

**Hardin Solar Energy II LLC  
Case No. 18-1360-EL-BGN**

**Application Part 4 of 6**

**Part 4 includes:**

- **Exhibit H TRC Wetlands and other Waters of the U.S. Delineation Report October 2018**
- **Exhibit I PJM Feasibility Study AD1-130 May 2018**
- **Exhibit J Economic Impact Report September 2018**
- **Exhibit K Complaint Resolution Plan**
- **Exhibit L Certificate of Liability Insurance (filed under seal, in part)**
- **Exhibit M Determination of Average Ambient Noise Levels**

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Date Filed: October 12, 2018

## **Exhibit H**

# **TRC Wetlands and other Waters of the U.S. Delineation Report October 2018**

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# **WETLANDS AND OTHER WATERS OF THE U.S. DELINEATION REPORT**

**Hardin Solar II Energy Center**

**Hardin County, Ohio**

**October 2018**

TRC Project No. 302899.0002.0000



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**CONFIDENTIAL BUSINESS INFORMATION**

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## ACRONYMS

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DOW	Division of Wildlife
FAC	Facultative
FACU	Facultative upland
FACW	Facultative wetland
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
HSE	Hardin Solar Energy II, LLC
HHEI	Headwater Habitat Evaluation Index
HUC	Hydrologic Unit Code
MWH	Modified Warmwater Habitat
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OAC	Ohio Administrative Code
OBL	Obligate wetland
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
PEM	Palustrine emergent
PFO	Palustrine forested
PHWH	Primary Headwater Habitat
POW	Palustrine open-water

Project	Hardin Solar II Energy Center Project
PSS	Palustrine scrub-shrub
QHEI	Qualitative Habitat Evaluation Index
Report	Wetlands and Other Waters of the U.S. Delineation Report
TNM	The National Map
TRC	TRC Environmental Corporation
UPL	Upland
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WWH	Warmwater Habitat
WQC	Water Quality Certification

## 1.0 INTRODUCTION

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On behalf of Hardin Solar Energy II LLC (HSE), TRC Environmental Corporation (TRC) has prepared this Wetlands and Other Waters of the United States (U.S.) Delineation Report (Report) as part of the environmental studies conducted for the Hardin Solar II Energy Center (Project), located in Hardin County, Ohio. This Report contains the methodology and results of the wetland identification and delineation investigations performed on May 16<sup>th</sup>, 18<sup>th</sup>, 22<sup>nd</sup>, 23<sup>th</sup>, 29<sup>th</sup>, June 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, and September 14<sup>th</sup> and 17<sup>th</sup>, 2018 by TRC. Ms. Maggie Molnar, PWS, Mr. Jeffrey Vandever, Ms. Sarah Bender, Mr. Dan Kelly, Mr. Justin Pitts, and Ms. Lindsey Moss, of TRC are environmental scientists who have over 30 years of combined experience and performed field surveys for this Project.

The primary objective of the survey was to identify and evaluate wetlands and other waters of the U.S. within the Study Area, such that the resources could be considered in the planning, design, permitting, and installation of the proposed Project in accordance with Ohio Administrative Code (OAC) Chapter 4906-4-08 (B)(1)(a)(iv-v)-(b).

In total, the Project Area is approximately 3,388 acres (1,371 hectares), including 396 acres (160 hectares) of underground collection corridors. As proposed, the two (2) underground collection corridors will have no above ground construction impact. The Study Area, totaling approximately 3,696 acres, includes the potential construction Project Area and a 100 foot (30 meter) buffer in accordance with OAC 4906-4-08(B)(1)(b). In addition, 35 acres (14 hectares) of this Study Area was previously surveyed as part of TRC's Addendum (*Hardin Wind Energy Project Wetlands and Other Waters of the U.S. Delineation Survey Report, October 2016*) for Point on Interconnection Facility dated September 12, 2017 (Appendix A, Figure 1)(TRC 2017). The area investigated was dominated by rotational upland cropland with pockets of emergent herbaceous and scrub/shrub wetland, and wetland and upland deciduous forest. The Study Area is bisected by Township Road 120 (east/west) and is bounded by Township Road 100 on the north, County Road 65 on the east, and private land holdings to the south and west. Currently, the undeveloped land is privately owned (Appendix A, Figure 1).

The Study Area lies within the Eastern Corn Belt Plains, which typically have loamy and well-drained soils, and are most commonly characterized by rolling plains and local end moraines (Wilken, Jiménez Nava and Griffith 2011). The vegetation of the ecoregion was originally dominated by American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and American basswood (*Tilia americana*) forests. Overall, the landscape has been significantly altered to accommodate agricultural activities which have negatively altered stream chemistry and turbidity (US EPA 2010) (US EPA 2013) (Wilken, Jiménez Nava and Griffith

2011). Topography in the region consists of flat farmland, with elevations ranging from 961 feet (290 meters) to 1011 feet (308 meters) above mean sea level. The proposed Project is located within the Ohio River drainage basin. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) maintains a classification system for identifying watersheds by hydrologic unit code (HUC). The Project is located within the Upper Scioto River watershed (8-Digit HUC: 05060001) (USDA/NRCS, Watershed Boundary Dataset 2013). The streams and tributaries found within the Study Area include Scioto River, Elder Creek, Cottonwood Ditch, and Twin Branches as well as multiple unnamed tributaries to these waterbodies. The Study Area is located within Marion, McDonald, and Roundhead townships in Hardin County, Ohio (Appendix A, Figure 1).

## **2.0 METHODOLOGY**

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Pursuant to the United States Army Corps of Engineers (USACE) wetlands and other waters of the U.S. delineation methodology, potential wetland and other waters of the U.S. located within the Study Area were identified, delineated, and mapped through the combined use of existing available public source information and field investigation. In addition, in accordance with the State of Ohio's Water Quality Standards (OAC Rule 3745-1-54), wetlands within the Study Area were evaluated and provisionally categorized utilizing Ohio EPA's Ohio Rapid Assessment Method (ORAM).

### **2.1 Desktop Review Methodology**

The sources utilized for the desktop review included: the United States Geological Survey (USGS) Alger and Roundhead, Ohio (1988) 7.5 minute series topographical quadrangles (USGS 1994) (Appendix A, Figure 1), soil datasets acquired from the NRCS Web Soil Survey (USDA 2018) for Hardin County, Ohio (Appendix A, Figure 2), the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) for Ohio (USFWS 2018) (Appendix A, Figure 3), the United States Geological Survey (USGS) National Hydrography Dataset (NHD) (USGS no date (n.d.)) (Appendix A, Figure 3), the Ohio Environmental Protection Agency (Ohio EPA) 401 Water Quality Certification (WQC) for the Nationwide Permits Stream Eligibility Map (Ohio EPA 2017) (Appendix A, Figure 4), the Federal Emergency Management Agency (FEMA) flood hazard risk map (FEMA 2018) (Appendix A, Figure 5), the Ohio EPA OAC Chapter 3745-1 Water Quality Standards (Ohio EPA 2017a), and the Ohio Department of Natural Resources (ODNR), Division of Wildlife (DOW) (ODNR 2018). Sources were reviewed to identify wetland and other waters of the U.S. conditions that may be present within the Study Area. The results of the desktop review were used to aid in the field investigation.

## 2.2 Field Methodology-Wetlands

Wetland resources within the Study Area were identified and their boundaries determined in accordance with the USACE *Wetlands Delineation Manual (1987 Manual)* (USACE 1987), utilizing the *Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Midwest (Version 2.0) (Regional Supplement)* (USACE 2012). Consistent with the *1987 Manual*, wetland determinations were based on dominant plant species, soil characteristics, and hydrologic characteristics. In addition, wetlands and other waters of the U.S. were evaluated in accordance with the State of Ohio's Water Quality Standards (OAC Chapter 3745-1) as managed by the Ohio Environmental Protection Agency (Ohio EPA). Areas that exhibit hydric soils, wetland hydrology, and a dominance of hydrophytic vegetation were considered potentially jurisdictional wetlands. Wetlands or other waters of the U.S. are considered potentially jurisdictional until verified by the USACE (USACE/USEPA 2008). A photographic log of field observations is presented in Appendix B. Completed USACE Wetland Determination Data Forms-Midwest Region are presented in Appendix C.

Soils were examined by excavating a soil pit twenty (20) inches (50 centimeters) below the ground surface using a tile spade. The exposed soil profile was examined for characteristics using hydric soil criteria described in the National Technical Committee for Hydric Soils *Field Indicators of Hydric Soils in the United States* (USDA 2017). Hue, value, and chroma of the matrix (e.g., 10YR 6/1) and mottles (e.g., 10YR 5/6) of moist soils were examined, and were determined by comparing soils to the *Munsell Soil Color Chart* (Munsell Color 2009).

The hydrology criterion in the *Regional Supplement* requires that an area exhibit at least one primary or at least two secondary indicators of wetland hydrology. Examples of primary wetland hydrology indicators include standing water or saturated soils, water marks on trees, drift lines, water-stained leaves, and oxidized root zones surrounding living roots. Examples of secondary wetland hydrology indicators include drainage patterns, microtopographic relief, presence of crayfish burrows, and sparsely vegetated concave surfaces. Additional secondary signs of hydrology include visible saturation on aerial photographs and a positive facultative (FAC)-neutral test as described below (USACE 2010).

Plants were identified to the lowest taxonomic level possible, using professional references to differentiate cryptic taxa (Braun 1967) (Braun 1969) (Gleason and Cronquist 1991) (Holmgren 1998) (Mohlenbrock 2001a) (Mohlenbrock 2001) (Mohlenbrock 2002) (Mohlenbrock 2006) (Mohlenbrock 2011) (Newcomb 1977) (Rhoads and Block 2007) (Rothrock 2009) (Stein, Binion and Acciavatti 2003) (Voss and Reznicek 2012) (Weakley, Ludwig and Townsend 2013). Dominant vegetation for each community was determined by estimating dominant species in the tree, sapling/shrub, herbaceous, and woody vine strata. Dominant

species were determined by using the 50/20 dominance rule for each stratum, which was accomplished by estimating the percent areal cover for each species. The relative percent areal cover was calculated for each species by dividing each species percent cover by the total percent cover for all species and multiplying by 100. The species were then arranged in descending order of relative percent cover. A running total was kept by adding the relative cover of each species starting with the species with the highest relative cover until the total cover equals 50 percent. All species included in this calculation are regarded as dominant. Species of equal cover value that contributed to meeting the sum of 50 percent are also considered dominant. Additionally, other species that solely accounted for 20 percent or more of the relative percent cover were also considered dominant species.

The indicator status of each dominant species was determined. An indicator status of obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU) and/or upland (UPL) has been assigned to each plant species in the *U.S. Army Corps of Engineers National Wetlands Plant List* (Lichvar, et al. 2016). In accordance with the aforementioned guidance, an area was classified with hydrophytic vegetation when, under normal circumstances, more than 50 percent of the composition of the dominant species from all strata is comprised of OBL, FACW, and/or FAC species.

The FAC-neutral test, as a secondary indicator of hydrology, was calculated for each data set. This test considers all FAC species as neutral for wetland determination and compares the number of dominant species wetter than FAC (i.e., OBL, FACW) against the number of dominant species drier than FAC (i.e., FACU, UPL). A positive FAC-neutral test results when dominant species wetter than FAC are more prevalent than dominant species drier than FAC. A positive FAC-neutral test is a secondary indicator of wetland hydrology.

Plots, and consequently communities, that meet the three criteria of hydric soils, wetland hydrology, and hydrophytic vegetation are considered wetlands. Wetland boundaries were mapped where one or more of these criteria gave way to upland characteristics (i.e. no longer met the soils, hydrology, and hydrophytic vegetation requirements as previously described). Samples were also taken in nearby apparent upland areas to confirm that one or more of the criteria were not met in these locations.

Wetlands within the Study Area were classified according to the USFWS *Classification of Wetlands and Deepwater Habitats for the United States* (Cowardin, et al. 1979). Wetland classifications were based upon hydrophytic vegetation type and dominance found within the delineated wetland, and included the following classification types: palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), palustrine open-water (POW), or a combination of these classifications (Cowardin, et al. 1979).

The wetland boundaries were flagged, and surveyed through the use of a Global Positioning System (GPS) receiver capable of sub-meter accuracy (Model R1, handheld, Trimble, Sunnyvale, California). The delineated wetlands were labeled (e.g., *Wetland HS-MA*, *Wetland HS-MB*, etc.), and correspond to the wetlands illustrated on the Delineated Resources map provided in Appendix A, as Figure 6A. The wetland boundaries were mapped as polygons and the wetland areal extents were calculated using the shapefile properties utility in ArcMap.

Wetland boundaries that extend beyond the Study Area were collected to the edge of the Study Area and categorized as “Open Ended” within the GPS data to indicate that the wetland continued.

### **2.3 Ohio Rapid Assessment Method**

The regulation of wetlands under Section 401 and 404 of the Clean Water Act, requires the assessment of the function and quality of wetlands in order to determine the appropriate level of mitigation that should be required for the destruction, alteration, or degradation of a wetland. In accordance with Ohio EPA requirements (OAC Rule 3745-1-54), delineated wetlands within the Study Area were evaluated using the Ohio Rapid Assessment Method in an attempt to determine the ecological quality and the level of function of these wetlands (ORAM Version 5.0) (Mack 2001). The wetland value information, as determined by the ORAM, is provided to the Ohio EPA for the purposes of placing wetlands in the appropriate wetland Antidegradation Category as defined in Ohio’s Wetland Antidegradation Rule (OAC Rule 3745-1-54). These ORAM scoring sheets (data forms) are populated based on a review of resource material (e.g. FEMA 100 year floodplain, known occurrence of state/federal threatened or endangered species, etc.), data obtained in the field, and the acreage as determined by delineation and mapping. Utilizing the ORAM wetland categories as defined by Ohio EPA, wetlands were provisionally categorized as low quality (Category 1) to high quality (Category 3). The score from the Quantitative Rating ranges from 0 to 100 and the scoring breakdown for wetland regulatory categories is as follows:

Category 1: 0 - 29.9 (Low Quality)

Category 1 or 2 Gray Zone: 30 - 34.9

Modified Category 2: 35 - 44.9

Category 2: 45-59.9 (Moderate Quality)

Category 2 or 3: 60 - 64.9

Category 3: 65 - 100 (High Quality)



The ORAMs were performed using detailed field evaluations and, for wetland features extending beyond the Study Area, were supplemented by aerial photographic interpretation to aid in approximate boundary determination and total area estimates. While the score and conclusions of the ORAM are designed such that they correlate well with more detailed measures of the biology of the wetlands, they are not considered absolutely definite. ORAM scores are considered preliminary until verified by the Ohio EPA. Refer to Appendix D for completed ORAM data forms.

The scoring sheets (ORAM Version 5.0 Field Form Quantitative Rating) for individual wetlands were completed and were the basis for the provisional wetland categorizations. The delineated wetlands and preliminary ORAM scores are illustrated in Appendix A, Figure 6B.

## **2.4 Field Methodology - Other Waters of the U.S.**

The Study Area was screened for the presence of areas that meet the criteria for “other waters of the U.S.” specified in the USACE’s *1987 Manual*. Other waters of the U.S. consist of ephemeral, intermittent, and perennial streams, as well as open water features, such as ponds. Drainage channels that exhibited defined “bed and bank” and an ordinary high water mark in the channel were identified and delineated as jurisdictional streams. Drainage channels that did not exhibit an ordinary high water mark and/or defined bed and bank were regarded as non-jurisdictional drainages. Delineated resources are illustrated in Appendix A, Figure 6A. Final jurisdictional determinations are made by the USACE; therefore, all determinations are preliminary until verified by the USACE (USACE/USEPA 2008).

Identified streams were evaluated utilizing Ohio EPA approved methods for stream habitat assessment which include the Qualitative Habitat Evaluation Index (QHEI) and/or the Headwater Habitat Evaluation Index (HHEI) assessment method (Ohio EPA 2006) (Ohio EPA 2012). These approved assessment methods provide an empirical, quantified evaluation of streams as required by the State of Ohio for permitting and mitigation purposes. These methods assess stream habitat to provide a qualitative index (score) to determine the level of compensatory mitigation that may be needed for impacts to waters of the U.S.

Use of the QHEI or HHEI assessment method is determined based on the size of the stream’s drainage area and/or the stream’s pool depths. Where coverage was available, the drainage area was calculated using automated basin characteristics from USGS StreamStats v 4.0: Ohio (USGS 2017).

Following Ohio EPA guidance, streams with a drainage area of greater than 1.0 square mile (2.6 square kilometers), or which have pools with maximum depths over 15.8 inches (40.0 centimeters), as determined by measuring pool depth within the stream, were evaluated using the QHEI. Data on these streams were

collected on the QHEI form provided by the Ohio EPA. The QHEI is composed of six principal metrics: substrate, instream cover, channel morphology, riparian zone and bank erosion, pool/glide and riffle-run quality, and map gradient. Each metric is scored separately and summed to obtain the total QHEI score. Using the scoring methods associated with these forms, the stream is placed into the following general narrative ranges, dependent on stream size; for smaller streams ( $\leq 20$  sq mi): Excellent  $>70$ , Good 55-69, Fair 43-54, Poor 30-42, and Very Poor  $<30$ ; for larger streams ( $>20$  sq mi): Excellent  $>75$ , Good 60-74, Fair 45-59, Poor 30-44, and Very Poor  $<30$ .

The HHEI was utilized to score streams with a drainage area of less than 1.0 square mile (2.6 square kilometers). Data on these streams were collected on the HHEI forms, provided by the Ohio EPA. Observational data regarding the physical nature of the stream corridor including stream flow, riparian zone land use and buffer width, and channel modification were recorded. Measurements included bankfull width, maximum pool depth and substrate composition.

Using the scoring method associated with these forms, a Class I, II, or III was assigned to each stream (with Class I being the least protected and Class III being the most protected). Streams that exhibited a major change in morphology were scored at multiple representative locations. QHEI and HHEI scores are considered preliminary until verified by the Ohio EPA. Appendix E provides completed Ohio EPA Stream Data Sheets (QHEI and HHEI Data Forms). The delineated streams and QHEI and HHEI scores are illustrated in Appendix A, Figure 6B.

The Study Area was investigated for other waters of the U.S. that are considered “open water” by the USACE. By definition, open water was “an area that, during a year with normal patterns of precipitation, has standing or flowing water for sufficient duration to establish an ordinary high water mark, where aquatic vegetation is either non-emergent, sparse, or absent” (USACE n.d.). When identified, the derived open water (pond) boundaries were surveyed through the use of a GPS receiver capable of sub-meter accuracy (model GeoHX handheld, Trimble, Sunnyvale, California). Delineated open waters are labeled (e.g., *WB-M1*, *WB-M2* etc.) and areas were mapped as polygons in GIS.

## 3.0 RESULTS

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During the investigations identified within this Report, fourteen (14) wetlands, ten (10) streams, one (1) ditch, and six (6) open water resources (ponds) were identified and delineated within the Study Area (Tables 3.1, 3.2.1, and 3.2.2).

**Table 3.1 Potential Wetlands and Other Waters of the U.S. Investigated and Jurisdictional Determinations within the Study Area**

Resource ID	Field Survey Date	Location (Latitude, Longitude)	Provisional Determination	Acreage (Hectares) of Jurisdictional Waters in Study Area and Cowardin Classification <sup>1</sup>
HS-MA	05/22/18	40.62896, -83.78380	Waters of the U.S., Wetland	0.05 (0.02)/PEM
HS-MB	05/22/18	40.63755, -83.78418	Waters of the U.S., Wetland	1.13 (0.46)/PFO
HS-MC	05/22/18	40.63659, -83.78176	Waters of the U.S., Wetland	1.91 (0.77)/PSS, PFO
HS-MD	05/22/18	40.63673, -83.78030	Waters of the U.S., Wetland	0.14 (0.06)/PEM, PFO
HS-MQ	05/23/18	40.63099, -83.79334	Waters of the U.S., Wetland	0.43 (0.17)/PEM
HS-VA	05/23/18	40.62780, -83.81884	Waters of the U.S., Wetland	3.67 (1.49)/PEM
HS-VB	05/23/18	40.62732, -83.82878	Waters of the U.S., Wetland	0.41 (0.17)/PEM
HS-VC	05/23/18	40.63208, -83.83163	Waters of the U.S., Wetland	4.09 (1.66)/PFO
HS-VD	05/23/18	40.63222, -83.82940	Waters of the U.S., Wetland	0.03 (0.01)/PFO
HW-MH	09/14/18	40.65146, -83.79942	Waters of the U.S., Wetland	0.06 (0.02)/PEM
HW-ML	05/23/18	40.63765, -83.79774	Waters of the U.S., Wetland	0.44 (0.18)/PEM
HS-JA	09/14/18	40.62596, -83.80588	Waters of the U.S., Wetland	1.98 (0.80)/PEM
HS-JB	09/14/18	40.62716, -83.80368	Waters of the U.S., Wetland	1.81 (0.73)/PEM
HS-JC	09/14/18	40.62780, -83.806073	Waters of the U.S., Wetland	0.36 (0.15)/PEM
HS-M1 (Scioto River)	05/18/18	40.64344, -83.80440	Waters of the U.S., Stream	6.56 (2.65)/R5
HS-M2	05/18/18	40.66162, -83.79594	Waters of the U.S., Stream	<0.01(<0.01)/R4
HS-M3	05/18/18	40.66104, -83.79662	Waters of the U.S., Stream	<0.01 (<0.01)/R4

**Table 3.1 Potential Wetlands and Other Waters of the U.S. Investigated and Jurisdictional Determinations within the Study Area**

Resource ID	Field Survey Date	Location (Latitude, Longitude)	Provisional Determination	Acreage (Hectares) of Jurisdictional Waters in Study Area and Cowardin Classification <sup>1</sup>
HS-M4	05/18/18	40.65976, -83.79786	Waters of the U.S., Stream	<0.01 (<0.01)/R5
HS-M6 (Elder Creek)	05/18/18	40.64109, -83.83490	Waters of the U.S., Stream	0.18 (0.07)/R5
HS-M9 (Cottonwood Ditch)	06/12/18	40.68936, -83.79707	Waters of the U.S., Stream	0.45 (0.18)/R5
HS-M10	06/14/18	40.66668, -83.84106	Waters of the U.S., Stream	0.10 (0.04)/R5
HS-M11	06/14/18	40.65213, -83.84656	Waters of the U.S., Stream	<0.01 (<0.01)/R5
HW-M9 (Twin Branches)	06/14/18	40.67457, -83.80498	Waters of the U.S., Stream	0.86 (0.35)/R5
HW-M10	05/16/18	40.65453, -83.82305	Waters of the U.S., Stream	0.33 (0.13)/R5
Ditch M1	5/16/18	40.65988, -83.82309	Waters of the U.S., Ditch	0.15 (0.06)/N/A
HS-WB-M1	5/22/18	40.63792, -83.78553	Waters of the U.S., Waterbody	1.91 (0.77)/POW
HS-WB-M2	5/22/18	40.63832, -83.78503	Waters of the U.S., Waterbody	0.53 (0.21)/POW
HS-WB-M3	5/22/18	40.63851, -83.78486	Waters of the U.S., Waterbody	0.35 (0.14)/POW
HS-WB-M4	5/22/18	40.63875, -83.78467	Waters of the U.S., Waterbody	0.52 (0.21)/POW
HS-WB-M5	5/16/18	40.66009, -83.81637	Waters of the U.S., Waterbody	0.02 (0.01)/POW
HS-WB-M6	6/14/18	40.63485, -83.78782	Waters of the U.S., Waterbody	0.25 (0.10)/POW
<sup>1</sup> Cowardin Classification			POW = Palustrine Open Water	
PEM = Palustrine Emergent			R4 = Intermittent Stream	
PSS = Palustrine Scrub/Shrub			R5 = Perennial Stream	
PFO = Palustrine Forested			R6 = Ephemeral Stream	

## 3.1 Background Resources

### 3.1.1 USGS Topographic Map

Based on desktop review, the Study Area contains no wetland features according to the Alger and Roundhead, Ohio (1988) USGS 7.5 minute series topographic quadrangles (USGS 1994) (Appendix A, Figure 1). The majority of the terrain is almost completely level, with the exception of stream channels. Elevation ranges from approximately 961 feet (290 meters) to 1011 feet (308 meters) above mean sea level.

### 3.1.2 Soils

According to the soil dataset acquired from the NRCS Web Soil Survey for Hardin County, Ohio, the Study Area was underlain by twenty (20) different soil types; ten (10) soil types are mapped as non-hydric and ten (10) soil types are mapped as hydric (USDA 2018) (Table 3.1.2 and Appendix A, Figure 2).

**Table 3.1.2 Soils Mapped within the Study Area**

Soil Code	Soil Name	Percent (%) in Study Area	Hydric Status
Ro	Roundhead muck	25.77%	Yes
Mc	McGuffey muck	19.42%	Yes
Ln	Linwood muck	15.50%	Yes
PkA	Pewamo silty clay loam, 0 to 1 percent slopes	14.04%	Yes
Po	Pewamo variant muck	2.47%	Yes
Co	Colwood loam	2.17%	Yes
Ot	Olentangy silt loam	1.21%	Yes
Mf	Milford silty clay loam, 0 to 2 percent slopes	0.24%	Yes
Ca	Carlisle muck, Central Ohio clayey till plain, drained, 0 to 2 percent slopes	0.10%	Yes
So	Sloan silt loam, frequently flooded	0.04%	Yes
Blg1B1	Blount silt loam, ground moraine, 2 to 4 percent slopes	10.02%	No
Blg1A1	Blount silt loam, ground moraine, 0 to 2 percent slopes	4.61%	No
Ble1B1	Blount silt loam, end moraine, 2 to 4 percent slopes	1.37%	No
Gwd5C2	Glynwood clay loam, 6 to 12 percent slopes, eroded	1.22%	No
Gwg1B1	Glynwood silt loam, ground moraine, 2 to 6 percent slopes	0.65%	No
Gwg5C2	Glynwood clay loam, ground moraine, 6 to 12 percent slopes, eroded	0.43%	No
Gwe1B1	Glynwood silt loam, end moraine, 2 to 6 percent slopes	0.36%	No

**Table 3.1.2 Soils Mapped within the Study Area**

Soil Code	Soil Name	Percent (%) in Study Area	Hydric Status
Gwg5B2	Glynwood clay loam, ground moraine, 2 to 6 percent slopes, eroded	0.25%	No
Ble1A1	Blount silt loam, end moraine, 0 to 2 percent slopes	0.13%	No
MrD2	Morley clay loam, 12 to 18 percent slopes, eroded	0.00%	No

### **3.1.3 National Wetlands Inventory**

According to the USFWS NWI (USFWS 2018) three (3) freshwater emergent wetlands, three (3) freshwater forested wetlands, and three (3) freshwater ponds are located within Study Area. Two (2) emergent wetlands identified on the NWI maps were not found in the field during the reconnaissance (Appendix A, Figure 3).

### **3.1.4 National Hydrography Database**

The USGS Natural Hydrography Dataset (NHD) (USGS 2018) Downloadable Data Collection from The National Map (TNM) is a comprehensive set of digital spatial data that encodes information about naturally occurring and constructed bodies of surface water (lakes, ponds, and reservoirs), paths through which water flows (canals, ditches, streams, and rivers), and related entities such as point features (springs, wells, stream gages, and dams). Eight (8) streams were identified in the NHD, within the Study Area (Appendix A, Figure 3).

### **3.1.5 Ohio EPA Stream Eligibility for Nationwide Permit Program**

Ohio EPA, as part of Ohio's 401-WQC process, has determined which HUC12 watersheds within the state have streams eligible for coverage under Nationwide Permits. There are three categories identified within Ohio: eligible, ineligible, and possibly eligible, with additional field screening required. All streams identified as part of this Project are located within "Eligible" areas according to Ohio EPA's Stream Eligibility for Nationwide Permit Program (Ohio EPA 2017) and are therefore eligible for coverage under the 401-WQC for Nationwide Permits (Appendix A, Figure 4).

### **3.1.6 FEMA Flood Hazard**

According to the FEMA Flood Hazard mapping, a small portion of the northern Project boundary and a small portion of one (1) of the most eastern parcels is located within a FEMA Flood Zone A (FEMA 2018) (Appendix A, Figure 5).

### 3.1.7 Water Quality Standards

Four (4) streams within the Study Area have a Designated Use from Ohio EPA according to OAC Chapter 3745-1 Water Quality Standards (Ohio EPA 2017a). Cottonwood Ditch is listed as Modified Warmwater Habitat (MWH), whereas Elder Creek, Twin Branches, and Scioto River are listed as Warmwater Habitat (WWH). All four (4) designations are based on the results of a biological field assessment performed by the Ohio EPA. MWH habitat streams, according to OAC Chapter 3745-1 Water Quality Standards, are incapable of supporting and maintaining a balanced community of warmwater aquatic organisms because of extensive and irretrievable modifications to the physical habitat of the streams. WWH habitat streams have been determined, by OAC Chapter 3745-1 Water Quality Standards, to be capable of supporting and maintaining a balanced community of warmwater aquatic organisms. WWH is the most common designation assigned to streams within Ohio.

## 3.2 Field Delineations

TRC performed wetland and other waters of the U.S. identification and delineation on May 16<sup>th</sup>, 18<sup>th</sup>, 22<sup>nd</sup>, 23<sup>th</sup>, 29<sup>th</sup>, June 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, and September 14<sup>th</sup> and 17<sup>th</sup>, 2018. Weather conditions were seasonably warm, ranging between 55 degrees to 91 degrees Fahrenheit (13 degrees to 33 Celsius) with a mix of rain, and clear, and sunny skies. Native herbaceous vegetation and non-native cultivated crops were observed within the Study Area. The presence of hydrologic and hydric soil indicators, as well as identifiable plant species within the wetland areas, allowed for positive wetland determinations. The USACE maintains the final authority that determines jurisdiction; therefore, statements about jurisdiction within this Report are preliminary and subject to final determination by the USACE and Ohio EPA.

### 3.2.1 Wetlands

During the course of this investigation fourteen (14) wetlands were identified and delineated within the Study Area. Each wetland is listed in Table 3.2.1, described below and shown in Appendix A on Figures 6A and 6B. The completed USACE Wetland Determination Data Forms-Midwest Region are presented in Appendix C.

**Table 3.2.1 Wetlands Delineated within the Study Area**

Wetland ID	Vegetation Class <sup>1</sup>	Extends Offsite?	Acres (Hectares) <sup>2</sup>	ORAM Score <sup>3</sup>	ORAM Category <sup>3</sup>	Jurisdictional Status <sup>4</sup>
HS-MA	PEM	No	0.05 (0.02)	9	1	Jurisdictional
HS-MB	PFO	No	1.13 (0.46)	37	Modified 2	Jurisdictional
HS-MC	PSS/PFO	No	1.91 (0.77)	55	2	Jurisdictional



**Table 3.2.1 Wetlands Delineated within the Study Area**

Wetland ID	Vegetation Class <sup>1</sup>	Extends Offsite?	Acres (Hectares) <sup>2</sup>	ORAM Score <sup>3</sup>	ORAM Category <sup>3</sup>	Jurisdictional Status <sup>4</sup>
HS-MD	PEM/PFO	No	0.14 (0.06)	31	1 or 2 Gray Zone	Jurisdictional
HS-MQ	PEM	No	0.43 (0.17)	13	1	Jurisdictional
HS-VA	PEM	Yes	3.67 (1.49)	24.5	1	Jurisdictional
HS-VB	PEM	No	0.41 (0.17)	37	Modified 2	Jurisdictional
HS-VC	PFO	No	4.09 (1.66)	40.5	Modified 2	Jurisdictional
HS-VD	PFO	No	0.03 (0.01)	28.5	1	Jurisdictional
HW-MH	PEM	Yes	0.06 (0.02)	20	1	Jurisdictional
HW-ML	PEM	Yes	0.44 (0.18)	22	1	Jurisdictional
HS-JA	PEM	No	1.98 (0.80)	14	1	Jurisdictional
HS-JB	PEM	No	1.81 (0.73)	16	1	Jurisdictional
HS-JC	PEM	No	0.36 (0.15)	11	1	Jurisdictional

<sup>1</sup> PEM = palustrine emergent  
PSS = palustrine scrub/shrub  
PFO = palustrine forested  
<sup>2</sup> Represents delineated acreage within Study Area  
<sup>3</sup> Preliminarily assigned. Not considered final until verified by Ohio EPA  
<sup>4</sup> Preliminarily assigned. Not considered final until verified by the USACE

Much of the Study Area is maintained active, rotational agriculture (primarily corn and soy beans). However, a total of fourteen (14) wetlands were identified throughout the Study Area. These wetlands mostly occurred within in the tree-lines, grassed swales, and forested portions of the Study Area. Many of these wetlands occur within wetland forest complexes and mosaics. Historic and recent tiling is prevalent within the Study Area for the purpose of creating useable farmland. All wetlands within the Study Area are potentially jurisdictional as they display a physical connection or adjacency to a jurisdictional stream.

#### Wetland HS-MA

Wetland HS-MA is a 0.05 acre (0.02 hectare) PEM wetland dominated by blue joint grass (*Calamagrostis canadensis*). The wetland is preliminarily assigned an ORAM score of 9, corresponding to a Category 1 wetland. The determination of Category 1 was based on the wetland's limited size, very narrow buffer, high intensity of surrounding land use, and disturbances to the hydrology, substrate, and habitat of the Wetland HS-MA (i.e. tile, sedimentation, farming, and nutrient enrichment).

#### Wetland HS-MB

Wetland HS-MB is a 1.13 acre (0.46 hectares) PFO wetland dominated by eastern cottonwood (*Populus deltoides*), shagbark hickory (*Carya ovata*), and northern spicebush (*Lindera benzoin*) in tree stratum. The sapling/shrub stratum is dominated by northern spicebush, and the herb stratum is dominated by hybrid



cattail (*Typha x glauca*) and common duckweed (*Lemna minor*). The wetland is preliminarily assigned an ORAM score of 37, corresponding to a Modified Category 2 wetland. The determination of a Modified Category 2 wetland was based on average buffer width, duration of inundation/saturation and habitat development. The score was limited by disturbances to the hydrology, substrate, and habitat (i.e. roadbed/railroad track, dredging, and filling/grading, sedimentation, clearcutting, selective cutting, nutrient enrichment).

#### Wetland HS-MC

Wetland HS-MC is a 1.91 acre (0.77 hectare) PSS/PFO wetland dominated by silver maple (*Acer saccharinum*) in the tree stratum, green ash (*Fraxinus pennsylvanica*) in the sampling/shrub stratum, and fringed sedge (*Carex crinita*) in the herb stratum. The wetland is preliminarily assigned an ORAM score of 55, corresponding to a Category 2 wetland. The determination of a Category 2 wetland was based on good habitat, medium average buffer width, mature forested wetland component, and moderately high horizontal interspersion. The score was limited by the upland buffers, surrounding land use and size of HS-MC (i.e. narrow buffers and row cropping).

#### Wetland HS-MD

Wetland HS-MD is a 0.14 acre (0.06 hectares) PEM/PFO wetland, the PEM portion is dominated by fringed sedge and reed canary grass (*Phalaris arundinacea*), and the PFO portion is dominated by northern spicebush, green ash, Eastern hop-hornbeam (*Ostrya virginiana*), fringed sedge, and Gray's sedge (*Carex grayi*). The wetland is preliminarily assigned an ORAM score of 31, corresponding to a Category 1 or 2 Gray Zone wetland. The determination of a Category 1 or 2 Gray Zone wetland was based on moderately good habitat development, moderate horizontal interspersion, and microtopography (i.e. coarse woody debris, and amphibian breeding pools). The score was limited by the size and disturbances to the hydrology and substrate of Wetland HS-MD (i.e. ditch, filling/grading, road bed/RR track, sedimentation, mowing, clearcutting).

#### Wetland HS-MQ

Wetland HS-MQ is a 0.43 acre (0.17 hectare) PEM wetland with a small amount of great ragweed (*Ambrosia trifida*). The hydrophytic vegetation criterion is assumed met as Wetland HS-MQ has a sparsely vegetated concave surface. The wetland is preliminarily assigned an ORAM score of 13, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on habitat and hydrology (i.e. groundwater, precipitation, seasonal/intermittent surface water, and perennial surface water). The score was limited by the very narrow buffer widths, high intensity of surround land use, poor habitat development,

lack of horizontal interspersion, and disturbances to the hydrology, substrate, and habitat of HS-MQ (i.e. tile, stormwater input, filling/grading, clearcutting, sedimentation, and farming).

#### Wetland HS-VA

Wetland HS-VA is a PEM wetland with 3.67 acres (1.48 hectares) delineated within the Study Area. Wetland HS-VA is dominated by reed canary grass and lesser poverty rush (*Juncus tenuis*). The wetland is preliminarily assigned an ORAM score of 24.5, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on narrow buffer width, high intensity of surrounding land use, poor habitat development, moderately low horizontal interspersion, and moderate coverage of invasive plants.

#### Wetland HS-VB

Wetland HS-VB is a 0.41 acre (0.17 hectare) PEM wetland dominated by lesser poverty rush. The wetland is preliminarily assigned an ORAM score of 37, corresponding to a Modified Category 2 wetland. The determination of a Modified Category 2 wetland was based on size, sources of water (precipitation and seasonal/intermittent surface water), and duration of inundation/saturation. The score was limited by the narrow buffer width, high intensity of surrounding land use, poor to fair habitat development, and disturbance to hydrology, substrate, and habitat (i.e. tile, farming, nutrient enrichment, sedimentation).

#### Wetland HS-VC

Wetland HS-VC is a 4.09 acre (1.66 hectares) PFO wetland dominated by black walnut (*Juglans nigra*) and red maple (*Acer rubrum*) in the tree stratum, red maple and northern spicebush in the sapling/shrub stratum, stinging nettle (*Urtica dioica*) and fowl manna grass (*Glyceria striata*) in the herb stratum, and Virginia-creeper (*Parthenocissus quinquefolia*) in the woody vine stratum. The wetland is preliminarily assigned an ORAM score of 40.5, corresponding to a Modified Category 2 wetland. The determination of a Modified Category 2 wetland was based on medium buffer width, low intensity of surrounding land use, moderately good habitat development, sparse coverage of invasive plants, and microtopography (coarse woody debris, amphibian breeding pools). The score was limited by the shallow maximum water depth, and disturbances to hydrology, substrate, and habitat (i.e. tile, farming, selective cutting, and nutrient enrichment).

#### Wetland HS-VD

Wetland HS-VD is a 0.03 acre (0.01 hectare) PFO wetland dominated by black tupelo (*Nyssa sylvatica*), red maple, and black walnut in the tree stratum, northern spicebush and silky dogwood (*Cornus amomum*) in the sapling/shrub stratum, and garlic-mustard (*Alliaria petiolata*), curly blue grass (*Poa pratensis*), and beaked grooveburr (*Agrimonia rostellata*). The wetland is preliminarily assigned an ORAM score of 28.5, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on narrow

buffer width, size, source of water, low horizontal interspersions, poor to fair habitat development, and disturbance to hydrology, substrate, and habitat (i.e. tile, selective cutting, farming, and nutrient enrichment).

#### Wetland HW-MH

Wetland HW-MH is a PEM wetland with a 0.06 acre (0.02 hectare) portion delineated within the Study Area. Wetland HW-MH is dominated by reed canary grass and hybrid cattail. This area is located within a drainage ditch that receives hydrology from adjacent field tiles. The water was stagnant at the time of the investigation, allowing for wetland vegetation to revert and dominate. The wetland is preliminarily assigned an ORAM score of 20, corresponding to a Category 1 wetland. The score was limited by intensity of surrounding land use, very narrow buffer width, poor habitat development, moderate coverage of invasive plants, and disturbances to hydrology, substrate, and habitat (i.e. nutrient enrichment, sedimentation, farming, dredging, tiling, and filling/grading, etc.).

#### Wetland HW-ML

Wetland HW-ML is a PEM wetland with a 0.44 acre (0.18 hectare) portion delineated within the Study Area. Wetland HW-ML is dominated by American burr-reed (*Sparganium americanum*). The wetland is preliminarily assigned an ORAM score of 22, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on the very narrow buffer width, high intensity of surrounding land use, moderate coverage of invasive plants, and disturbances to hydrology, substrate, and habitat (i.e. ditch, filling/grading, dredging, clearcutting, sedimentation, and nutrient enrichment).

#### Wetland HS-JA

Wetland HS-JA is a 1.98 acre (0.80 hectare) PEM wetland delineated within the Study Area. Wetland HS-JA is dominated by fall panicgrass (*Panicum dichotomiflorum*) and false pimpernel (*Lindernia dubia*). The wetland is preliminarily assigned an ORAM score of 14, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on the very narrow buffer width, high intensity of surrounding land use, and disturbances to hydrology, substrate, and habitat (i.e. filling/grading, farming, nutrient enrichment).

#### Wetland HS-JB

Wetland HS-MB is a 1.81 acre (0.73 hectare) PEM wetland delineated within the Study Area. Wetland HS-MB is dominated by yellow nutsedge (*Cyperus esculentus*). The wetland is preliminarily assigned an ORAM score of 16, corresponding to a Category 1 wetland. The determination of a Category 1 wetland

was based on the very narrow buffer width, high intensity of surrounding land use, and disturbances to hydrology, substrate, and habitat (i.e. tile, farming, and nutrient enrichment).

#### Wetland HS-JC

Wetland HS-JC is a 0.36 acre (0.15 hectare) PEM wetland delineated within the Study Area. Wetland HS-JC is located within a cropped field and therefore lacks a natural plant community and because of this is dominated by soybean (*Glycine max*). The wetland is preliminarily assigned an ORAM score of 11, corresponding to a Category 1 wetland. The determination of a Category 1 wetland was based on the very narrow buffer width, high intensity of surrounding land use, and disturbances to hydrology, substrate, and habitat (i.e. tile, farming, and nutrient enrichment).

### 3.2.2 Other Waters of the U.S.

#### A. Streams

Ten (10) streams with defined bed and bank and ordinary high water mark were identified within the Study Area. Delineated streams within the Study Area are within the Upper Scioto River watershed (8-Digit HUC: 05060001) (USGS/NRCS, Watershed Boundary Dataset 2013). The streams are listed in Table 3.2.2, described below and shown in Appendix A on Figures 6A and 6B. The streams were channelized agricultural drainages and received direct drainage from field drain tile sources which has influenced channel morphology, increased embeddedness, reduced sinuosity and flow regime, and affected water quality of the streams. Therefore, the streams are recorded as “Modified” channels. Table 3.2.2. below, provides flow regime, drainage area, preliminary HHEI and QHEI scores, and HHEI class and QHEI ratings for streams identified in the Study Area. All HHEI and QHEI scores are considered preliminary until verified by OEPA. Completed Ohio EPA stream assessment forms are provided in Appendix E. In addition, one (1) ditch, Ditch M1 was identified within the Study Area. All jurisdiction determinations are preliminary until the USACE makes the final determination.

**Table 3.2.2 Other Waters of the U.S. Delineated within the Study Area**

Stream ID	Flow Regime	Length <sup>1</sup> (ft; m)	Drainage Area (sq mi; sq km) <sup>2</sup>	HHEI (H) /QHEI (Q) Score <sup>3, 4</sup>	HHEI Class/ QHEI Rating
HS-M1 (Scioto River)	Perennial	14292.75 (5784.07)	55.00 (142.00)	23 (Q)	Very Poor
HS-M2	Intermittent	25.27 (7.70)	<0.01 (0.03)	20 (H)	Modified Class I
HS-M3	Intermittent	17.03 (5.19)	<0.01 (0.03)	17 (H)	Modified Class I

**Table 3.2.2 Other Waters of the U.S. Delineated within the Study Area**

Stream ID	Flow Regime	Length <sup>1</sup> (ft; m)	Drainage Area (sq mi; sq km) <sup>2</sup>	HHEI (H) /QHEI (Q) Score <sup>3, 4</sup>	HHEI Class/ QHEI Rating
HS-M4	Perennial	53.30 (16.25)	3.41 (8.83)	25 (Q)	Very Poor
HS-M6 (Elder Creek)	Perennial	660.41 (267.26)	6.39 (16.55)	53.5 (Q)	Fair
HS-M9 (Cottonwood Ditch)	Perennial	2432.07 (984.22)	2.20 (6.70)	25 (Q)	Very Poor
HS-M10	Perennial	750.80 (228.84)	0.50 (1.29)	58 (H)	Modified Class II
HS-M11	Perennial	1.95 (0.79)	1.10 (2.85)	47 (Q)	Fair
HW-M9 (Twin Branches)	Perennial	7456.56 (3017.56)	1.97 (5.10)	23 (Q)	Very Poor
HW-M10	Perennial	2906.35 (1176.16)	1.67 (4.32)	19 (Q)	Very Poor
Ditch M1	N/A	1307.61 (529.17)	N/A	N/A	N/A

<sup>1</sup> Represents delineated length, in feet, and meters within Study Area  
<sup>2</sup> Where within coverage, drainage area was calculated using automated basin characteristics from USGS StreamStats v 4.0: Ohio (USGS 2017).  
<sup>3</sup> Primary Headwater Habitat Evaluation Index (HHEI), for streams with drainage areas of less than 1.0 square mile and a maximum pool depth of less than 40 centimeters.  
<sup>4</sup> Qualitative Habitat Evaluation Index (QHEI), for larger streams with a drainage area greater than 1.0 square mile.

#### Stream HS-M1

Stream HS-M1 (Scioto River) is a perennial stream with a drainage area of approximately 55.00 square miles (142.00 square kilometers). The stream flows west to east through the Study Area for approximately 14292.75 feet (5784.07 meters). Stream HS-M1 (Scioto River) is preliminarily determined to be a jurisdictional water of the U.S. The QHEI habitat assessment method was used to evaluate Stream HS-M1. It was determined that dominant substrates for Stream HS-M1 are comprised of silt and muck; instream cover (i.e. shallows and pools >70 centimeters) is nearly absent; channel sinuosity is nonexistent, development is poor; channelization is recent; and stability is low; bank erosion is moderate; riparian width is very narrow; floodplain quality is row crop; maximum pool depth is less than 2.30 feet (0.7 meter); and bankfull width is 20.0 feet (6.1 meters). Scioto River (Stream HS-M1) has an Ohio EPA designated use of WWH. This stream has been preliminarily assigned a QHEI score of 23; therefore, categorized as in the very poor QHEI narrative range.

#### Stream HS-M2

Stream HS-M2 is a modified intermittent stream with a drainage area of less than 0.01 square mile (<0.03 square kilometer). The stream flows north to south through the Study Area for approximately 25.27 feet (7.70 meters). Stream HS-M2 drains to HS-M1 (Scioto River) and, as such, Stream HS-M2 is preliminarily determined to be jurisdictional. The HHEI habitat assessment method was used to evaluate Stream HS-M2. It was determined that dominant substrates for Stream HS-M2 are comprised of muck and silt, the maximum pool depth is 2.00 inches (5.08 centimeters), and the bankfull width is 2.00 feet (0.61 meter). Consequently, this stream has been preliminarily assigned an HHEI score of 20; therefore, categorized as a Modified Class I Primary Headwater Habitat (PHWH).

#### Stream HS-M3

Stream HS-M3 is a modified intermittent stream within the Study Area with a drainage area of less than 0.01 square mile (<0.03 square kilometer). The stream flows south to north through the Study Area for approximately 17.03 feet (5.19 meters). Stream HS-M3 drains to HS-M1 (Scioto River) and, as such Stream HS-M3 is preliminary determined to be jurisdictional. The HHEI habitat assessment method was used to evaluate Stream HS-M3. It was determined that dominant substrates for Stream HS-M3 are comprised of muck and silt, the maximum pool depth is 2.00 inches (5.08 centimeters), and the bankfull width is 1.50 feet (0.46 meter). This stream has been preliminarily assigned an HHEI score of 17; therefore, categorized as a Modified Class I PHWH.

#### Stream HS-M4

Stream HS-M4 is a perennial stream within the Study Area with a drainage area of 3.41 square miles (8.83 square kilometers). The stream flows west to east through the Study Area for approximately 53.30 feet (16.25 meters). Stream HS-M4 drains to HS-M1 (Scioto River) and, as such Stream HS-M4 is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HS-M4. It was determined that dominant substrates for Stream HS-M4 are comprised of gravel and muck; instream cover (i.e. shallows) is nearly absent; channel sinuosity is nonexistent; development is poor; channelization is recovering; and stability is low; bank erosion is moderate; riparian width is very narrow; floodplain quality is row crop; maximum pool depth is less than 0.66 feet (0.20 meter); and bankfull width is 5.00 feet (1.52 meters). This stream has been preliminarily assigned a QHEI score of 25; therefore, categorized as in the very poor QHEI narrative range.

#### Stream HS-M6 (Elder Creek)

Stream HS-M6 is a perennial stream within the Study Area with a drainage area of 6.39 square miles (16.55 square kilometers). The stream flows north through the Study Area for approximately 660.41 feet (267.26

meters). Stream HS-M6 (Elder Creek) is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HS-M6. It was determined that dominant substrates for Stream HS-M6 are comprised of gravel and sand; instream cover (i.e. undercut banks, shallows, boulders, oxbows, backwaters, aquatic macrophytes) is moderate; channel sinuosity is nonexistent; development is fair; channelization is recovering; and stability is low to moderate; bank erosion is moderate; riparian width is very narrow; floodplain quality row crop; maximum pool depth is less than 2.30 feet (0.70 meter); and bankfull width is 12.00 feet (3.66 meters). Elder Creek (Stream HS-M6) has an Ohio EPA designated use of WWH. This stream has been preliminarily assigned a QHEI score of 53.5; therefore, categorized as in the fair QHEI narrative range.

Stream HS-M9 (Cottonwood Ditch)

Stream HS-M9 (Cottonwood Ditch) is a perennial stream within the Study Area with a drainage area of 2.20 square mile (6.70 square kilometer). The stream flows southwest through the Study Area for approximately 2432.07 feet (984.22 meters). Stream HS-M9 (Cottonwood Ditch) is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HS-M9. It was determined that dominant substrates for Stream HS-M9 are comprised of sand and silt; instream cover (i.e. overhanging vegetation, shallows, and pools >70 cm) is nearly absent; channel sinuosity is nonexistent; development is poor; channelization is recent; and stability is low; bank erosion is moderate; riparian width is nonexistent; floodplain quality is row crop; maximum pool depth is less than 27.0 inches (0.70 meter); and bankfull width is 8.00 feet (2.40 meters). Cottonwood Ditch (Stream HS-M9) has an Ohio EPA designated use of MWH. This stream has been preliminarily assigned a QHEI score of 25; therefore, categorized as in the very poor QHEI narrative range.

Stream HS-M10

Stream HS-M10 is a modified perennial stream originating within the Study Area with a drainage area of less than 0.50 square mile (1.29 square kilometer). The stream flows east through the Study Area for approximately 750.80 feet (228.84 meters). Stream HS-M10 is preliminary determined to be jurisdictional. The HHEI assessment method was used to evaluate Stream HS-M10. It was determined that dominant substrates for Stream HS-M10 are comprised of sand and silt, the maximum pool depth is 8.00 inches (20.32 centimeters), and the bankfull width is 6.00 feet (1.82 meters). This stream has been preliminarily assigned an HHEI score of 58; therefore, categorized as a Modified Class II PHWH.

Stream HS-M11

Stream HS-M11 is a modified perennial stream originating within the Study Area with a drainage area of less than 1.1 square mile (2.85 square kilometers). The stream flows west through the Study Area for



approximately 1.95 feet (0.79 meters). Stream HS-M11 is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HS-M11. It was determined that dominant substrates for Stream HS-M11 are comprised of gravel and silt; instream cover (i.e. undercut banks, overhanging vegetation, shallows, pools, aquatic macrophytes, and logs or woody debris) is moderate; channel sinuosity is low; development is fair; channelization is recovering, and stability is low to moderate; bank erosion is moderate; riparian width is very narrow; floodplain quality is open pasture (row crop); maximum pool depths are 0.66 to 1.31 feet (0.2 to 0.4 meters) and bankfull width is less than 5.00 feet (1.52 meters). This stream has been preliminarily assigned a QHEI score of 47; therefore, categorized as in the fair QHEI narrative range.

Stream HW-M9 (Twin Branches)

Stream HW-M9 (Twin Branches) is a perennial stream with a drainage area of 1.97 square miles (5.10 square kilometers). The stream flows west through the Study Area for approximately 7456.56 feet (3017.56 meters). Stream HW-M9 is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HW-M9. It was determined that dominant substrates for Stream HW-M9 are comprised of silt; instream cover (i.e. overhanging vegetation, shallows, and aquatic macrophytes,) is nearly absent; channel sinuosity is nonexistent, development is poor, channelization is recent, and stability is moderate; bank erosion is little; riparian width is nonexistent; floodplain quality is row crop and urban or industrial; maximum pool depths are less than 0.66 feet (0.20 meter) and bankfull width of 5.00 feet (1.52 meters). Twin Branches (Stream HW-M9) has an Ohio EPA designated use of WWH. Macroinvertebrates were not sampled or observed during the time of delineation. This stream has been preliminarily assigned a QHEI score of 23; therefore, categorized as in the very poor QHEI narrative range.

Stream HW-M10

Stream HW-M10 is a perennial stream originating within the Study Area with a drainage area of 1.67 square mile (4.32 square kilometers). The stream flows west through the Study Area for approximately 2906.35 feet (1176.16 meters). Stream HW-M10 is preliminary determined to be jurisdictional. The QHEI habitat assessment method was used to evaluate Stream HW-M10. It was determined that dominant substrates for Stream HW-M10 are comprised of silt; instream cover (i.e. overhanging vegetation and aquatic macrophytes) is nearly absent; channel sinuosity is none; development is poor; channelization is recent; and stability is low; bank erosion is moderate; riparian width is nonexistent; floodplain quality is row crop; maximum pool depths are less than 0.66 feet (<0.20 meter) and bankfull width is less than 5.0 feet (1.52 meters). Macroinvertebrates were not sampled or observed during the time of delineation. This stream has



been preliminarily assigned a QHEI score of 19; therefore, categorized as in the very poor QHEI narrative range.

## **B. Open Waters (Ponds)**

The Study Area was investigated for areas that are considered “open water” by the USACE. Field investigations identified six (6) potentially jurisdictional open water resources (ponds) within the Study Area. All six (6) of these pond appear to be man-made. Several were created by drainage tile pump stations, others were created as stormwater retention basins, residential ponds, or fish hatchery ponds.

**Table 3.2.3 Waterbodies Delineated within the Study Area**

<b>Waterbody ID</b>	<b>Acres (Hectares)</b>
HS-WB-M1	1.91 (0.77)
HS-WB-M2	0.53 (0.21)
HS-WB-M3	0.35 (0.14)
HS-WB-M4	0.52 (0.21)
HS-WB-M5	0.02 (0.01)
HS-WB-M6	0.25 (0.10)

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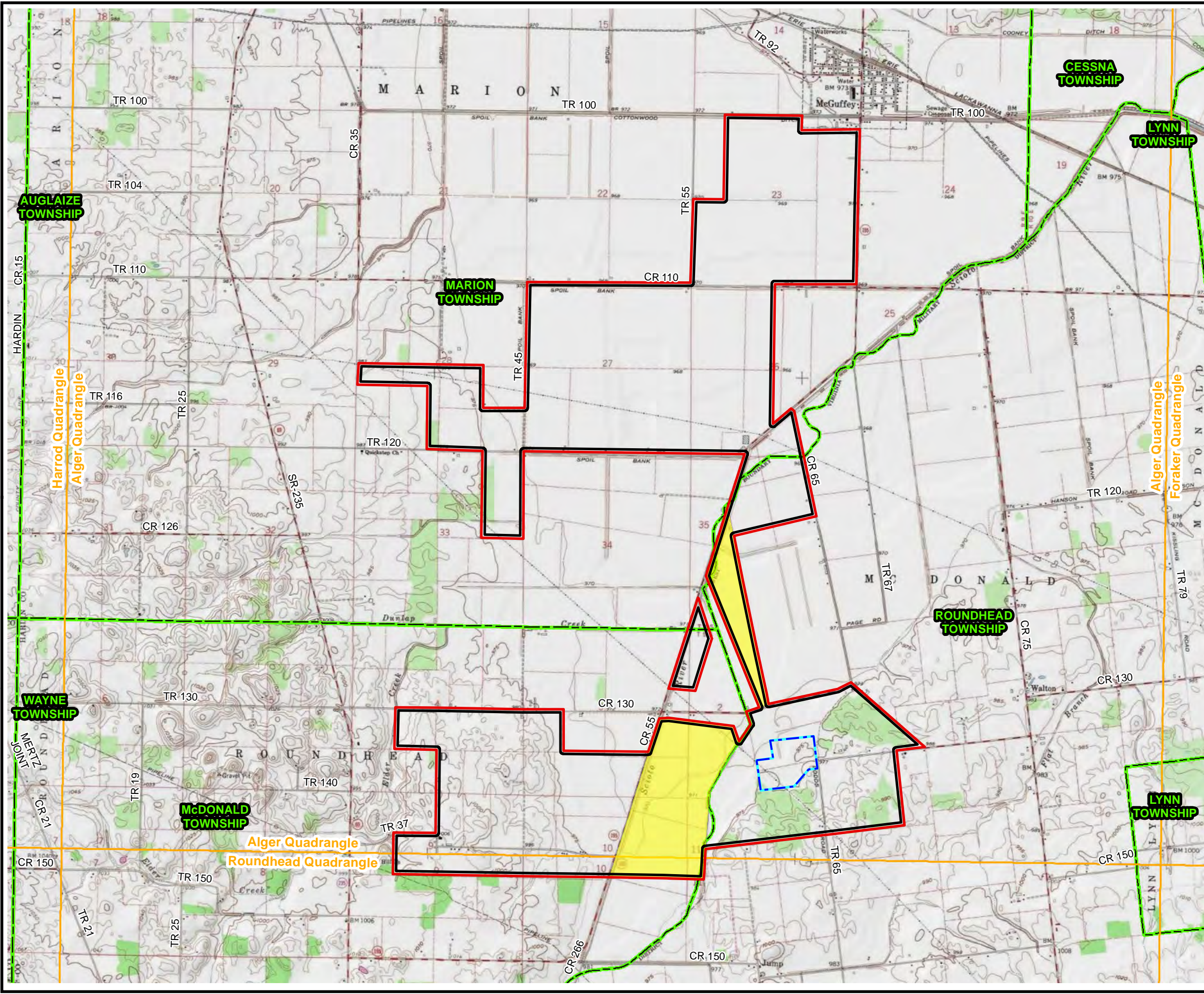
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# **Appendix A**

## **Figures**





**Legend**

- Study Area (September 2018)
- Project Area (September 2018)
- Proposed Underground Collection Corridor
- Point of Interconnection Facility Studied 2017
- USGS 24k Quadrangle
- Township

0 3,000 6,000 Feet

1" = 3,000'

1:36,000

PROJECT: **HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE: **USGS TOPOGRAPHIC MAP  
PROJECT LOCATION MAP**

DRAWN BY: D. KENWORTHY PROJ NO.: 302899.0000.0000

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

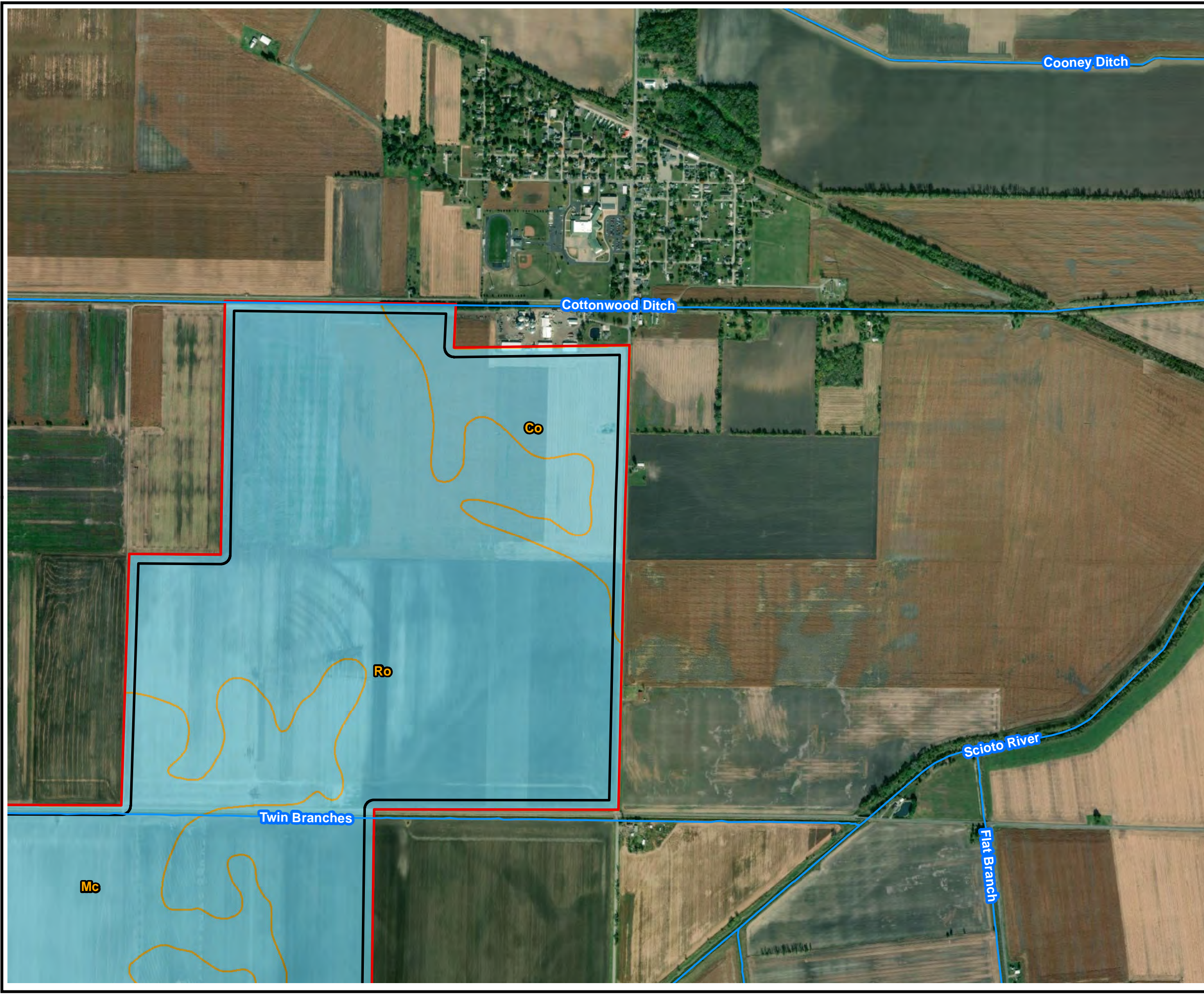
**FIGURE 1.1**

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FILE NO.: HSIL\_Fig1\_USGS\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

National Hydrology Dataset (NHD) Stream

Non-Hydric Soils With Hydric Inclusions

Hydric Soils

**SOILS LIST**

Co - Colwood loam

Mc - McGuffey muck

Ro - Roundhead muck

01,0002,000

01,000'1:12,000

Feet

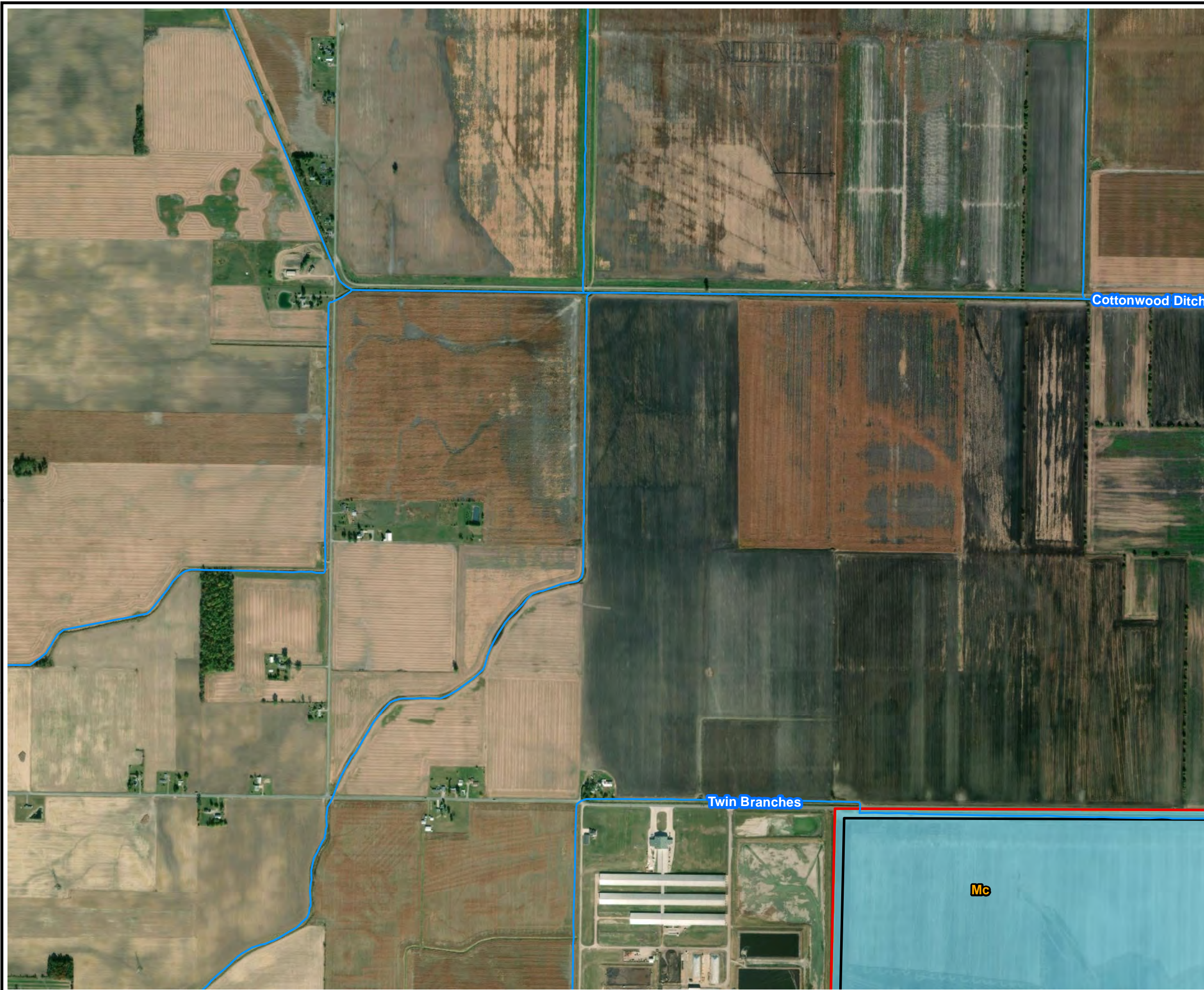
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PROJECT:		<b>HARDIN SOLAR ENERGY II, LLC HARDIN SOLAR II ENERGY CENTER CONFIDENTIAL BUSINESS INFORMATION</b>	
TITLE: <b>USDA SOIL SURVEY MAP</b>			
DRAWN BY:	D. KENWORTHY	PROJ NO.:	302899.0000.0000
CHECKED BY:	M. MOLNAR	<b>FIGURE 2</b> Page 1 of 6	
APPROVED BY:	J. PITTS		
DATE:	OCTOBER 2018		






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FILE NO.:HSII\_Fig2\_SSURGO\_Soils\_11x17.mxd



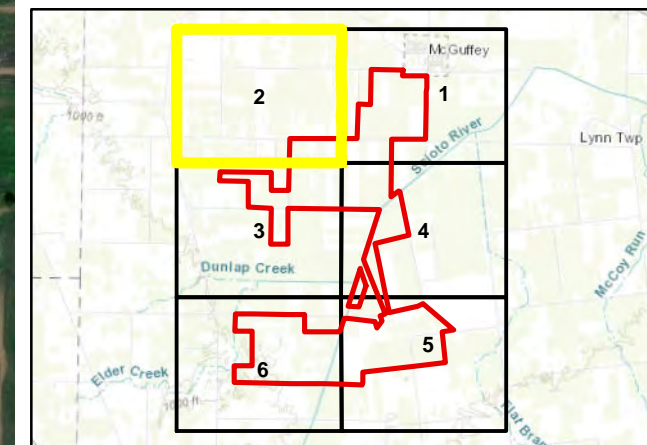


### Legend

- 
-  Study Area (September 2018)  
 Project Area (September 2018)  
 National Hydrology Dataset (NHD) Stream  
 Non-Hydric Soils With Hydric Inclusions  
 Hydric Soils

## SOILS LIST

-  Mc - McGuffey muck



1" = 1,000'  
1:12,000

PROJECT: **HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
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TITLE: **USDA SOIL SURVEY MAP**

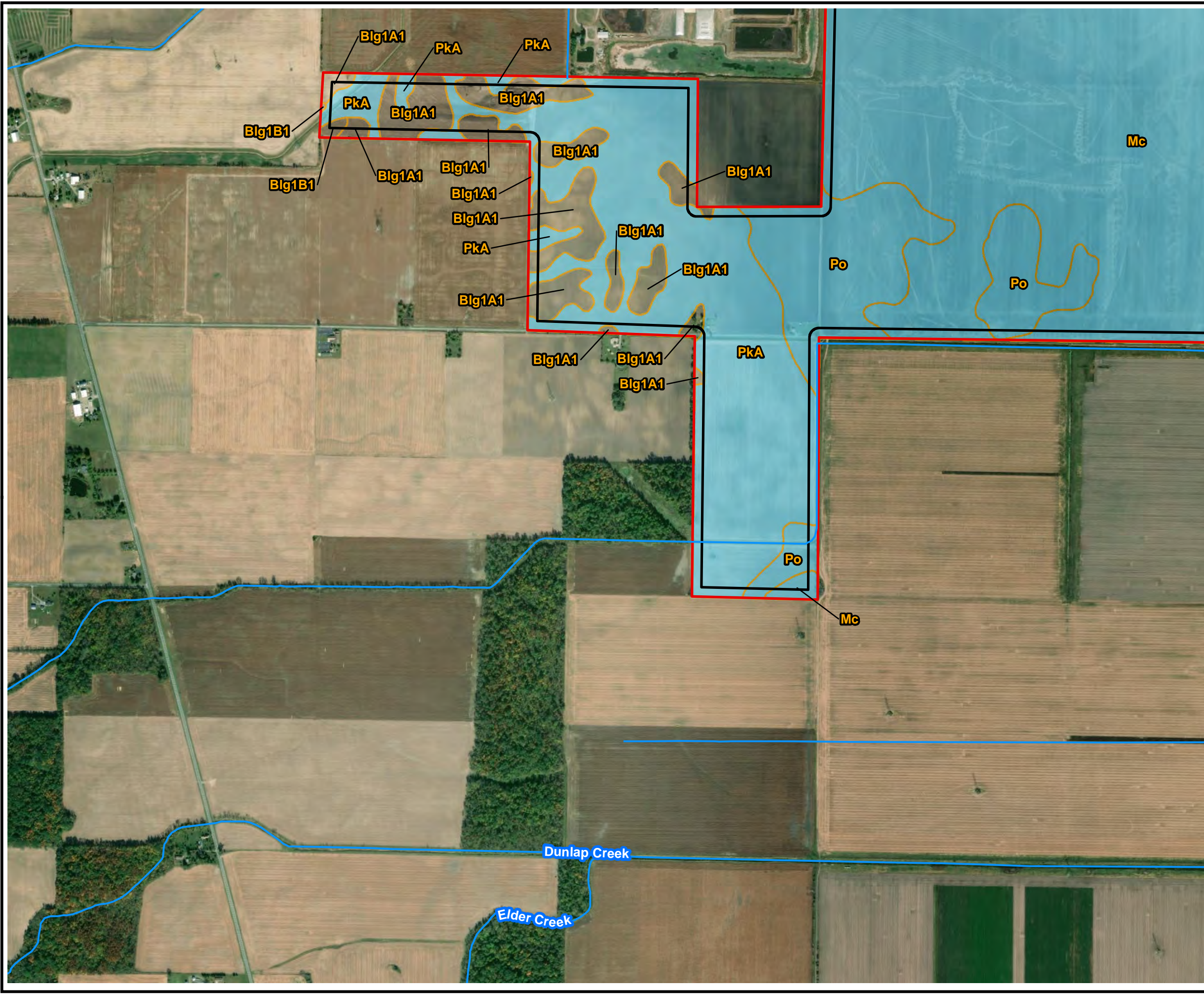
DRAWN BY: D. KENWORTHY	PROJ NO.: 302899.0000.0000
CHECKED BY: M. MOLNAR	<div>FIGURE 2</div> <div>Page 2 of 6</div>
APPROVED BY: J. PITTS	
DATE: OCTOBER 2018	



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FILE NO.: HSII\_Fig2\_SSURGO\_Soils\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

National Hydrology Dataset (NHD) Stream

Non-Hydric Soils With Hydric Inclusions

Hydric Soils

**SOILS LIST**

Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes

Blg1B1 - Blount silt loam, ground moraine, 2 to 4 percent slopes

Mc - McGuffey muck

PkA - Pewamo silty clay loam, 0 to 1 percent slopes

Po - Pewamo variant muck

01,0002,000

01,000'1:12,000

PROJECT:

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**HARDIN SOLAR II ENERGY CENTER**  
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TITLE:

**USDA SOIL SURVEY MAP**

DRAWN BY: D. KENWORTHY

PROJ NO.: 302899.0000.0000

CHECKED BY: M. MOLNAR

**FIGURE 2**

APPROVED BY: J. PITTS

Page 3 of 6

DATE: OCTOBER 2018

FILE NO:

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**Legend**

Study Area (September 2018)

Project Area (September 2018)

National Hydrology Dataset (NHD) Stream

Non-Hydric Soils With Hydric Inclusions

Hydric Soils

**SOILS LIST**

Ln - Linwood muck

Mc - McGuffey muck

Ro - Roundhead muck

01,0002,000

Feet

1" = 1,000'

1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**USDA SOIL SURVEY MAP**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

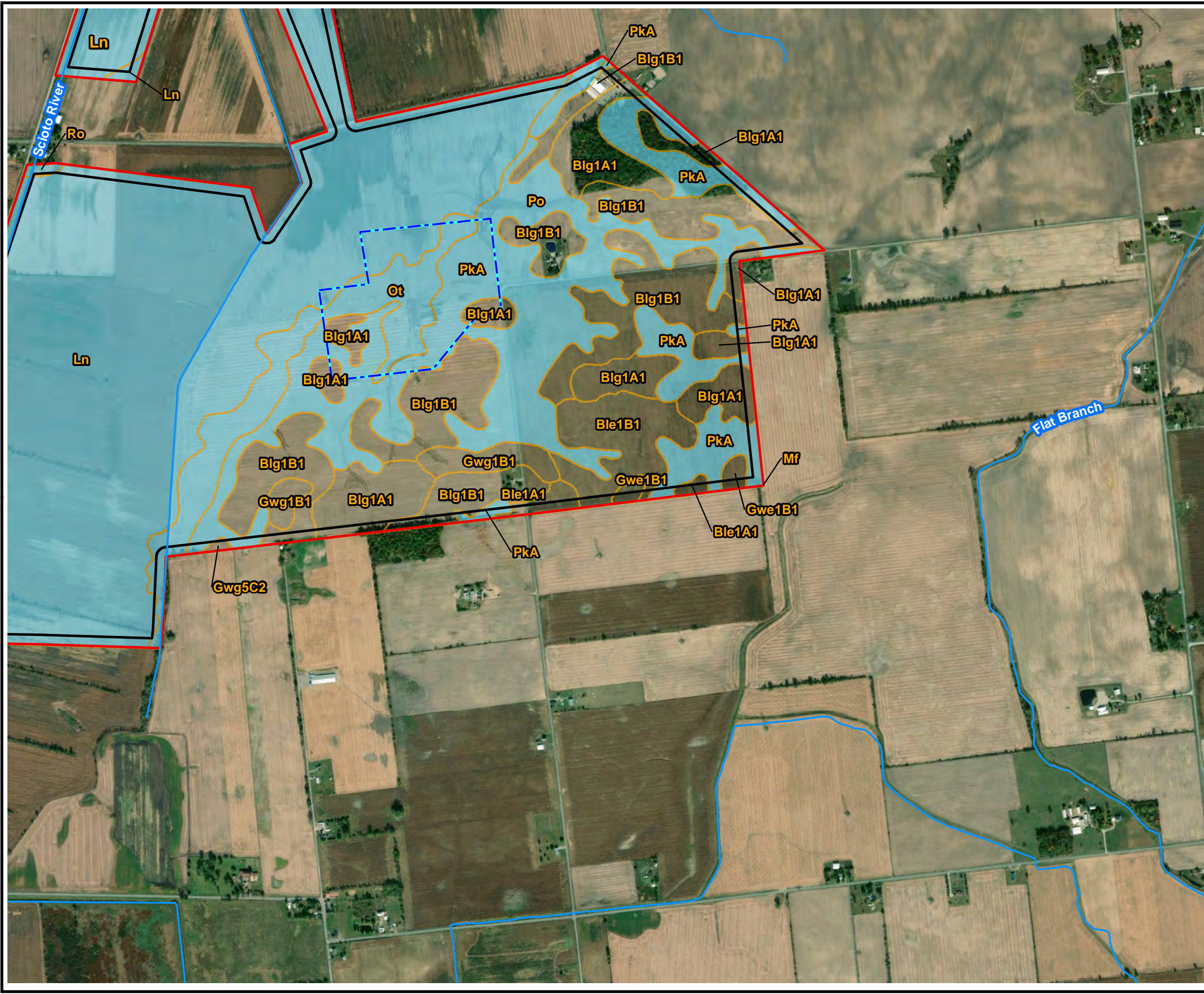
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Page 4 of 6

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FILE NO.:

HSII\_Fig2\_SSURGO\_Soils\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

National Hydrology Dataset (NHD) Stream

Non-Hydric Soils With Hydric Inclusions

Hydric Soils

**SOILS LIST**

Ble1A1 - Blount silt loam, end moraine, 0 to 2 percent slopes

Ble1B1 - Blount silt loam, end moraine, 2 to 4 percent slopes

Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes

Blg1B1 - Blount silt loam, ground moraine, 2 to 4 percent slopes

Gwe1B1 - Glynwood silt loam, end moraine, 2 to 6 percent slopes

Gwg1B1 - Glynwood silt loam, ground moraine, 2 to 6 percent slopes

Gwg5C2 - Glynwood clay loam, ground moraine, 6 to 12 percent slopes, eroded

Ln - Linwood muck

Mf - Milford silty clay loam, 0 to 2 percent slopes

Ot - Olentangy silt loam

PkA - Pewamo silty clay loam, 0 to 1 percent slopes

Po - Pewamo variant muck

Ro - Roundhead muck

01,0002,000

01,000'1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
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**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**USDA SOIL SURVEY MAP**

DRAWN BY:

D. KENWORTHY

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M. MOLNAR

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J. PITTS

DATE:

OCTOBER 2018

PROJ NO.:

302899.0000.0000

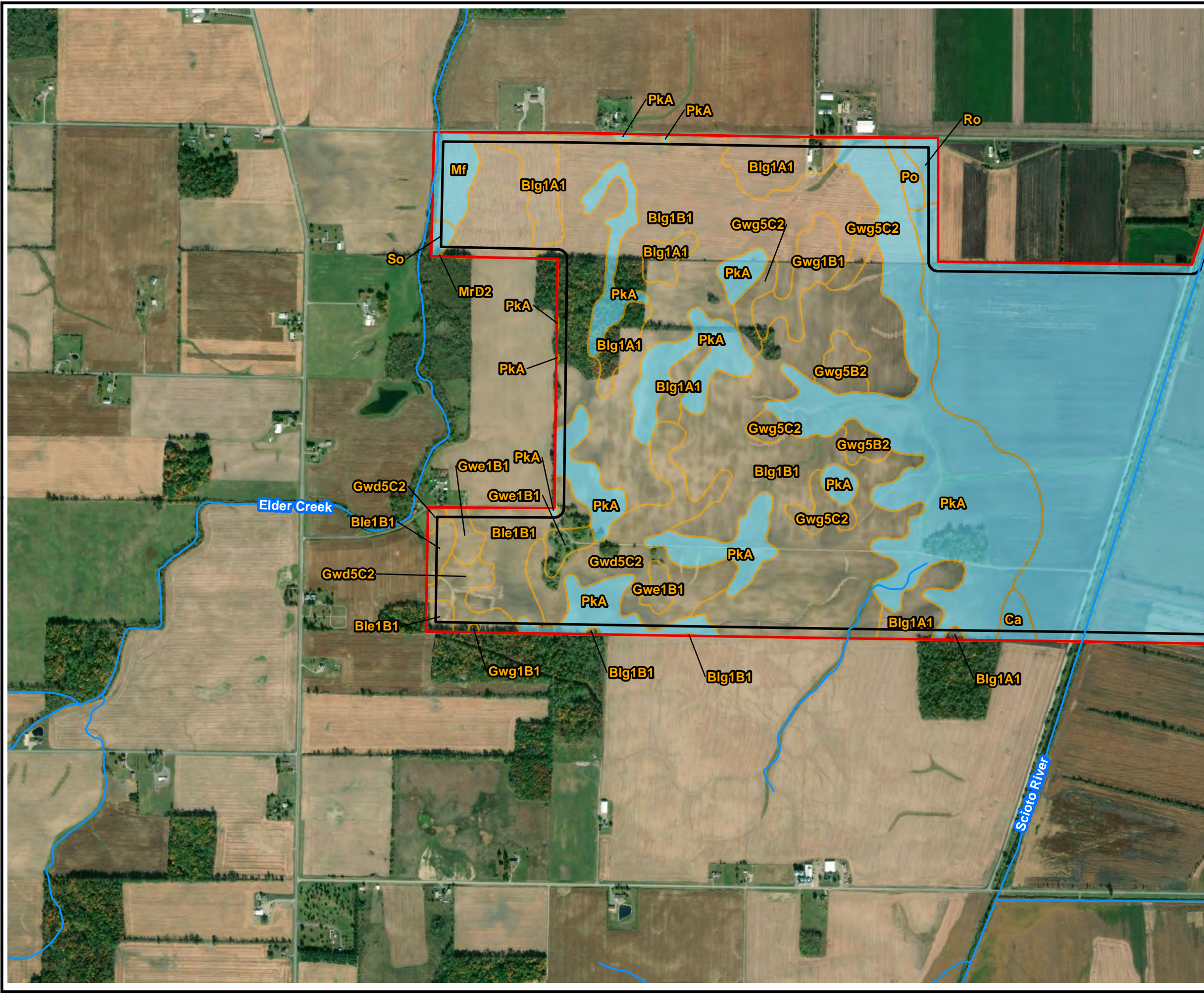
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Page 5 of 6

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FILE NO.:

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**Legend**

Study Area (September 2018)

Project Area (September 2018)

National Hydrology Dataset (NHD) Stream

Non-Hydric Soils With Hydric Inclusions

Hydric Soils

**SOILS LIST**

Ble1B1 - Blount silt loam, end moraine, 2 to 4 percent slopes

Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes

Blg1B1 - Blount silt loam, ground moraine, 2 to 4 percent slopes

Ca - Carlisle muck, Central Ohio clayey till plain, drained, 0 to 2 percent slopes

Gwd5C2 - Glynwood clay loam, 6 to 12 percent slopes, eroded

Gwe1B1 - Glynwood silt loam, end moraine, 2 to 6 percent slopes

Gwg1B1 - Glynwood silt loam, ground moraine, 2 to 6 percent slopes

Gwg5B2 - Glynwood clay loam, ground moraine, 2 to 6 percent slopes, eroded

Gwg5C2 - Glynwood clay loam, ground moraine, 6 to 12 percent slopes, eroded

Ln - Linwood muck

Mf - Milford silty clay loam, 0 to 2 percent slopes

MrD2 - Morley clay loam, 12 to 18 percent slopes, eroded

PkA - Pewamo silty clay loam, 0 to 1 percent slopes

Po - Pewamo variant muck

Ro - Roundhead muck

So - Sloan silt loam, frequently flooded

01,0002,000

01,000'1:12,000

Feet

N

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
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TITLE:

**USDA SOIL SURVEY MAP**

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PROJ NO.: 302899.0000.0000

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

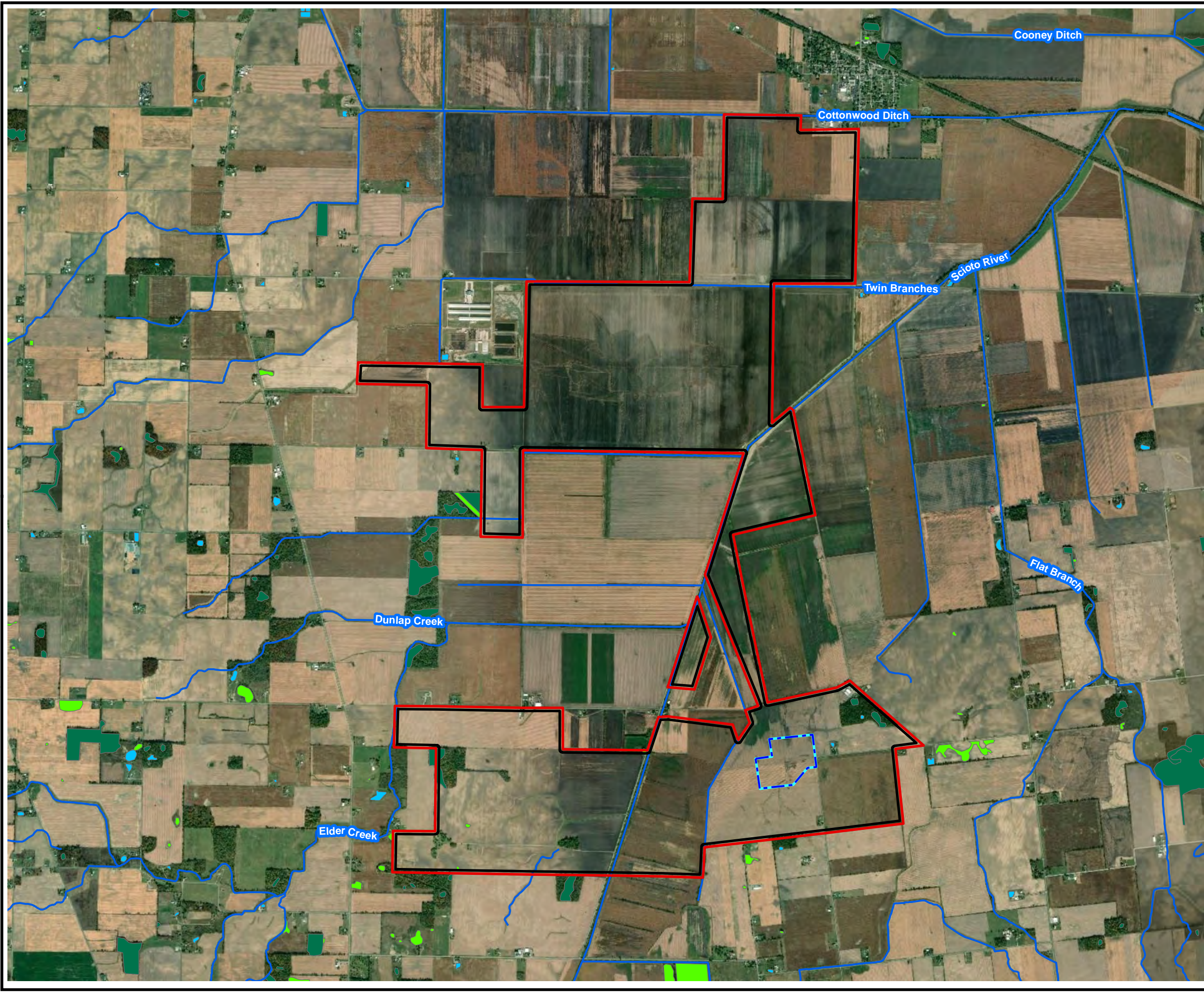
**FIGURE 2**  
Page 6 of 6

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FILE NO.:

HSII\_Fig2\_SSURGO\_Soils\_11x17.mxd





**Legend**

- Study Area (September 2018)
- Project Area (September 2018)
- Point of Interconnection Facility Studied 2017
- National Hydrography Dataset (NHD) Stream

**National Wetlands Inventory (NWI)**

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

PROJECT:**HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

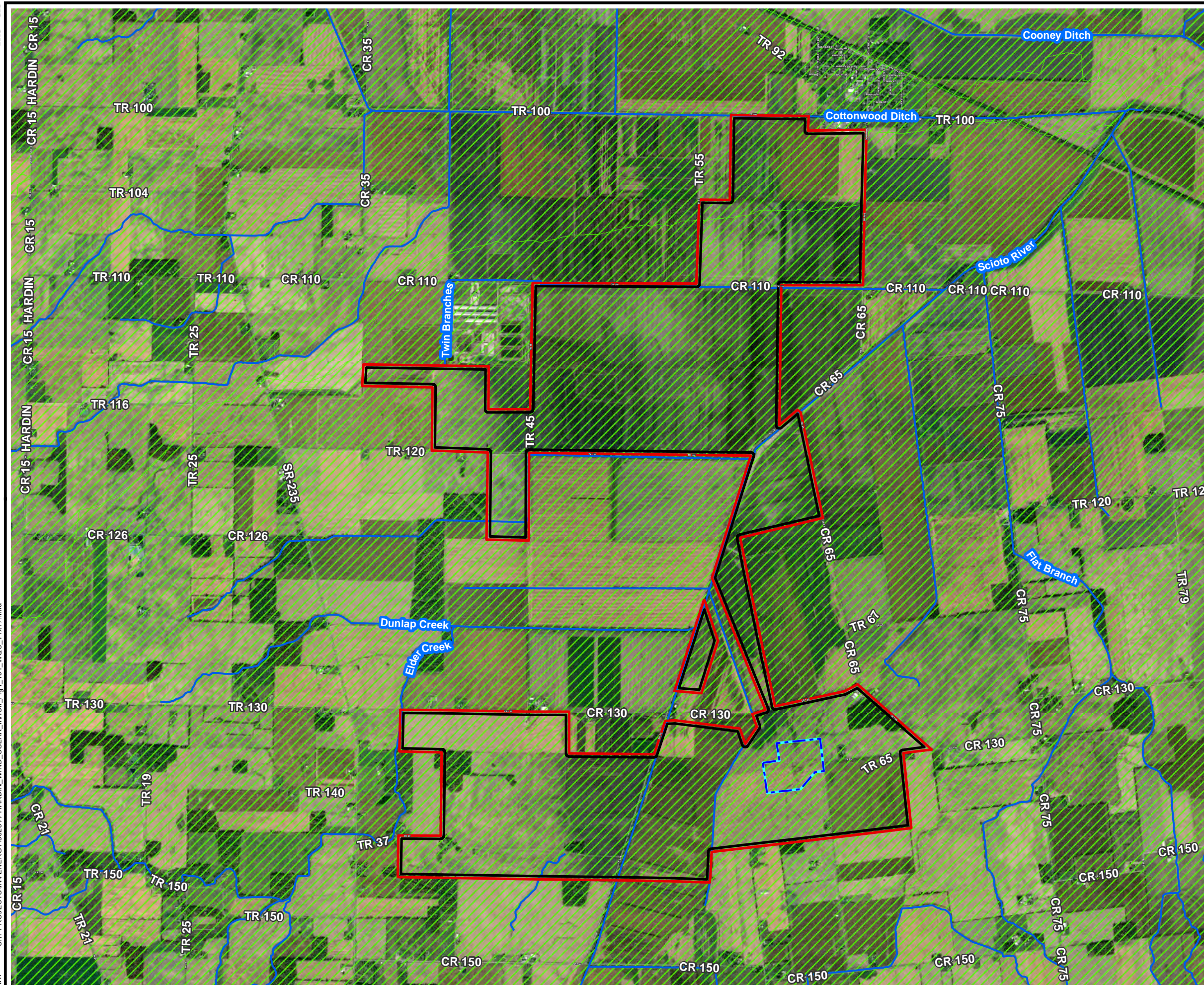
TITLE:**NATIONAL WETLAND INVENTORY MAP**

DRAWN BY:	D. KENWORTHY	PROJ NO.:	302899.0000.0000
CHECKED BY:	M. MOLNAR	<b>FIGURE 3</b>	
APPROVED BY:	J. PITTS		
DATE:	SEPTEMBER 2018		

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FILE NO.:HSLI\_Fig3\_NWI\_11x17.mxd



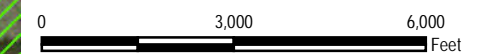


**Legend**


- 
- Study Area (September 2018)
- Project Area (September 2018)
- Point of Interconnection Facility Studied 2017
- National Hydrography Dataset (NHD) Stream

## NWP Stream Eligibility

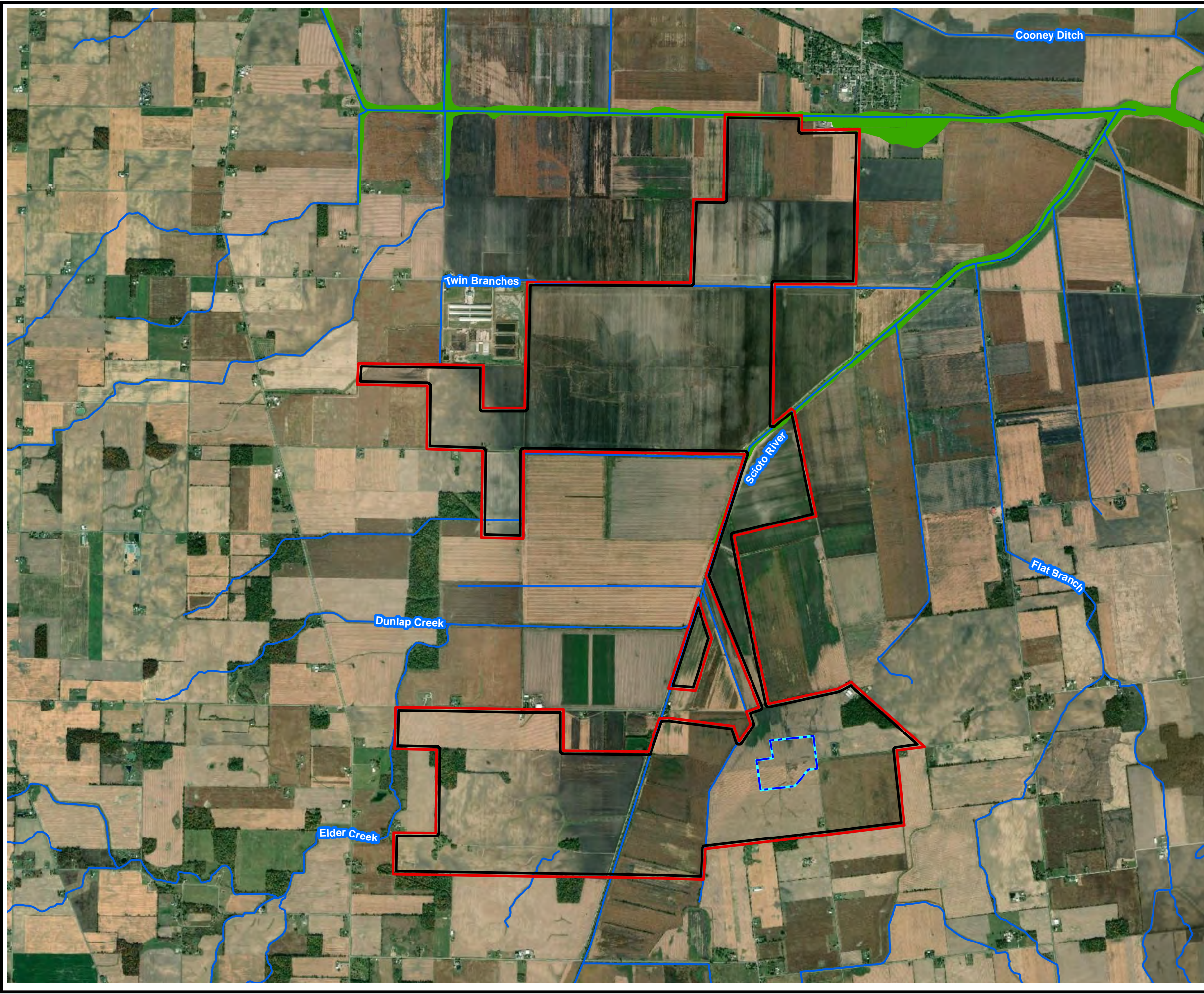
- 
- Eligible
- Ineligible
- Possibly Eligible



1" = 3,000'  
1:36,000

PROJECT:		<b>HARDIN SOLAR ENERGY II, LLC HARDIN SOLAR II ENERGY CENTER CONFIDENTIAL BUSINESS INFORMATION</b>	
TITLE:		<b>NATIONWIDE PERMITS STREAM ELIGIBILITY MAP</b>	
DRAWN BY:	D. KENWORTHY	PROJ NO.:	302899.0000.0000
CHECKED BY:	M. MOLNAR	<b>FIGURE 4</b>	
APPROVED BY:	J. PITTS		
DATE:	SEPTEMBER 2018		
		921 Eastwind Drive, Suite 122 Westerville, OH 43081 Phone: 614.423.6334 www.trcsolutions.com	
FILE NO.:		HSII_Fig4_401_WQC_11x17.mxd	





**Legend**

- Study Area (September 2018)
- Project Area (September 2018)
- Point of Interconnection Facility Studied 2017
- National Hydrography Dataset (NHD) Stream
- FEMA 100-year Floodplain

03,0006,000

1" = 3,000'  
1:36,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**FEDERAL EMERGENCY MANAGEMENT  
AGENCY FLOOD HAZARD MAP**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: SEPTEMBER 2018

PROJ NO.: 302899.0000.0000

**FIGURE 5**

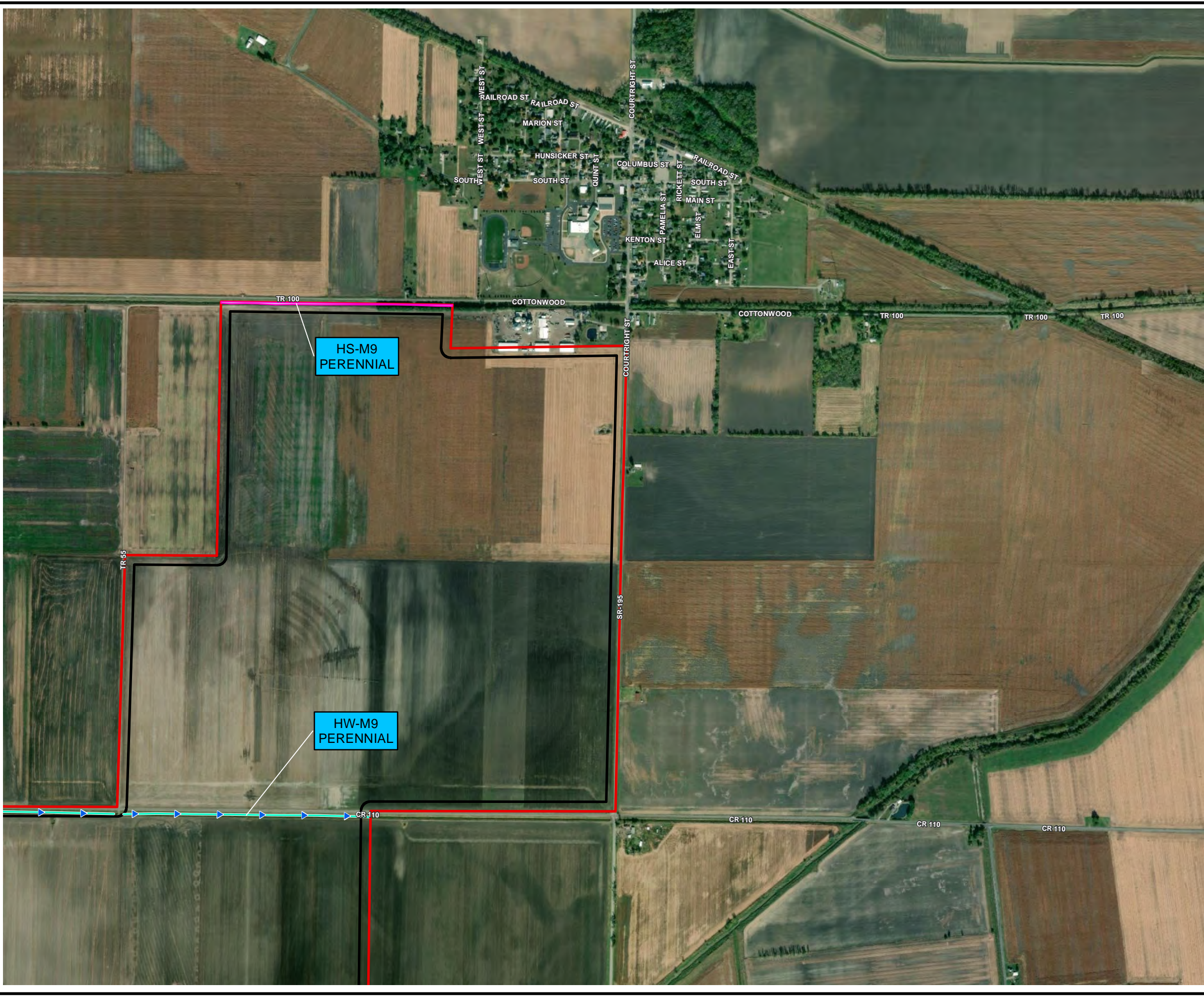
TRC

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FILE NO:

HSIL\_Fig5\_FEMA\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**DELINEATED RESOURCE BOUNDARIES**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

**FIGURE 6A**  
Page 1 of 6

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FILE NO:

HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'

1:12,000

PROJECT:

HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION

TITLE:

DELINEATED RESOURCE BOUNDARIES

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

FIGURE 6A

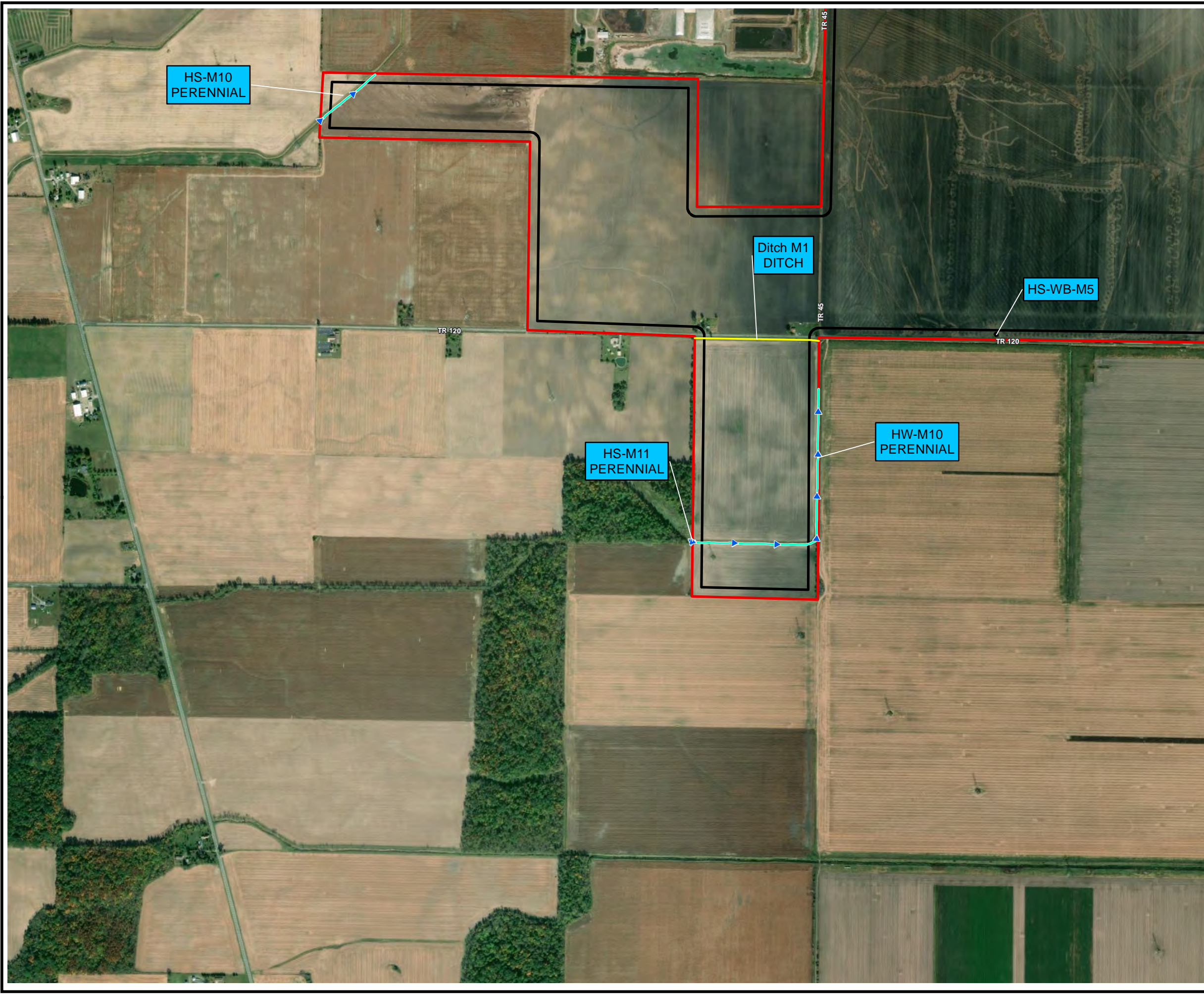
Page 2 of 6

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Phone: 614.423.6334  
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FILE NO.:

HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

HARDIN SOLAR ENERGY II, LLC

HARDIN SOLAR II ENERGY CENTER

CONFIDENTIAL BUSINESS INFORMATION

TITLE:

DELINEATED RESOURCE BOUNDARIES

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

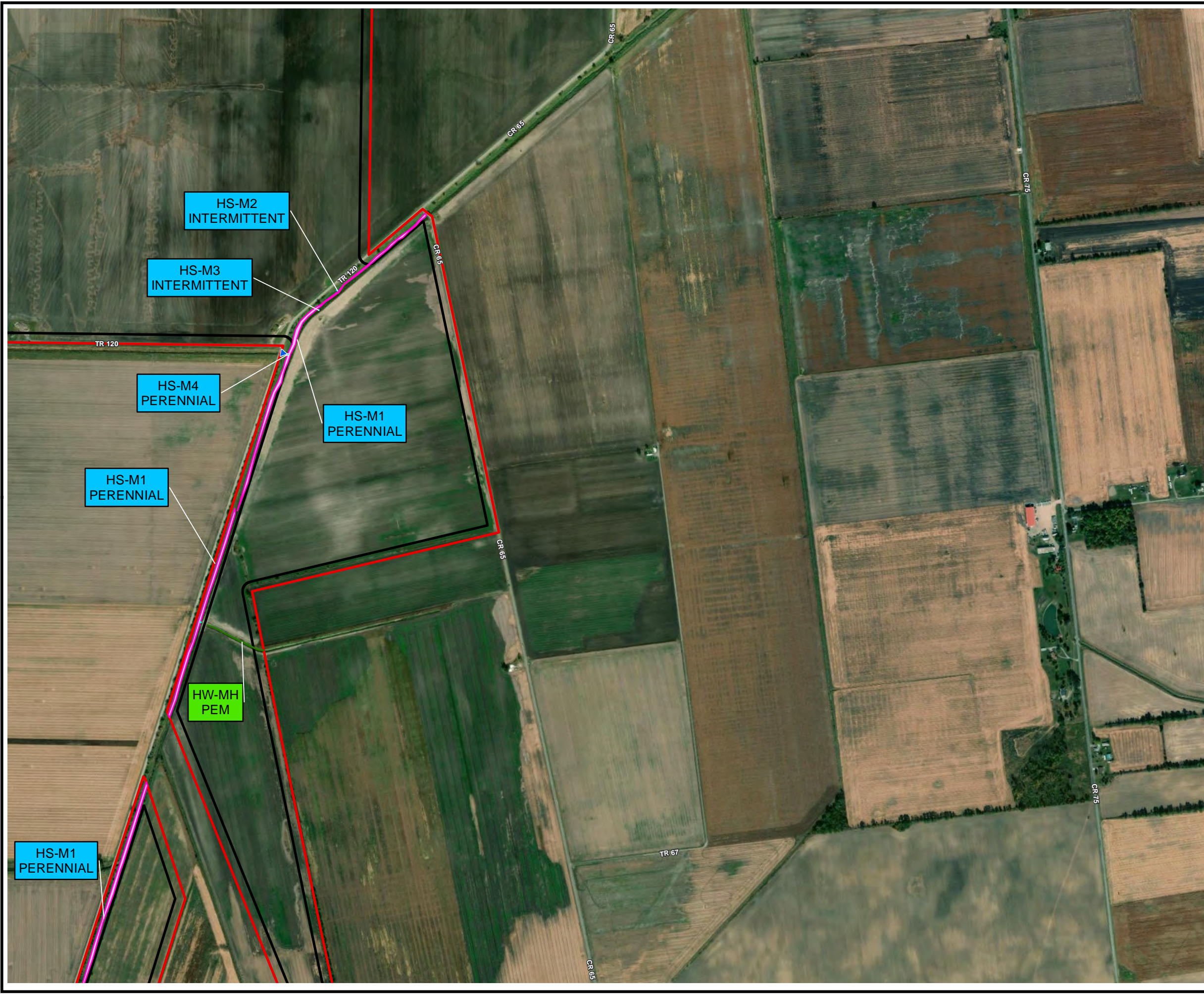
**FIGURE 6A**

Page 3 of 6

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FILE NO.: HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**DELINEATED RESOURCE BOUNDARIES**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

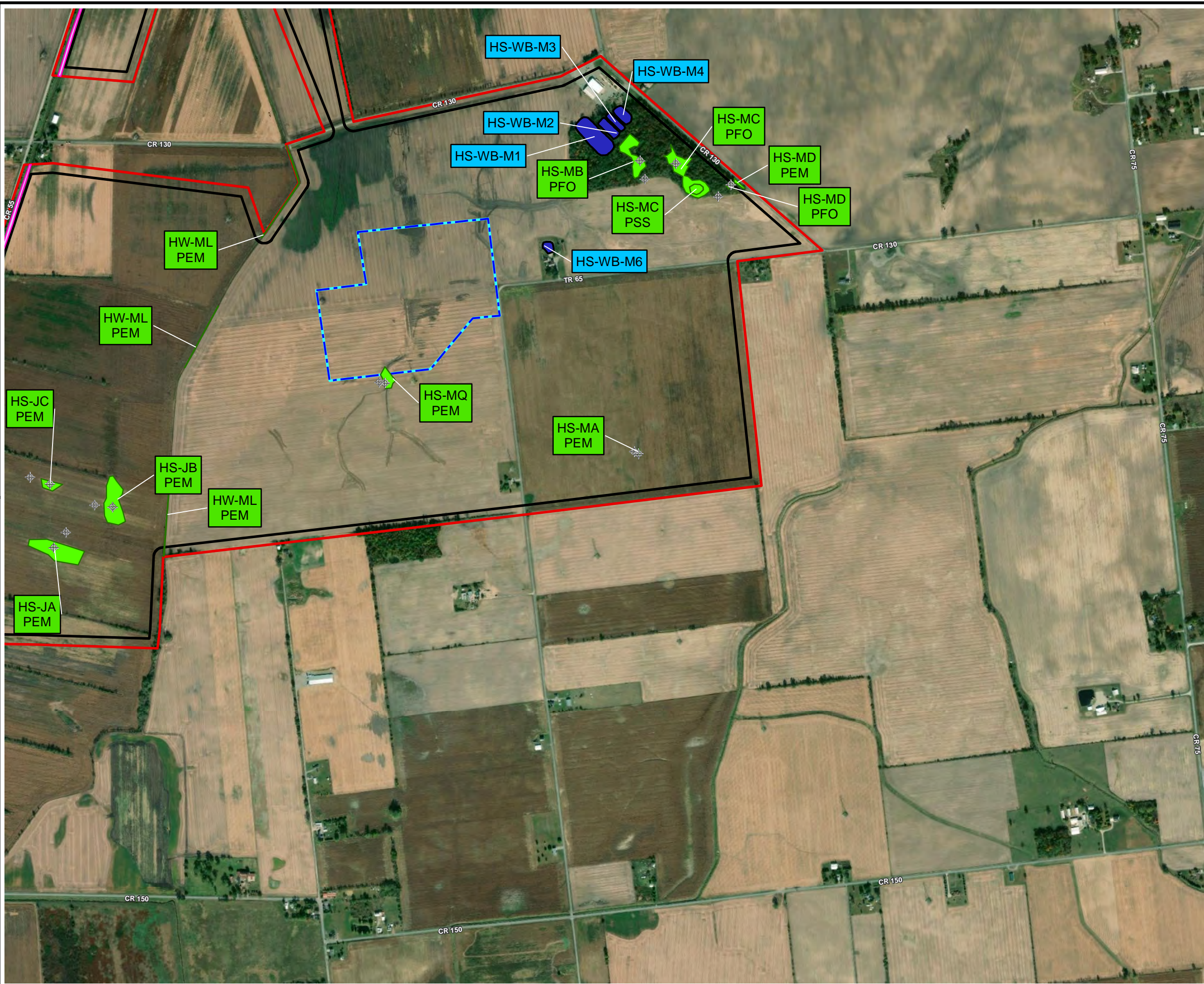
**FIGURE 6A**  
Page 4 of 6

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FILE NO.:

HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

HARDIN SOLAR ENERGY II, LLC

HARDIN SOLAR II ENERGY CENTER

CONFIDENTIAL BUSINESS INFORMATION

TITLE:

DELINEATED RESOURCE BOUNDARIES

DRAWN BY: D. KENWORTHY

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DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

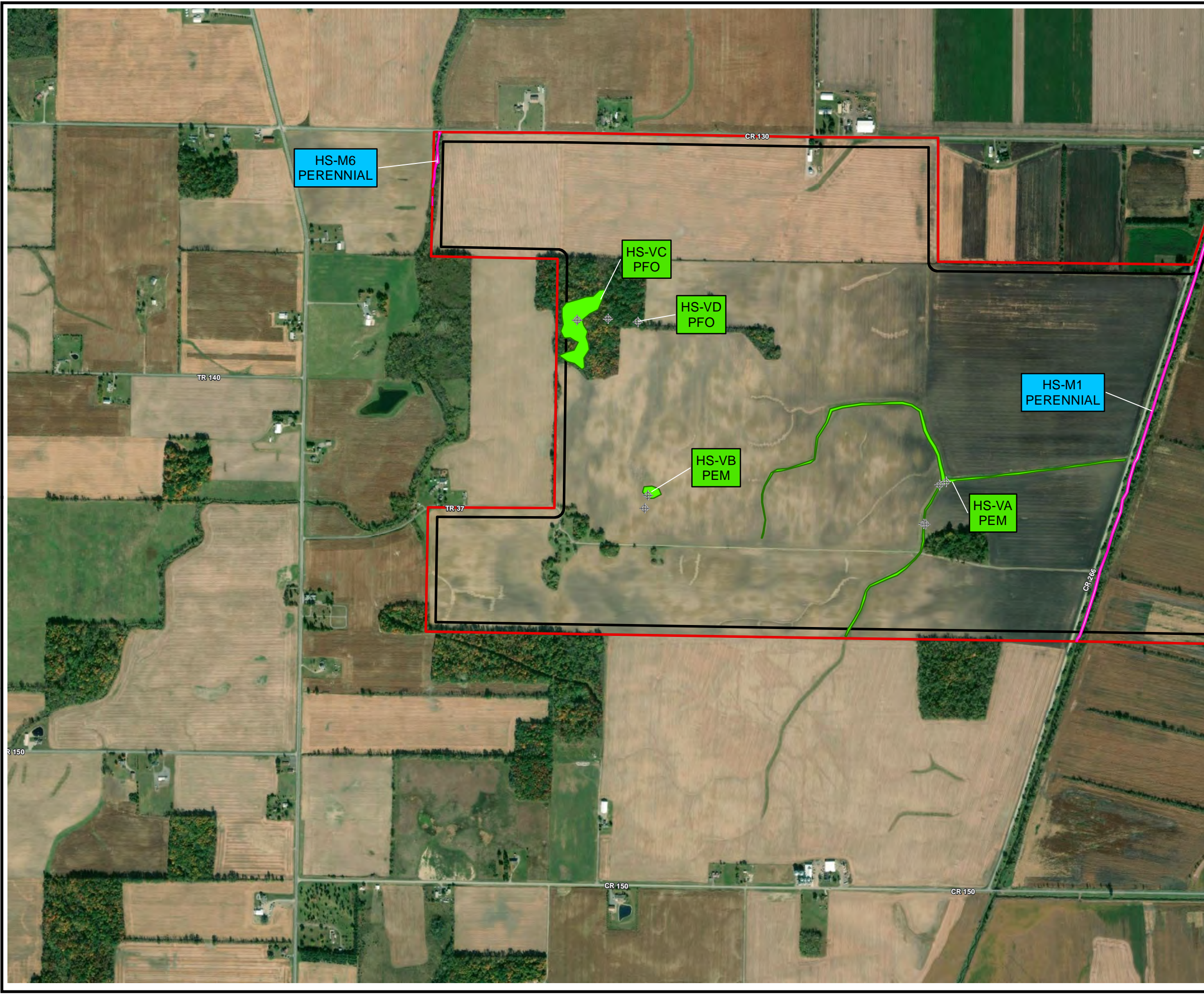
**FIGURE 6A**

Page 5 of 6

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FILE NO.: HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'

1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**DELINEATED RESOURCE BOUNDARIES**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

**FIGURE 6A**  
Page 6 of 6

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FILE NO:

HSII\_Fig6A\_DELIN\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

0 500 1,000 Feet  
1" = 1,000'  
1:12,000

PROJECT:

HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION

TITLE:

DELINEATED RESOURCE PRELIMINARY  
ORAMS QHEI AND HHEIS

DRAWN BY:

D. KENWORTHY

CHECKED BY:

M. MOLNAR

APPROVED BY:

J. PITTS

DATE:

OCTOBER 2018

PROJ NO.:

302899.0000.0000

**FIGURE 6B**  
Page 1 of 6

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FILE NO.:

HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'

1:12,000

PROJECT:

HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION

TITLE:

DELINEATED RESOURCE PRELIMINARY  
ORAMS QHEI AND HHEIS

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

FIGURE 6B

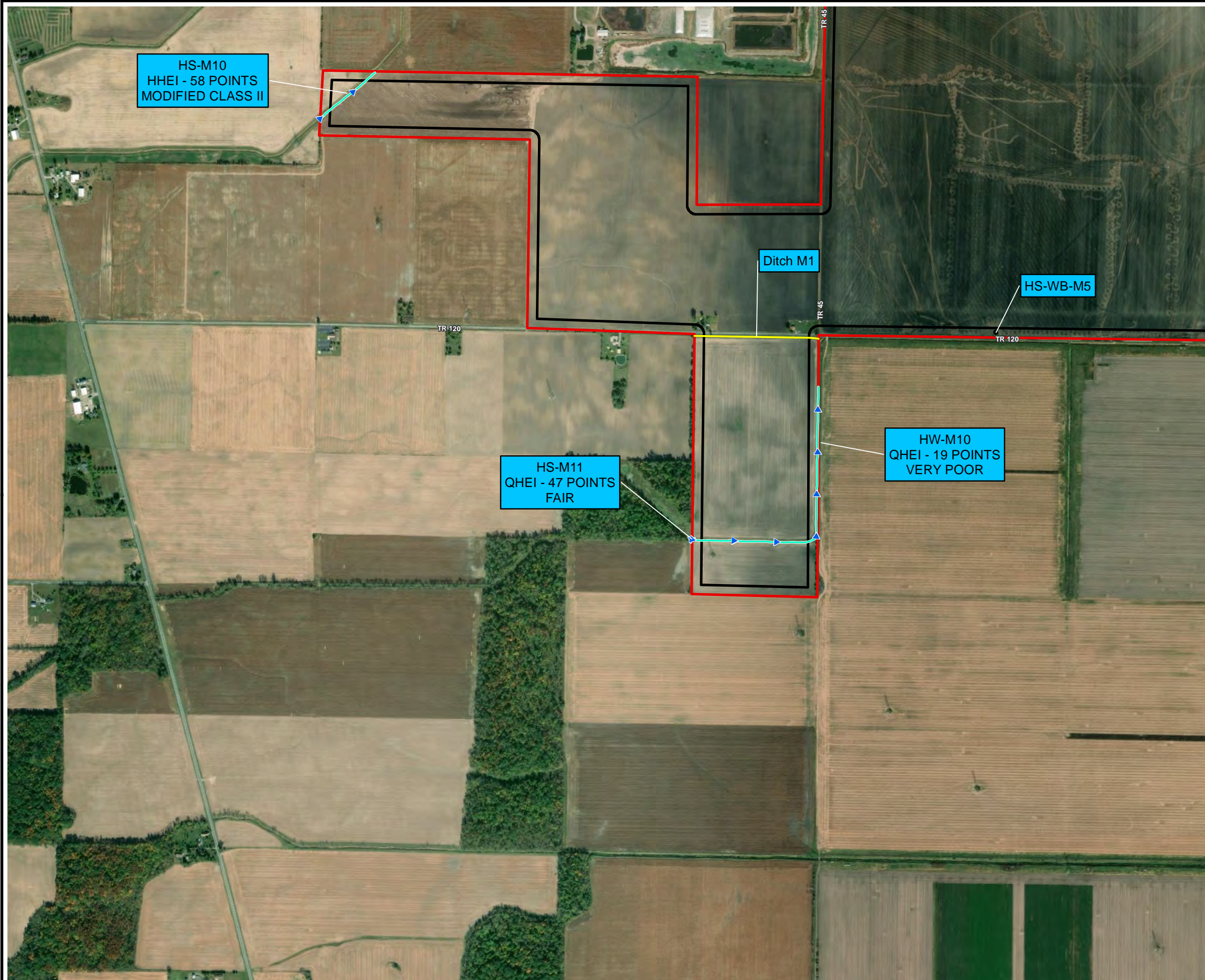
Page 2 of 6

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Westerville, OH 43081  
Phone: 614.423.6334  
www.trcsolutions.com

FILE NO.:

HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**DELINEATED RESOURCE PRELIMINARY  
ORAMS QHEI AND HHEIS**

DRAWN BY:

D. KENWORTHY

CHECKED BY:

M. MOLNAR

APPROVED BY:

J. PITTS

DATE:

OCTOBER 2018

PROJ NO.:

302899.0000.0000

**FIGURE 6B**

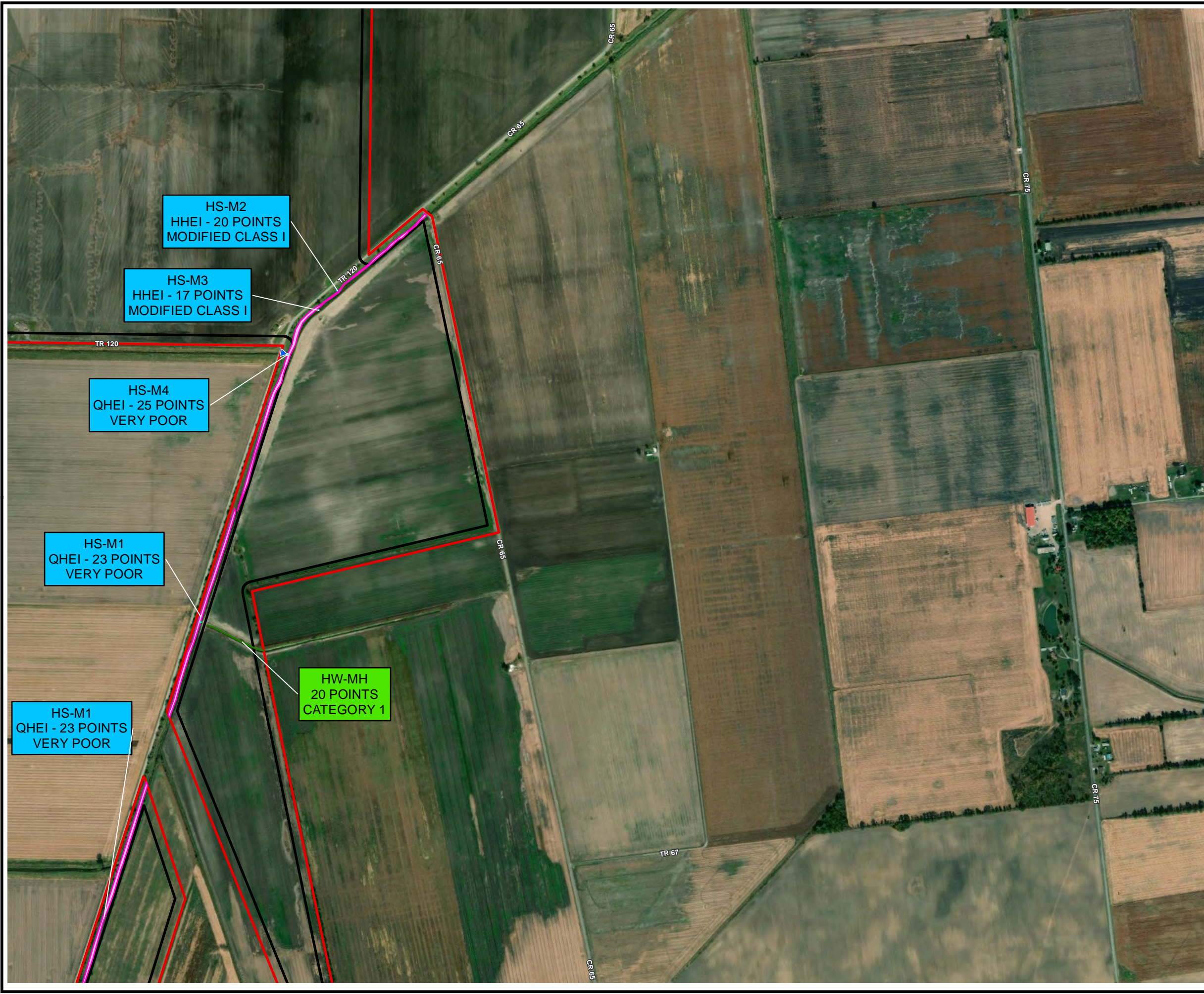
Page 3 of 6

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Phone: 614.423.6334  
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FILE NO.:

HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT: **HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE: **DELINEATED RESOURCE PRELIMINARY  
ORAMS QHEI AND HHEIS**

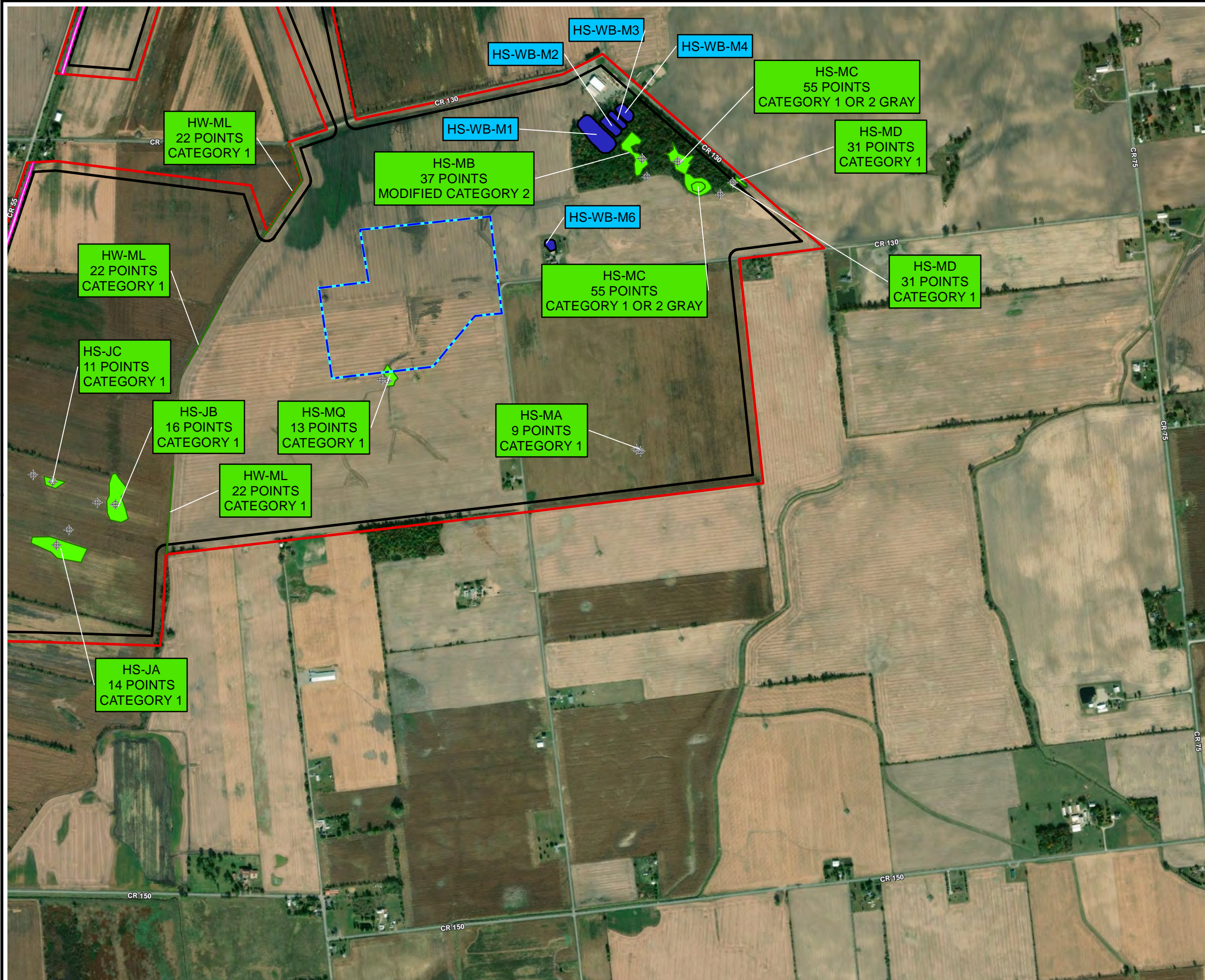
DRAWN BY: D. KENWORTHY  
CHECKED BY: M. MOLNAR  
APPROVED BY: J. PITTS  
DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000  
**FIGURE 6B**  
Page 4 of 6

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FILE NO.: HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

- Study Area (September 2018)
- Project Area (September 2018)
- Point of Interconnection Facility Studied 2017

**Delineated Streams**

- Ditch
- Ephemeral
- Intermittent
- Perennial

**Delineated Area**

- Stream Polygon
- Water/Pond Boundary
- Wetland Boundary
- Sample Point

**Map Scale**

0 500 1,000 Feet

1" = 1,000'

1:12,000

**PROJECT:** HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION

**TITLE:** DELINEATED RESOURCE PRELIMINARY  
ORAMS QHEI AND HHEIS

**DRAWN BY:** D. KENWORTHY **PROJ NO.:** 302899.0000.0000

**CHECKED BY:** M. MOLNAR

**APPROVED BY:** J. PITTS

**DATE:** OCTOBER 2018

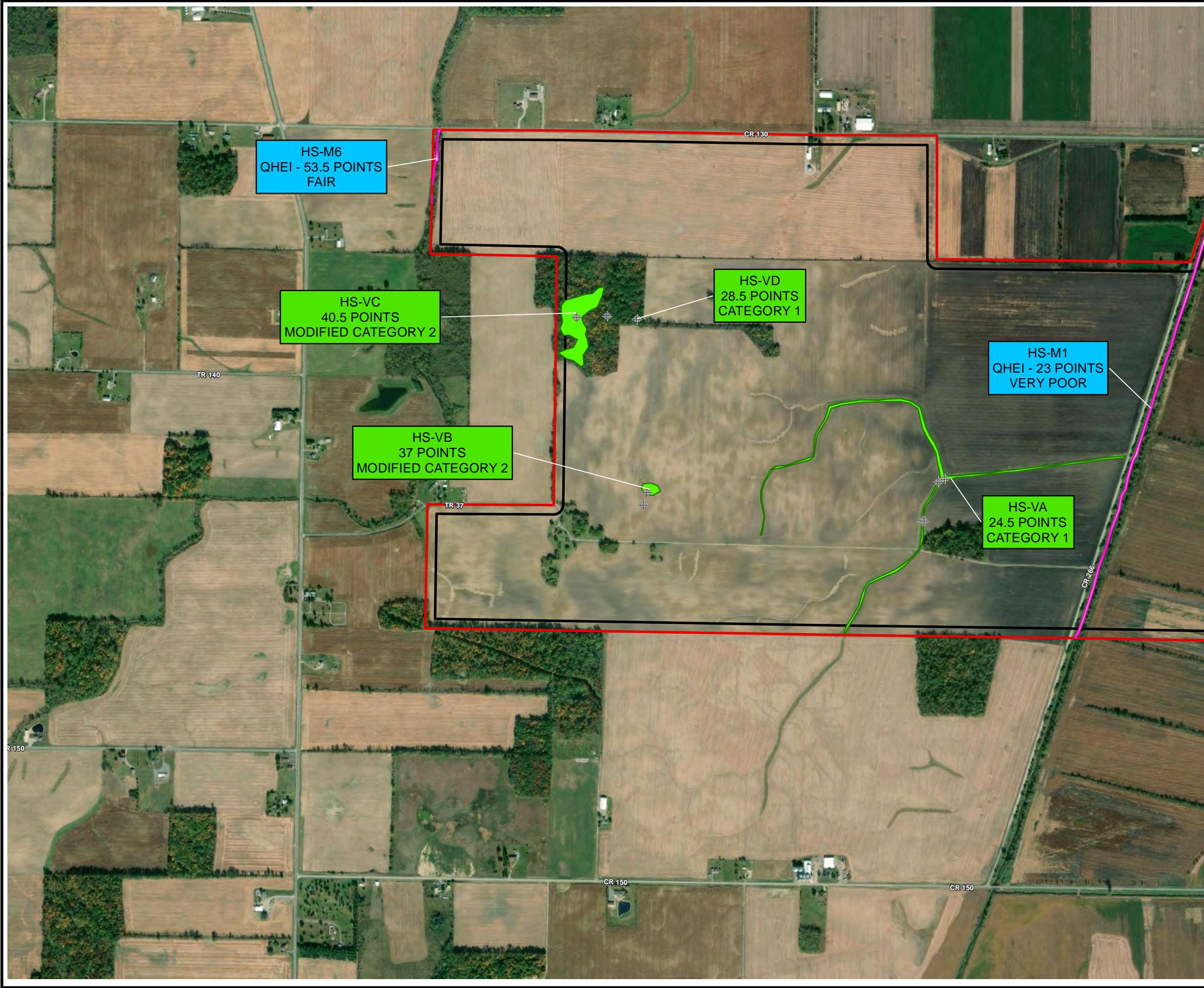
**FIGURE 6B**  
Page 5 of 6

**TRC**

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Westerville, OH 43081  
Phone: 614.423.6334  
www.trcsolutions.com

**FILE NO.:** HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

05001,000

Feet

1" = 1,000'

1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**DELINEATED RESOURCE PRELIMINARY**  
**ORAMS QHEI AND HHEIS**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

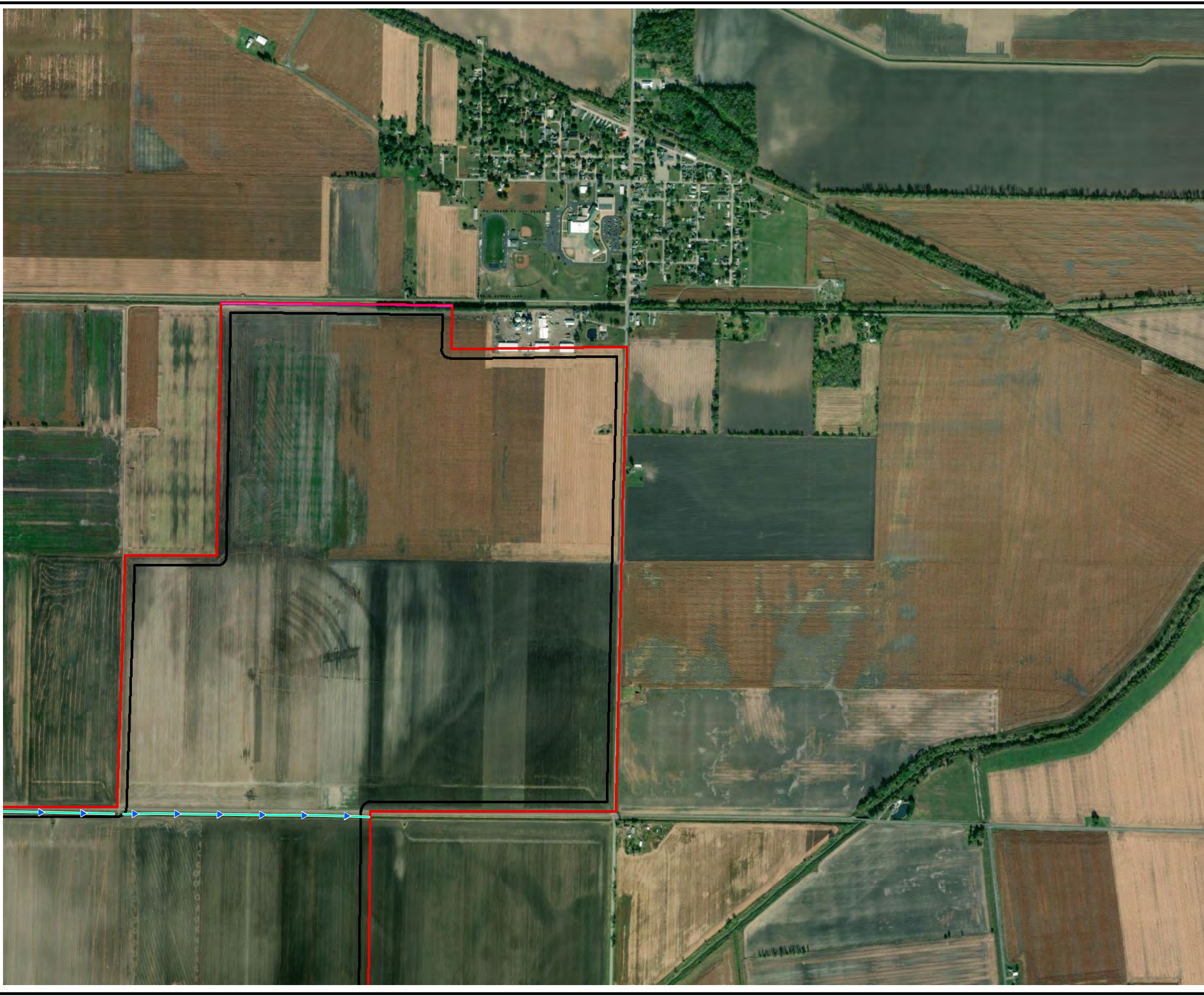
**FIGURE 6B**  
Page 6 of 6

921 Eastwind Drive, Suite 122  
Westerville, OH 43081  
Phone: 614.423.6334  
www.trcsolutions.com

FILE NO.:

HSII\_Fig6B\_PrelimORAM\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

NOTE:  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**PHOTO DOCUMENTATION  
AND LOCATIONS**

DRAWN BY:

D. KENWORTHY

PROJ NO.:

302899.0000.0000

CHECKED BY:

M. MOLNAR

APPROVED BY:

J. PITTS

DATE:

OCTOBER 2018

**FIGURE 7**  
Page 1 of 6

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FILE NO.:

HSII\_Fig7\_PhotoLocations\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

NOTE:  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

05001,000

Feet

1" = 1,000'

1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**PHOTO DOCUMENTATION**  
**AND LOCATIONS**

DRAWN BY:

D. KENWORTHY

PROJ NO.:

302899.0000.0000

CHECKED BY:

M. MOLNAR

APPROVED BY:

J. PITTS

DATE:

OCTOBER 2018

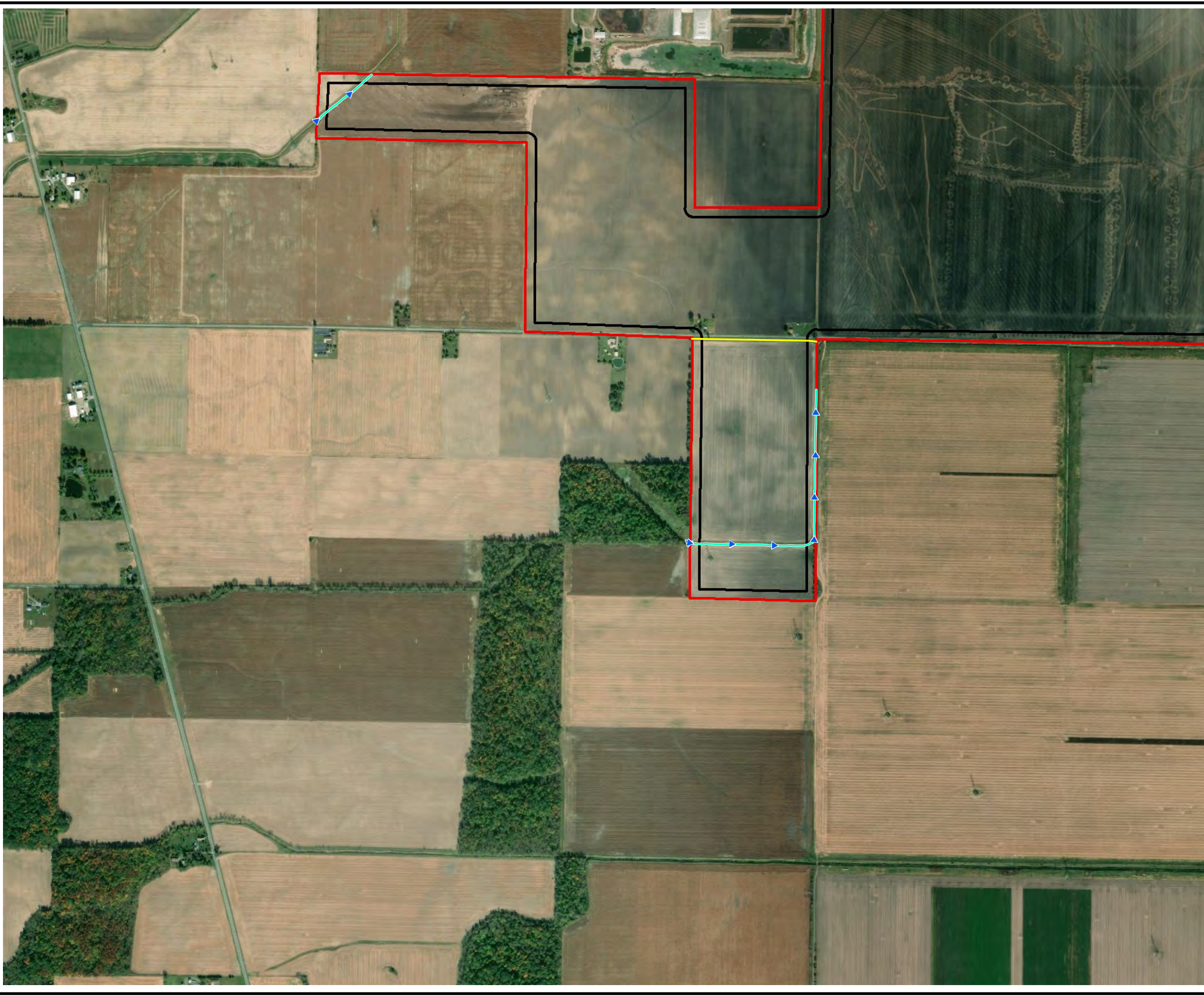
**FIGURE 7**  
Page 2 of 6

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Phone: 614.423.6334  
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FILE NO.:

HSII\_Fig7\_PhotoLocations\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

NOTE:  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

05001,000

Feet

1" = 1,000'  
1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**PHOTO DOCUMENTATION  
AND LOCATIONS**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

**FIGURE 7**  
Page 3 of 6

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FILE NO.:

HSII\_Fig7\_PhotoLocations\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

NOTE:  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

05001,000

Feet

1" = 1,000'  
1:12,000

N

PROJECT:

HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION

TITLE:

PHOTO DOCUMENTATION  
AND LOCATIONS

DRAWN BY: D. KENWORTHY  
CHECKED BY: M. MOLNAR  
APPROVED BY: J. PITTS  
DATE: OCTOBER 2018

PROJ NO.: 302899.0000.0000

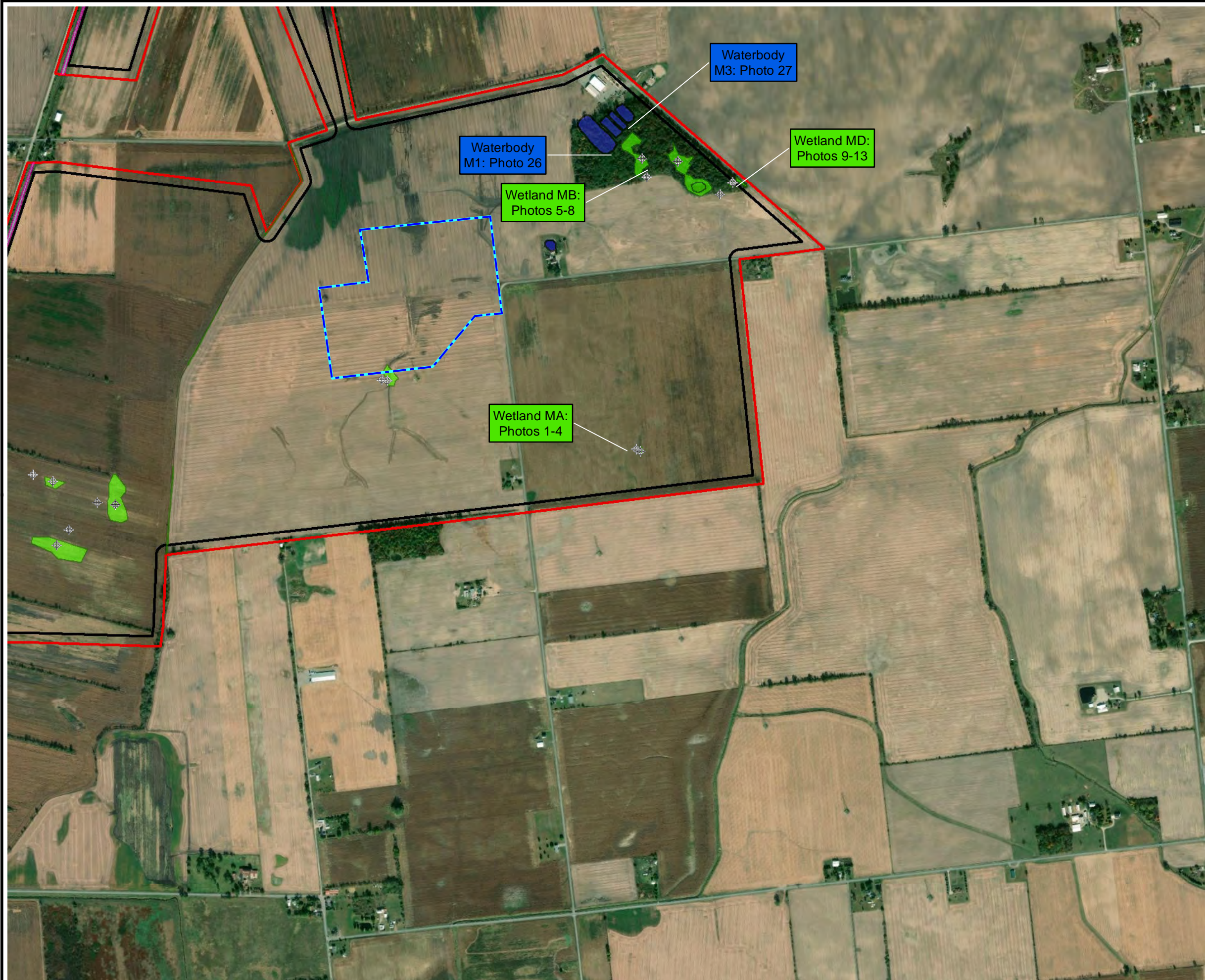
**FIGURE 7**  
Page 4 of 6

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FILE NO:

HSII\_Fig7\_PhotoLocations\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

NOTE:  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

0 500 1,000  
Feet  
1" = 1,000'  
1:12,000

PROJECT: **HARDIN SOLAR ENERGY II, LLC  
HARDIN SOLAR II ENERGY CENTER  
CONFIDENTIAL BUSINESS INFORMATION**

TITLE: **PHOTO DOCUMENTATION  
AND LOCATIONS**

DRAWN BY: D. KENWORTHY

CHECKED BY: M. MOLNAR

APPROVED BY: J. PITTS

DATE: OCTOBER 2018

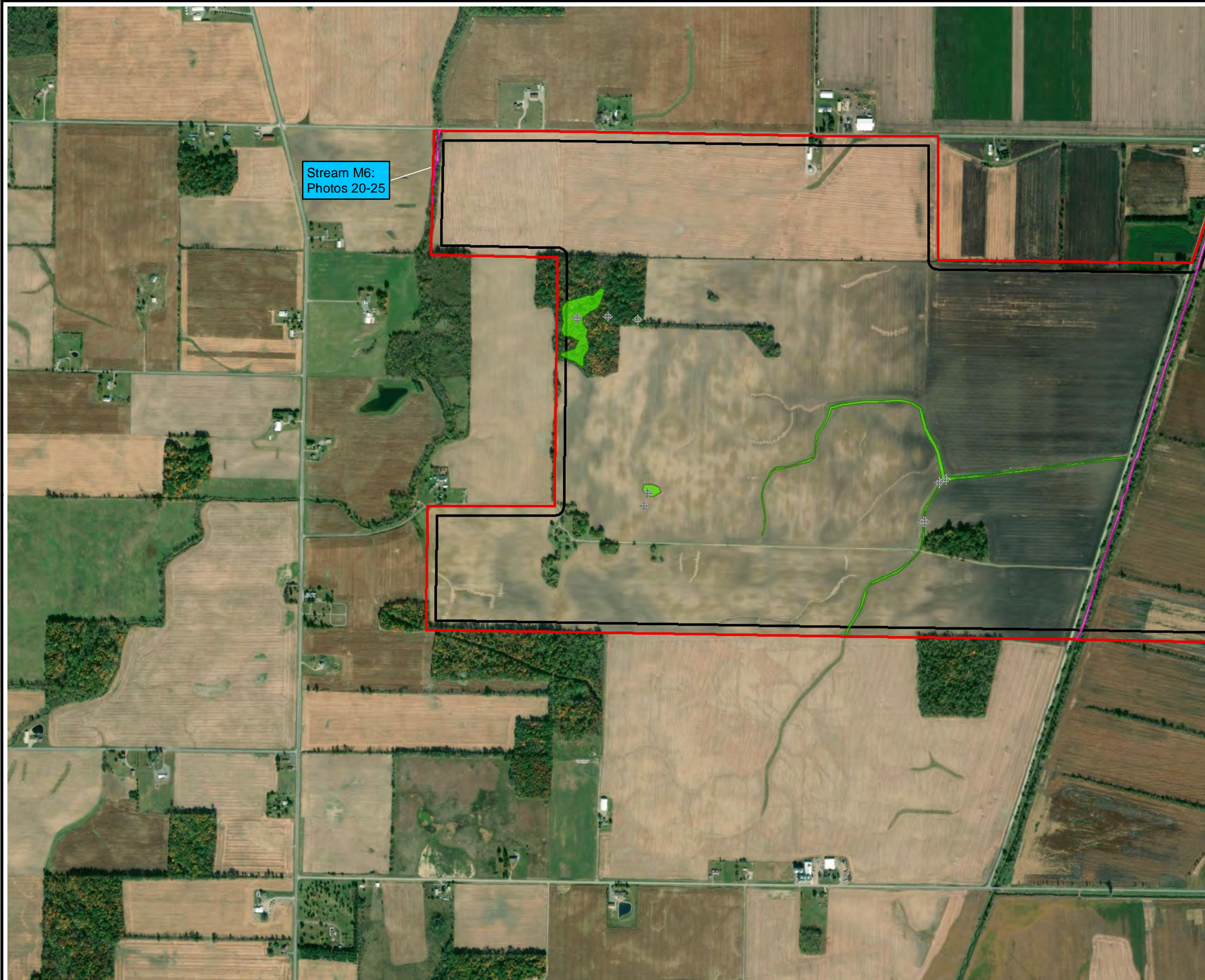
PROJ NO.: 302899.0000.0000

**FIGURE 7**  
Page 5 of 6

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Westerville, OH 43081  
Phone: 614.423.6334  
www.trcsolutions.com

FILE NO.: HSIIL\_Fig7\_PhotoLocations\_11x17.mxd





**Legend**

Study Area (September 2018)

Project Area (September 2018)

Point of Interconnection Facility Studied 2017

**Delineated Streams**

Ditch

Ephemeral

Intermittent

Perennial

**Delineated Area**

Stream Polygon

Water/Pond Boundary

Wetland Boundary

Sample Point

**NOTE:**  
LABEL LEADERS INDICATE  
THE LOCATION WHERE  
THE PHOTO WAS TAKEN.

05001,000

1" = 1,000'

1:12,000

PROJECT:

**HARDIN SOLAR ENERGY II, LLC**  
**HARDIN SOLAR II ENERGY CENTER**  
**CONFIDENTIAL BUSINESS INFORMATION**

TITLE:

**PHOTO DOCUMENTATION**  
**AND LOCATIONS**

DRAWN BY:

D. KENWORTHY

PROJ NO.:

302899.0000.0000

CHECKED BY:

M. MOLNAR

APPROVED BY:

J. PITTS

DATE:

OCTOBER 2018

**FIGURE 7**  
Page 6 of 6

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FILE NO.:



HSIL\_Fig7\_PhotoLocations\_11x17.mxd





# **Appendix B**

## **Photographic Log**



## **WETLAND RESOURCE PHOTOGRAPHS**

<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #1			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MA			
<b>Comments:</b> Photo of PEM wetland HS-MA, looking north.			
<b>Photo ID:</b> Photo #2			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MA			
<b>Comments:</b> Photo of PEM wetland HS-MA, looking east.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #3			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MA			
<b>Comments:</b> Photo of PEM wetland HS-MA, looking south.			
<b>Photo ID:</b> Photo #4			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MA			
<b>Comments:</b> Photo of PEM wetland HS-MA, looking west.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #5			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MB			
<b>Comments:</b> Photo of PFO wetland HS-MB, looking east.			
<b>Photo ID:</b> Photo #6			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MB			
<b>Comments:</b> Photo of PEM section of wetland HS-MB, looking north.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #7			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MB			
<b>Comments:</b> Photo of PFO wetland HS-MB, looking southwest.			
<b>Photo ID:</b> Photo #8			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MB			
<b>Comments:</b> Photo of PFO wetland HS-MB, looking south.			




<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #9			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MD			
<b>Comments:</b> Photo of PFO wetland HS-MD, looking north.			
<b>Photo ID:</b> Photo #10			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MD			
<b>Comments:</b> Photo of PFO wetland HS-MD, looking east.			



<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #11			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MD			
<b>Comments:</b> Photo of PFO wetland HS-MD, looking south.			
<b>Photo ID:</b> Photo # 12			
<b>Date:</b> 05/22/2018			
<b>Feature:</b> HS-MD			
<b>Comments:</b> Photo of PFO wetland HS-MD, looking west.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #13			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-MD			
<b>Comments:</b> Photo of PEM section of wetland HS-MD.			



## **WATERBODY RESOURCE PHOTOGRAPHS**





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #14			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M1			
<b>Comments:</b> Photo of perennial stream HS-M1, looking upstream.			
<b>Photo ID:</b> Photo #15			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M1			
<b>Comments:</b> Photo of perennial stream HS-M1, looking downstream.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #16			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M1			
<b>Comments:</b> Photo of perennial stream HS-M1, looking at the substrate.			
<b>Photo ID:</b> Photo #17			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M4			
<b>Comments:</b> Photo of perennial stream HS-M4, looking upstream.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #18			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M4			
<b>Comments:</b> Photo of perennial stream HS-M4, looking downstream.			
<b>Photo ID:</b> Photo #19			
<b>Date:</b> 05/18/2018			
<b>Feature:</b> HS-M4			
<b>Comments:</b> Photo of perennial stream HS-M4, looking at the substrate.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #20			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M6, looking upstream.			
<b>Photo ID:</b> Photo #21			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M1, looking downstream.			





<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #22			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M6, looking at the substrate.			
<b>Photo ID:</b> Photo #23			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M6, looking downstream.			




<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #24			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M6, looking upstream.			
<b>Photo ID:</b> Photo #25			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-M6			
<b>Comments:</b> Photo of perennial stream HS-M6, looking at the substrate.			



<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #26			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-WB-M1			
<b>Comments:</b> Photo of waterbody HS-WB-M1, looking north.			
<b>Photo ID:</b> Photo #27			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-WB-M3			
<b>Comments:</b> Photo of waterbody HS-WB-M3, looking north.			



<b>Hardin Solar Energy II, LLC</b>		<b>State:</b> Ohio	<b>County:</b> Hardin
<b>Project Name:</b> Hardin Solar II Energy Center			
<b>Photo ID:</b> Photo #28			
<b>Date:</b> 05/23/2018			
<b>Feature:</b> HS-WB-M4			
<b>Comments:</b> Photo of waterbody HS-WB-M4, looking northeast.			



## **Appendix C**

### **USACE Wetland Determination Data Forms**



# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenenergy, LLC State: OH Sampling Point: WET-HS-MA  
 Investigator(s): MMM, SKB Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): on cam  
 Slope (%): 0% Lat: 40.62892 Long: -83.78381 Datum: WGS84  
 Soil Map Unit Name: (Ble1 B1) Blount silt loam, end moraine, 2-4% slope NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☒ significantly disturbed? ☒ Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☒, Soil ☐, or Hydrology ☐ naturally problematic? ☒ (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>All 3 wetland criteria have been met.</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <del>_____</del>				
2. <del>_____</del>				
3. <del>_____</del>				
4. <del>_____</del>				
5. <del>_____</del>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	<u>0</u> = Total Cover			Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >80% 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.  Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <del>_____</del>				
2. <del>_____</del>				
3. <del>_____</del>				
4. <del>_____</del>				
5. <del>_____</del>				
Herb Stratum (Plot size: <u>5'</u> )	<u>0</u> = Total Cover			
1. <u>Galium aparine</u>	<u>50</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	
2. <u>Poa palustris</u>	<u>10</u>		<u>FACW</u>	
3. <u>Glycine max</u>	<u>10</u>		<u>UPL</u>	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
Woody Vine Stratum (Plot size: <u>30'</u> )	<u>70</u> = Total Cover			
1. <del>_____</del>				
2. <del>_____</del>				
	<u>0</u> = Total Cover			
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



## SOIL

Sampling Point: WET-HS-MA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR3/1	90	5YR5/8	2	C	M	silty clay	
			5YR3/1	2	C	M	Manganese masses	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

Indicators for Problematic Hydric Soils<sup>3</sup>:

- |  |   |
|--|---|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Gleyed Matrix (S4)           |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Sandy Redox (S5)                   |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Stripped Matrix (S6)               |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Mucky Mineral (F1)           |
| <input type="checkbox"/> Stratified Layers (A5)            | <input type="checkbox"/> Loamy Gleyed Matrix (F2)           |
| <input type="checkbox"/> 2 cm Muck (A10)                   | <input type="checkbox"/> Depleted Matrix (F3)               |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input checked="" type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Depleted Dark Surface (F7)         |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Redox Depressions (F8)             |
| <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)      |   |

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☒ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NoneDepth (inches): N/AHydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Surface Water (A1)             | <input type="checkbox"/> Water-Stained Leaves (B9)                  |
| <input checked="" type="checkbox"/> High Water Table (A2)          | <input type="checkbox"/> Aquatic Fauna (B13)                        |
| <input checked="" type="checkbox"/> Saturation (A3)                | <input type="checkbox"/> True Aquatic Plants (B14)                  |
| <input type="checkbox"/> Water Marks (B1)                          | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                 |
| <input type="checkbox"/> Sediment Deposits (B2)                    | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3)                       | <input type="checkbox"/> Presence of Reduced Iron (C4)              |
| <input type="checkbox"/> Algal Mat or Crust (B4)                   | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Iron Deposits (B6)                        | <input type="checkbox"/> Thin Muck Surface (C7)                     |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Gauge or Well Data (D9)                    |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)   | <input type="checkbox"/> Other (Explain in Remarks)                 |

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)

## Field Observations:

- |  |   |                                  |
|--|---|----------------------------------|
| Surface Water Present?                             | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | Depth (inches): <u>1"</u>        |
| Water Table Present?                               | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | Depth (inches): <u>@ surface</u> |
| Saturation Present?<br>(includes capillary fringe) | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | Depth (inches): <u>@ surface</u> |

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HF-MA  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none  
 Slope (%): 0% Lat: 40.62898 Long: -93.78397 Datum: NGS84  
 Soil Map Unit Name: (Ble1B1) Blount silt loam, end moraine, 2-4% slopes NWL classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>1 of 3 wetland criteria have been met. Area is not a wetland. Active farm field</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		<u>0</u> = Total Cover	

Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		<u>0</u> = Total Cover	

Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Glycine max</u>	<u>30</u>	<input checked="" type="checkbox"/>	<u>UPL</u>
2. <u>Zea mays</u>	<u>15</u>	<input checked="" type="checkbox"/>	<u>UPL</u>
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		<u>45</u> = Total Cover	

Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
		<u>0</u> = Total Cover	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals:	(A) (B)

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation N

2 - Dominance Test is >50% N

3 - Prevalence Index is ≤3.0 N

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ☐ No ☒



## SOIL

Sampling Point: UPL-HS-MA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-18"	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NOMDepth (Inches): N/AHydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A

Water Table Present? Yes ☐ No ☒ Depth (inches): N/A

Saturation Present? Yes ☐ No ☒ Depth (inches): N/A

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.



# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HS-MB  
 Investigator(s): SKB, MMM Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave  
 Slope (%): 0% Lat: 40.63738 Long: -83.78391 Datum: WGS84  
 Soil Map Unit Name: (PKA) Pewamosit clay loam, 0-1% slopes NWI classification: PEO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>All 3 wetland criteria have been met.</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>83%</u> (A/B)
1. <u>Populus deltoides</u>	<u>20%</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	
2. <u>Fraxinus pennsylvanica</u>	<u>10%</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
3. <u>Carya ovata</u>	<u>20%</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) 1. <u>Lindera benzoin</u> <u>10%</u> <input checked="" type="checkbox"/> <u>FACW</u> 2. _____ 3. _____ 4. _____ 5. _____				
10% = Total Cover				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0' <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>5'</u> ) 1. <u>Typha x glauca</u> <u>15%</u> <input checked="" type="checkbox"/> <u>OBL</u> 2. <u>Lemna minor</u> <u>25%</u> <input checked="" type="checkbox"/> <u>OBL</u> 3. <u>Polygonum sp.</u> <u>5%</u> <input type="checkbox"/> <u>NT</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____				
45% = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Woody Vine Stratum (Plot size: <u>30'</u> ) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____				
0 = Total Cover				Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>



## SOIL

Sampling Point: WET-MS-MB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-3"	10YR 3/1	100%					si'tt	saturated
3-18"	10YR 3/1	70%	10YR 4/6	30%	C	M	si'tt clay	saturated

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A6)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☒ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NoneDepth (inches): N/AHydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☒ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☒ Water-Stained Leaves (B9)  
☒ Aquatic Fauna (B13)  
☒ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

- Surface Water Present? Yes ☒ No ☐ Depth (inches): 5"  
 Water Table Present? Yes ☒ No ☐ Depth (inches): @surface  
 Saturation Present? Yes ☒ No ☐ Depth (inches): @surface  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



## WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: UPL-HS-MB  
 Investigator(s): MMM, SKB Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none

Slope (%): 00% Lat: 40.63686 Long: -83.78372 Datum: NGS84

Soil Map Unit Name: (Bgl1A1) Blant silt loam ground moraine, 0-2% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Aesculus glabra</u>	<u>5%</u>	<input type="checkbox"/>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. <u>Carya ovata</u>	<u>20%</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	Total Number of Dominant Species Across All Strata: <u>4</u> (B)
3. <u>Fraxinus pennsylvanica</u>	<u>5%</u>	<input type="checkbox"/>	<u>FACW</u>	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
4. _____	_____	<input type="checkbox"/>	_____	
5. _____	_____	<input type="checkbox"/>	_____	
<u>80%</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet:
1. <u>Lindera benzoin</u>	<u>30%</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	Total % Cover of: _____ Multiply by: _____
2. _____	_____	<input type="checkbox"/>	_____	OBL species <u>0</u> x 1 = <u>0</u>
3. _____	_____	<input type="checkbox"/>	_____	FACW species <u>5</u> x 2 = <u>10</u>
4. _____	_____	<input type="checkbox"/>	_____	FAC species <u>50</u> x 3 = <u>150</u>
5. _____	_____	<input type="checkbox"/>	_____	FACU species <u>50</u> x 4 = <u>200</u>
<u>30%</u> = Total Cover				UPL species <u>5</u> x 5 = <u>25</u>
				Column Totals: <u>110</u> (A) <u>385</u> (B)
				Prevalence Index = B/A = <u>3.5</u>
Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:
1. <u>Hydrophyllum virginianum</u>	<u>15%</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	1 - Rapid Test for Hydrophytic Vegetation <u>N</u>
2. <u>Podophyllum peltatum</u>	<u>25%</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	2 - Dominance Test is >60% <u>N</u>
3. <u>Polygonatum biflorum</u>	<u>5%</u>	<input type="checkbox"/>	<u>FACU</u>	3 - Prevalence Index is ≥3.0 <u>N</u>
4. <u>Jeffersonia diphylla</u>	<u>5%</u>	<input type="checkbox"/>	<u>UPL</u>	4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
5. _____	_____	<input type="checkbox"/>	_____	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
6. _____	_____	<input type="checkbox"/>	_____	
7. _____	_____	<input type="checkbox"/>	_____	
8. _____	_____	<input type="checkbox"/>	_____	
9. _____	_____	<input type="checkbox"/>	_____	
10. _____	_____	<input type="checkbox"/>	_____	
<u>50</u> = Total Cover				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present?
1. _____	_____	<input type="checkbox"/>	_____	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. _____	_____	<input type="checkbox"/>	_____	
<u>0</u> = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation criterion has not been met.



## SOIL

Sampling Point: UPL-HS-MB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR 2/1	100					silty loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NoneDepth (inches): N/AHydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has not been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A  
 Water Table Present? Yes ☐ No ☒ Depth (inches): N/A  
 Saturation Present? Yes ☐ No ☒ Depth (inches): N/A  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.



# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Inveenergy, LLC. State: OH Sampling Point: WET-HS-MC  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): CONCAVE  
 Slope (%): 0% Lat: 40.63731 Long: -83.78254 Datum: WGS84  
 Soil Map Unit Name: (PKA) Pewamo silty clay loam, 0-1% slopes NWI classification: PFO1C  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>ALL 3 wetland criteria have been met.</u>			

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>Platanus occidentalis</u>	<u>10</u>		<u>FACW</u>	
2. <u>Acer saccharinum</u>	<u>50</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
3. <u>Fraxinus pennsylvanica</u>	<u>15</u>		<u>FACW</u>	
4. <u>Quercus palustris</u>	<u>5</u>		<u>FACW</u>	
5. _____				
<u>80</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) 1. <u>Fraxinus pennsylvanica</u> <u>10</u> <input checked="" type="checkbox"/> <u>FACW</u> 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ _____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u> ) 1. <u>Carex spirochaeta</u> <u>35</u> <input checked="" type="checkbox"/> <u>OBL</u> 2. <u>Parthenocissus quinquefolia</u> <u>10</u> <u>FACU</u> 3. <u>Arisaema triphyllum</u> <u>10</u> <u>FACW</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>55</u> = Total Cover 1. _____ 2. _____ _____ = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet.)  
Hydrophytic vegetation criterion has been met.



## SOIL

Sampling Point: WET-45-MC

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR 2/1	95	10YR 4/6	5	C	M	silty clay	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☒ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A6)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: None  
 Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)
- ☒ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☒ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 2"  
 Water Table Present? Yes ☒ No ☐ Depth (inches): @surface  
 Saturation Present? Yes ☒ No ☐ Depth (inches): @surface  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



WET portion

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin solar II City/County: Hardin County Sampling Date: 5/22/18  
Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HS-MD  
Investigator(s): MMMSKB Section, Township, Range: N/A  
Landform (hillslope, terrace, etc.): depression/swale Local relief (concave, convex, none): concave  
Slope (%): 0% Lat: 40.63672 Long: -83.78040 Datum: WGS84  
Soil Map Unit Name: (PKA) Penamossity clay loam, 0-10% slopes NWI classification: None  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐  
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Remarks: All 3 wetland criteria have been met.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<b>Sapling/Shrub Stratum (Plot size: <u>15'</u>)</b>				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<b>Herb Stratum (Plot size: <u>5'</u>)</b>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 <sup>1</sup> ___ 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Carex crinata</u>	<u>40</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	
2. <u>Phalaris arundinacea</u>	<u>60</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<b>Woody Vine Stratum (Plot size: <u>30'</u>)</b>				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
<b>Remarks: (Include photo numbers here or on a separate sheet.)</b> <u>Hydrophytic vegetation criterion has been met.</u>				



## SOIL

Sampling Point: WET-HS-MD

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR4/2	85	10YR4/6	15	C	M	silty clay	gravel

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☒ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: None  
 Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☒ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D6)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 2"  
 Water Table Present? Yes ☒ No ☐ Depth (inches): @surface  
 Saturation Present? Yes ☒ No ☐ Depth (inches): @surface  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



PFO portion

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin solar II City/County: Hardin County Sampling Date: 5/22/18  
Applicant/Owner: TRC/Invenergy, LLC State: OH Sampling Point: WET-HS-MD  
Investigator(s): MMM, SKB Section, Township, Range: N/A  
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave  
Slope (%): 0% Lat: 40.63673 Long: -83.78047 Datum: WGS84  
Soil Map Unit Name: (PKA)Pewamo silty clay loam, 0-10% slopes NWI classification: None  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐  
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>All 3 wetland criteria have been met.</u>			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80%</u> (A/B)
1. <u>Fraxinus pennsylvanica</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
2. <u>Ostrya virginiana</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	
3.				
4.				
5.				
<u>10</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet: Total % Cover of: Multiplied by: OBL species <input type="checkbox"/> x 1 = <input type="checkbox"/> FACW species <input type="checkbox"/> x 2 = <input type="checkbox"/> FAC species <input type="checkbox"/> x 3 = <input type="checkbox"/> FACU species <input type="checkbox"/> x 4 = <input type="checkbox"/> UPL species <input type="checkbox"/> x 5 = <input type="checkbox"/> Column Totals: (A) <input type="checkbox"/> (B) <input type="checkbox"/>  Prevalence Index = B/A = <input type="checkbox"/>
1. <u>Lindera benzoin</u>	<u>40</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
2. <u>Fraxinus pennsylvanica</u>	<u>5</u>		<u>FACW</u>	
3.				
4.				
5.				
<u>45</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.  Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>Carex grayi</u>	<u>40</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
2. <u>Carex crinata</u>	<u>20</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	
3. <u>Carex blanda</u>	<u>5</u>		<u>FAC</u>	
4.				
5.				
6.				
7.				
8.				
9.				
10.				
<u>65</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	
1.				
2.				
<u>0</u> = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



PFO portion

SOIL

Sampling Point: WET-HS-MD

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-8"	10YR9/1	100						
8-18"	10YR4/2	85	10YR4/6	15	C	M	silt loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Dark Surface (S7)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Iron-Manganese Masses (F12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):  
Type: NONE  
Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

Remarks: Hydric soil criterion has been met.

HYDROLOGY

Wetland Hydrology Indicators:

<u>Primary Indicators (minimum of one is required; check all that apply)</u>		<u>Secondary Indicators (minimum of two required)</u>
<input checked="" type="checkbox"/> Surface Water (A1)	<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Gauge or Well Data (D9)	
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:

Surface Water Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>2"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>@surface</u>	
Saturation Present? (includes capillary fringe)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>@surface</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
N/A

Remarks: wetland hydrology criterion has been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HS-MC/MD  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): None  
 Slope (%): 0% Lat: 40.63638 Long: -83.78094 Datum: NGS84  
 Soil Map Unit Name: (Bgl LB1) Blount silt loam, ground moraine, 2-40% slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? N Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33%</u> (A/B)
1. <u>Tilia americana</u>	<u>60</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	
2. <u>Crataegus sp.</u>	<u>10</u>	<input type="checkbox"/>	<u>NT</u>	
3. _____	_____	<input type="checkbox"/>	_____	
4. _____	_____	<input type="checkbox"/>	_____	
5. _____	_____	<input type="checkbox"/>	_____	
<u>70</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) 1. <u>Cornus amomum</u> <u>10</u> <input checked="" type="checkbox"/> <u>FACW</u> 2. _____ 3. _____ 4. _____ 5. _____				
<u>10</u> = Total Cover				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>5'</u> ) 1. <u>Podophyllum peltatum</u> <u>50</u> <input checked="" type="checkbox"/> <u>FACU</u> 2. <u>Dicentra cucullaria</u> <u>10</u> <input type="checkbox"/> <u>UPL</u> 3. <u>Hydrophyllum virginiana</u> <u>10</u> <input type="checkbox"/> <u>FAC</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____				
<u>70</u> = Total Cover				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Woody Vine Stratum (Plot size: <u>30'</u> ) 1. _____ 2. _____ _____ = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation criterion has not been met.



# SOIL

Sampling Point: UPL-HS-MC/MD

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR 3/1	100						

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> 2 cm Muck (A10)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: <u>None</u> Depth (inches): <u>N/A</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: Hydric soil criterion has ~~not been~~ met.

# HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B6)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Gauge or Well Data (D9)	
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: <u>N/A</u>	Depth (inches): <u>N/A</u> Depth (inches): <u>N/A</u> Depth (inches): <u>N/A</u> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: wetland hydrology criterion has ~~not been~~ met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 6/13/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: WET-HS-MQ  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): Depression/swale Local relief (concave, convex, none): concave  
 Slope (%): 50% Lat: 40.63086 Long: -83.79345 Datum: WGS84  
 Soil Map Unit Name: (PKA) Penamossity clayloam, 0-10% slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>All 3 wetland criteria have been met.</u> <u>Actively farmed + adjacent AEP construction</u>			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)  Total Number of Dominant Species Across All Strata: _____ (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
1. <u>/</u>				
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
1. <u>/</u>				
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Ambrosia trifida</u>	<u>2</u>			
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>2</u> = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>/</u>				
2. <u>/</u>				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u> <u>Sparsely vegetated concave surface. Hydrophytic vegetation assumed.</u>				



## SOIL

Sampling Point: WET-HS-MQ

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6"	10YR 3/1	100					clay	
6-18"	10YR 2/1	80	3.5YR 4/6	20	C	M	clay	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: None  
 Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☒ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☒ Inundation Visible on Aerial Imagery (B7)  
☒ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☒ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☒ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): .25"  
 Water Table Present? Yes ☐ No ☒ Depth (inches):    
 Saturation Present? Yes ☒ No ☐ Depth (inches): @surface  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 6/13/16  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HS-MQ  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): rolling hill Local relief (concave, convex, none): convex  
 Slope (%): 5% Lat: 40.630864 Long: -83.79345 Datum: NGS84  
 Soil Map Unit Name: (PKA) Penamas Hy clay loam, 0-1% slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? N (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland. Active farmfield</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>/</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>0.1</u> (A)
2. <u>/</u>				Total Number of Dominant Species Across All Strata: <u>1</u> (B)
3. <u>/</u>				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				Prevalence Index worksheet:
1. <u>/</u>				Total % Cover of: <u>0</u> Multiply by: <u>1</u>
2. <u>/</u>				OBL species <u>0</u> x 1 = <u>0</u>
3. <u>/</u>				FACW species <u>0</u> x 2 = <u>0</u>
4. <u>/</u>				FAC species <u>0</u> x 3 = <u>0</u>
5. <u>/</u>				FACU species <u>0</u> x 4 = <u>0</u>
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				UPL species <u>0</u> x 5 = <u>0</u>
1. <u>Ze mays</u>	<u>30</u>	<input checked="" type="checkbox"/>	<u>UPL</u>	Column Totals: <u>0</u> (A) <u>0</u> (B)
2. <u>/</u>				Prevalence Index = B/A = <u>0</u>
3. <u>/</u>				Hydrophytic Vegetation Indicators:
4. <u>/</u>				<u>1</u> - Rapid Test for Hydrophytic Vegetation
5. <u>/</u>				<u>2</u> - Dominance Test is >50%
6. <u>/</u>				<u>3</u> - Prevalence Index is ≤3.0 <sup>1</sup>
7. <u>/</u>				<u>4</u> - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
8. <u>/</u>				<u>Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</u>
9. <u>/</u>				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
10. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>0</u> = Total Cover				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1. <u>/</u>				
2. <u>/</u>				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation criterion has not been met.



## SOIL

Sampling Point: UPL-HS-MQ

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR 3/1	100					clay	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (inches): N/A

Hydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has not been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B9)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒  
 Water Table Present? Yes ☐ No ☒  
 Saturation Present? Yes ☐ No ☒  
 (includes capillary fringe)

Depth (inches): N/A  
 Depth (inches): N/A  
 Depth (inches): N/A

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-45-VA  
 Investigator(s): JDR, LM TR Section, Township, Range: S10, T55, R9E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None  
 Slope (%): 0-5 Lat: 40.62780 Long: -83.81884 Datum: WGS84  
 Soil Map Unit Name: PKA - Peoria silt clay loam, 0 to 1% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>All 3 wetland criteria have been met.</u>			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)														
1. <u>None</u>																		
2.																		
3.																		
4.																		
= Total Cover				<b>Prevalence Index worksheet:</b> <table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> </tr> </thead> <tbody> <tr><td>OBL species <u>0</u></td><td>x 1 = <u>0</u></td></tr> <tr><td>FACW species <u>77</u></td><td>x 2 = <u>154</u></td></tr> <tr><td>FAC species <u>35</u></td><td>x 3 = <u>105</u></td></tr> <tr><td>FACU species <u>0</u></td><td>x 4 = <u>0</u></td></tr> <tr><td>UPL species <u>0</u></td><td>x 5 = <u>0</u></td></tr> <tr><td>Column Totals: <u>112</u> (A)</td><td><u>259</u> (B)</td></tr> </tbody> </table> Prevalence Index = B/A = <u>2.31</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>77</u>	x 2 = <u>154</u>	FAC species <u>35</u>	x 3 = <u>105</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>112</u> (A)	<u>259</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>77</u>	x 2 = <u>154</u>																	
FAC species <u>35</u>	x 3 = <u>105</u>																	
FACU species <u>0</u>	x 4 = <u>0</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>112</u> (A)	<u>259</u> (B)																	
= Total Cover																		
<b>Sapling/Shrub Stratum (Plot size: <u>15'</u>)</b>																		
1. <u>None</u>																		
2.																		
3.																		
4.																		
5.																		
= Total Cover																		
<b>Herb Stratum (Plot size: <u>5'</u>)</b>																		
1. <u>Phalaris arundinacea</u>	<u>55</u>	<u>Y</u>	<u>FACW</u>															
2. <u>Juncus tenuis</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>															
3. <u>Echinochloa crus-galli</u>	<u>10</u>	<u>N</u>	<u>FACW</u>															
4. <u>Allaria petiolata</u>	<u>5</u>	<u>N</u>	<u>FAC</u>															
5. <u>Apocynum cannabinum</u>	<u>5</u>	<u>N</u>	<u>FAC</u>															
6. <u>Mentha spicata</u>	<u>5</u>	<u>N</u>	<u>FACW</u>															
7.																		
8.																		
9.																		
10.																		
= Total Cover																		
<b>Woody Vine Stratum (Plot size: <u>30'</u>)</b>																		
1. <u>None</u>																		
2.																		
= Total Cover																		
<b>Hydrophytic Vegetation Indicators:</b> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input checked="" type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <input type="checkbox"/>																		
<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																		
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																		
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>																		



## SOIL

Sampling Point: WET-45-VA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-14	2Y 4/2	95	2.5 10 Y 4/2	5	2	PL	Sic	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☒ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: \_\_\_\_\_

Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☒ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): \_\_\_\_\_Water Table Present? Yes ☐ No ☐ Depth (inches): 8Saturation Present? Yes ☒ No ☐ Depth (inches): 0  
(includes capillary fringe)Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HS-LA  
 Investigator(s): JOK, LM, TR Section, Township, Range: S10, T55, R1E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None  
 Slope (%): 0-5 Lat: 40.62651 Long: -83.81838 Datum: WGS84  
 Soil Map Unit Name: PKA - Peewee silty clay lam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>0 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>None</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)
2.				Total Number of Dominant Species Across All Strata: <u>3</u> (B)
3.				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
4.				
5.				
= Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				Prevalence Index worksheet:
1. <u>None</u>				Total % Cover of: <u>0</u> Multiply by: <u>1</u> = <u>0</u>
2.				OBL species <u>0</u> x 1 = <u>0</u>
3.				FACW species <u>0</u> x 2 = <u>0</u>
4.				FAC species <u>8</u> x 3 = <u>24</u>
5.				FACU species <u>85</u> x 4 = <u>340</u>
				UPL species <u>15</u> x 5 = <u>75</u>
= Total Cover				Column Totals: <u>108</u> (A) <u>439</u> (B)
Herb Stratum (Plot size: <u>5'</u> )				Prevalence Index = B/A = <u>4.06</u>
1. <u>Festuca rubra</u>	<u>40</u>	<u>Y</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0' ___ 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Rhynchospora pruriens</u>	<u>20</u>	<u>Y</u>	<u>FACU</u>	
3. <u>Cirsium discolor</u>	<u>20</u>	<u>Y</u>	<u>FACU</u>	
4. <u>Viola aduncata</u>	<u>15</u>	<u>N</u>	<u>UPL</u>	
5. <u>Apocynum cannabinum</u>	<u>8</u>	<u>N</u>	<u>FAC</u>	
6. <u>Arisaema filifolium</u>	<u>5</u>	<u>N</u>	<u>FACU</u>	
7.				
8.				
9.				
10.				
= Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )				
1. <u>None</u>				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2.				
= Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



## SOIL

Sampling Point: UPL-HS-VA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-14	10YR 3/2	100					SiC	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: \_\_\_\_\_

Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes \_\_\_\_\_ No X

## Remarks:

Hydric soil criterion has not been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required: check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes \_\_\_\_\_ No X Depth (inches): \_\_\_\_\_Water Table Present? Yes \_\_\_\_\_ No X Depth (inches): \_\_\_\_\_Saturation Present? Yes \_\_\_\_\_ No X Depth (inches): \_\_\_\_\_  
(includes capillary fringe)Wetland Hydrology Present? Yes \_\_\_\_\_ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: WET-415-VB  
 Investigator(s): JDR, LM, TR Section, Township, Range: S9, T5S, R9E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave  
 Slope (%): 0-5 Lat: 40.62732 Long: -83.82878 Datum: WGS84  
 Soil Map Unit Name: (PkA) Pewamo silty clay loam, 0-1% slopes NWI classification: PEM1C  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>All 3 wetland criteria have been met.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>1</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>None</u>				
2. _____				
3. _____				
4. _____				
5. _____				
= Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				
1. <u>None</u>				
2. _____				
3. _____				
4. _____				
5. _____				
= Total Cover				
Herb Stratum (Plot size: <u>5'</u> )				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 <sup>1</sup> ___ 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Juncus tenuis</u>	<u>12</u>	<u>Y</u>	<u>FAC</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
= Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>None</u>				
2. _____				
= Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



Sampling Point: WET-HS-VB

## HYDROLOGY

**Primary Indicators** (minimum of one is required; check all that apply)

US Army Corps of Engineers



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: JRC/Invenenergy, LLC. State: OH Sampling Point: UPL-HS-VB  
 Investigator(s): Jay, LM, TR Section, Township, Range: S9, T5S, R9E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): Convex  
 Slope (%): 0-5 Lat: 40.62685 Long: -83.92902 Datum: NGS84  
 Soil Map Unit Name: (Gwd5C2) Glynwood clay loam, ground moraine, 6-12% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No      (If no, explain in Remarks.)  
 Are Vegetation     , Soil     , or Hydrology      significantly disturbed? Are "Normal Circumstances" present? Yes X No       
 Are Vegetation     , Soil     , or Hydrology      naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>    </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u>    </u> No <u>X</u>
Hydric Soil Present?	Yes <u>    </u> No <u>X</u>	
Wetland Hydrology Present?	Yes <u>    </u> No <u>X</u>	
Remarks: <u>0 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
1. <u>None</u>				
2. <u>    </u>				
3. <u>    </u>				
4. <u>    </u>				
5. <u>    </u>				
= Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0' 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>None</u>				
2. <u>    </u>				
3. <u>    </u>				
4. <u>    </u>				
= Total Cover				
Herb Stratum (Plot size: <u>5'</u> )				Hydrophytic Vegetation Present? Yes <u>    </u> No <u>X</u>
1. <u>Glycine max</u>	<u>8</u>	<u>Y</u>	<u>UPL</u>	
2. <u>    </u>				
3. <u>    </u>				
4. <u>    </u>				
5. <u>    </u>				
6. <u>    </u>				
7. <u>    </u>				
8. <u>    </u>				
9. <u>    </u>				
10. <u>    </u>				
= Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )				
1. <u>None</u>				
2. <u>    </u>				
= Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



## SOIL

Sampling Point: UPL-45-VB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
0-10	10YR 5/3	100					S, CL
10-14	10YR 4/3	100					CL

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators:</b> <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b> <input type="checkbox"/> Coast Prairie Redox (A16) <input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Iron-Manganese Masses (F12) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed):</b> Type: _____ Depth (Inches): _____	Hydric Soil Present? Yes _____ No <u>X</u>
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Remarks: Hydric soil criterion has not been met.

## HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one is required: check all that apply)	Secondary Indicators (minimum of two required)	
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Gauge or Well Data (D9) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
N/A

Remarks: Wetland hydrology criterion has not been met.



# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin solar II City/County: Hardin County Sampling Date: 5/23/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: WET-HS-VC  
 Investigator(s): JDR, LM, TR Section, Township, Range: S4, T55, R9E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave  
 Slope (%): 0-5 Lat: 40.63208 Long: -83.83163 Datum: WGS84  
 Soil Map Unit Name: (Pka) Pewamo silty clay loam, 0-1% NWI classification: PFO1A2  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No      (If no, explain in Remarks.)  
 Are Vegetation     , Soil     , or Hydrology      significantly disturbed? Are "Normal Circumstances" present? Yes X No       
 Are Vegetation     , Soil     , or Hydrology      naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>✓</u>	No <u>    </u>	Is the Sampled Area within a Wetland?	Yes <u>✓</u>	No <u>    </u>
Hydric Soil Present?	Yes <u>✓</u>	No <u>    </u>			
Wetland Hydrology Present?	Yes <u>✓</u>	No <u>    </u>			
Remarks: <u>All 3 wetland criteria have been met.</u>					

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>71%</u> (A/B)														
1. <u>Acer rubrum</u>	<u>45</u>	<u>Y</u>	<u>FAC</u>															
2. <u>Taxus nigra</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>															
3. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
4. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
5. <u>    </u>																		
<u>65</u> = Total Cover																		
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Prevalence Index worksheet:</b> <table border="0"> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> </tr> <tr> <td>OBL species <u>46</u></td> <td>x 1 = <u>46</u></td> </tr> <tr> <td>FACW species <u>53</u></td> <td>x 2 = <u>106</u></td> </tr> <tr> <td>FAC species <u>87</u></td> <td>x 3 = <u>261</u></td> </tr> <tr> <td>FACU species <u>25</u></td> <td>x 4 = <u>100</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>205</u> (A)</td> <td><u>507</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>2.47</u>	Total % Cover of:	Multiply by:	OBL species <u>46</u>	x 1 = <u>46</u>	FACW species <u>53</u>	x 2 = <u>106</u>	FAC species <u>87</u>	x 3 = <u>261</u>	FACU species <u>25</u>	x 4 = <u>100</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>205</u> (A)	<u>507</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>46</u>	x 1 = <u>46</u>																	
FACW species <u>53</u>	x 2 = <u>106</u>																	
FAC species <u>87</u>	x 3 = <u>261</u>																	
FACU species <u>25</u>	x 4 = <u>100</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>205</u> (A)	<u>507</u> (B)																	
1. <u>Acer rubrum</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>															
2. <u>Lindera benzoin</u>	<u>8</u>	<u>Y</u>	<u>FACW</u>															
3. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
4. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
5. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
<u>73</u> = Total Cover																		
Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Hydrophytic Vegetation Indicators:</b> 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50% X 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)														
1. <u>Glyceria striata</u>	<u>40</u>	<u>Y</u>	<u>OBL</u>															
2. <u>Urtica dioica</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>															
3. <u>Barbarea vulgaris</u>	<u>15</u>	<u>N</u>	<u>FAC</u>															
4. <u>Carex grayi</u>	<u>15</u>	<u>N</u>	<u>FACW</u>															
5. <u>Althaea petiolata</u>	<u>12</u>	<u>N</u>	<u>FAC</u>															
6. <u>Agrimonia parviflora</u>	<u>10</u>	<u>N</u>	<u>FACW</u>															
7. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
8. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
9. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
10. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>															
<u>112</u> = Total Cover																		
Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Hydrophytic Vegetation Present?</b> Yes <u>✓</u> No <u>    </u>														
1. <u>Parthenocissus quinquefolia</u>	<u>5</u>	<u>Y</u>	<u>FACU</u>															
2. <u>    </u>	<u>5</u>	<u>    </u>	<u>    </u>															
<u>5</u> = Total Cover																		
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>																		



## SOIL

Sampling Point: WET-45-VC

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-4	2.5Y 3/1	100					CL	
4-14	10YR 3/1	95	10YR 4/4	5	C	M	CL	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☒ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☒ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☒ Surface Soil Cracks (B6)  
☒ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 2  
 Water Table Present? Yes ☒ No ☐ Depth (inches): 0  
 Saturation Present? Yes ☒ No ☐ Depth (inches): 0  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/23/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-45-KC10  
 Investigator(s): JOV, LM, TR Section, Township, Range: S4, T55, R9E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): Concave  
 Slope (%): 0-5 Lat: 40.63230 Long: -83.83053 Datum: NGS84  
 Soil Map Unit Name: (Blg1A1) Blount silt loam, ground moraine, 0-2% slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No      (If no, explain in Remarks.)  
 Are Vegetation     , Soil     , or Hydrology      significantly disturbed? Are "Normal Circumstances" present? Yes X No       
 Are Vegetation     , Soil     , or Hydrology      naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>    </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u>    </u> No <u>X</u>
Hydric Soil Present?	Yes <u>    </u> No <u>X</u>	
Wetland Hydrology Present?	Yes <u>    </u> No <u>X</u>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>25%</u> (A/B)
1. <u>Acer rubrum</u>	<u>80</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Juglans nigra</u>	<u>12</u>	<u>N</u>	<u>FACW</u>	
3. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
4. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
5. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
<u>92</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>88</u> x 3 = <u>264</u> FACU species <u>62</u> x 4 = <u>248</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>150</u> (A) <u>512</u> (B) Prevalence Index = B/A = <u>3.41</u>
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				
1. <u>None</u>	<u>    </u>	<u>    </u>	<u>    </u>	
2. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
3. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
4. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
5. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
<u>    </u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u> )				
1. <u>Agropyron repens</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Polygonum persicaria</u>	<u>15</u>	<u>Y</u>	<u>FACW</u>	
3. <u>Juglans nigra</u>	<u>10</u>	<u>N</u>	<u>FACW</u>	
4. <u>Acer rubrum</u>	<u>8</u>	<u>N</u>	<u>FAC</u>	
5. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
6. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
7. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
8. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
9. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
10. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
<u>53</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )				
1. <u>Parthenocissis quinquefolia</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>	
2. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	
<u>5</u> = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



Sampling Point: UPL-415-VC/D

HYDROLOGY			
<b>Wetland Hydrology Indicators:</b>			
<u>Primary Indicators (minimum of one is required; check all that apply)</u>		<u>Secondary Indicators (minimum of two required)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)	
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)	
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Crayfish Burrows (C8)	
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Stunted or Stressed Plants (D1)	
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Geomorphic Position (D2)	
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> FAC-Neutral Test (D5)	
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Gauge or Well Data (D9)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Other (Explain in Remarks)		
<b>Field Observations:</b>			
Surface Water Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches):	
Water Table Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches):	
Saturation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches):	
(includes capillary fringe)		Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
N/A			
Remarks:			
Wetland hydrology criterion has <u>not been</u> met.			

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin solar II City/County: Hardin County Sampling Date: 5/23/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: WET-HS-VD  
 Investigator(s): JDK, LM, JR Section, Township, Range: 54, T55, R9E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave  
 Slope (%): 0-5 Lat: 40.63222 Long: -83.82940 Datum: WGS84  
 Soil Map Unit Name: (Blg1A1) Blount silt loam, ground moraine, 0-2% slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>All 3 wetland criteria have been met.</u>			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>86%</u> (A/B)
1. <u>Nyssa sylvatica</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Acer rubrum</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Thlaspi arvense</u>	<u>10</u>	<u>N</u>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>70</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>30</u> x 2 = <u>60</u> FAC species <u>28</u> x 3 = <u>84</u> FACU species <u>15</u> x 4 = <u>60</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>123</u> (A) <u>354</u> (B) Prevalence Index = B/A = <u>2.88</u>
1. <u>Lonicera benzoin</u>	<u>30</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Cornus amomum</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>30</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Alliaria petiolata</u>	<u>10</u>	_____	<u>FAC</u>	
2. <u>Poa pratensis</u>	<u>8</u>	_____	<u>FAC</u>	
3. <u>Agrostis costellata</u>	<u>5</u>	_____	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>23</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>None</u>	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



## SOIL

Sampling Point: WET-45-V0

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-4	10YR 4/1	100					S:CL	
4-14	10YR 3/2	95	10YR 4/4	5	C	m	CL	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☒ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☒ Inundation Visible on Aerial Imagery (B7)  
☒ Sparsely Vegetated Concave Surface (B8)

- ☒ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 3  
 Water Table Present? Yes ☒ No ☐ Depth (inches): 0  
 Saturation Present? Yes ☒ No ☐ Depth (inches): 0  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Wind Energy Project City/County: Hardin County Sampling Date: 5/15/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HW-MH  
 Investigator(s): M. Molnar, J. Whittle Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave  
 Slope (%): 0% Lat: 40.65226 Long: -83.79237 Datum: WGS84  
 Soil Map Unit Name: (Ro) Roundhead Muck NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No      (If no, explain in Remarks.)  
 Are Vegetation      Soil ✓ or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes X No       
 Are Vegetation      Soil      or Hydrology      naturally problematic? (if needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>✓</u>	No <u>    </u>	Is the Sampled Area within a Wetland?	Yes <u>✓</u>	No <u>    </u>
Hydric Soil Present?	Yes <u>✓</u>	No <u>    </u>			
Wetland Hydrology Present?	Yes <u>✓</u>	No <u>    </u>			
Remarks: <u>All 3 wetland criteria have been met.</u> <u>Ditched + dredged</u>					

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>    </u>				
2. <u>    </u>				
3. <u>    </u>				
4. <u>    </u>				
5. <u>    </u>				
Sampling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				
1. <u>    </u>				Hydrophytic Vegetation Indicators: <u>✓</u> 1 - Rapid Test for Hydrophytic Vegetation <u>✓</u> 2 - Dominance Test is >50% <u>    </u> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <u>    </u> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <u>    </u> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>    </u>				
3. <u>    </u>				
4. <u>    </u>				
5. <u>    </u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				
1. <u>Typha x glauca</u>	<u>20</u>	<u>✓</u>	<u>OBL</u>	Hydrophytic Vegetation Present? Yes <u>✓</u> No <u>    </u>
2. <u>Phalaris arundinacea</u>	<u>30</u>	<u>✓</u>	<u>FACW</u>	
3. <u>Rumex crispus</u>	<u>10</u>	<u>    </u>	<u>FAC</u>	
4. <u>Allisoma subcordatum</u>	<u>8</u>	<u>    </u>	<u>OBL</u>	
5. <u>Ranunculus sceleratus</u>	<u>2</u>	<u>    </u>	<u>OBL</u>	
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>70</u> = Total Cover				
1. <u>    </u>				
2. <u>    </u>				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



## SOIL

Sampling Point: WET-HW-M-H

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-20"	7.5YR2/1	70	5R5/8	30	C	PL	MUCK	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: None  
 Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)  
☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☒ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☒ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☒ Surface Soil Cracks (B6)  
☒ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☒ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☒ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 4"  
 Water Table Present? Yes ☒ No ☐ Depth (inches): @ surface  
 Saturation Present? Yes ☒ No ☐ Depth (inches): @ surface  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Wind Energy Project City/County: Hardin County Sampling Date: 5/15/18  
 Applicant/Owner: TRC/Invenenergy, LLC State: OH Sampling Point: UPL-WH-MH  
 Investigator(s): M. Molnar, J. White Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): Elevation Local relief (concave, convex, none): None  
 Slope (%): 0% Lat: 40.65227 Long: -83.79237 Datum: NGS84  
 Soil Map Unit Name: (Ro) Roundhead Muck NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland. Active ag.</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. <u>Diaprepes</u>				
2. <u>Diaprepes</u>				
3. <u>Diaprepes</u>				
4. <u>Diaprepes</u>				
5. <u>Diaprepes</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				
1. <u>Diaprepes</u>				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. <u>Diaprepes</u>				
3. <u>Diaprepes</u>				
4. <u>Diaprepes</u>				
5. <u>Diaprepes</u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				
1. <u>Capsella bursa-pastoris</u>	<u>2</u>		FACU	Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>
2. <u>Zed mays</u>	<u>30</u>	<input checked="" type="checkbox"/>	UPL	
3. <u>Potamogeton perfoliatus</u>	<u>10</u>	<input checked="" type="checkbox"/>	UPL	
4. <u>Diaprepes</u>				
5. <u>Diaprepes</u>				
6. <u>Diaprepes</u>				
7. <u>Diaprepes</u>				
8. <u>Diaprepes</u>				
9. <u>Diaprepes</u>				
10. <u>Diaprepes</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>42</u> = Total Cover				
1. <u>Diaprepes</u>				
2. <u>Diaprepes</u>				
<u>0</u> = Total Cover				



## SOIL

Sampling Point: UPL-HW-MH

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>			
0-20"	10YR 2/1	100					silt loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NoneDepth (inches): N/AHydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has not been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒  
 Water Table Present? Yes ☐ No ☒  
 Saturation Present? Yes ☐ No ☒  
 (includes capillary fringe)

Depth (inches): N/A  
 Depth (inches): N/A  
 Depth (inches): N/A

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 6/14/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HW-ML  
 Investigator(s): MMM, SKB Section, Township, Range: S2, T5S, R9E  
 Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave  
 Slope (%): 0% Lat: 40.63541 Long: -83.79785 Datum: WGS84  
 Soil Map Unit Name: (Ln) Linwood Muck NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☐, or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? ☒ (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>All 3 wetland criteria have been met.</u> <u>Ditch ed</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>/</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2. <u>/</u>				Total Number of Dominant Species Across All Strata: <u>1</u> (B)
3. <u>/</u>				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				Prevalence Index worksheet:
1. <u>/</u>				Total % Cover of: <u>0</u> = Total Cover
2. <u>/</u>				OBL species <u>0</u> x 1 = <u>0</u>
3. <u>/</u>				FACW species <u>0</u> x 2 = <u>0</u>
4. <u>/</u>				FAC species <u>0</u> x 3 = <u>0</u>
5. <u>/</u>				FACU species <u>0</u> x 4 = <u>0</u>
Herb Stratum (Plot size: <u>5'</u> )				UPL species <u>0</u> x 5 = <u>0</u>
1. <u>Typha x glauca</u>	<u>10</u>		<u>OBL</u>	Column Totals: <u>0</u> (A) <u>0</u> (B)
2. <u>Spartanum americanum</u>	<u>45</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	Prevalence Index = B/A = <u>0</u>
3. <u>Peltandra virginica</u>	<u>10</u>		<u>OBL</u>	Hydrophytic Vegetation Indicators:
4. <u>Ambrosia trifida</u>	<u>5</u>		<u>FAC</u>	<input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
5. <u>Lemna minor</u>	<u>5</u>		<u>OBL</u>	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
6. <u>/</u>				<input type="checkbox"/> 3 - Prevalence Index is >3.0 <sup>1</sup>
7. <u>/</u>				<input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
8. <u>/</u>				<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
9. <u>/</u>				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
10. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> )				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>/</u>				
2. <u>/</u>				
Remarks: (Include photo numbers here or on a separate sheet.)				
<u>Hydrophytic vegetation criterion has been met.</u>				



# PEM

## SOIL

Sampling Point: WET-HW-ML

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18"	10YR 7/1	60	7.5YR 3/4	15	C	M	silty clay	
	10YR 4/1	20	7.5YR 5/8	5	C	PL		

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

### Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

### Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

### Restrictive Layer (if observed):

Type: None  
Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

### Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

### Wetland Hydrology Indicators:

#### Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☒ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

#### Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)

### Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 4"  
Water Table Present? Yes ☒ No ☐ Depth (inches): @surface  
Saturation Present? Yes ☒ No ☐ Depth (inches): @surface  
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

### Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 6/14/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HW-ML  
 Investigator(s): MMM, SKB Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none  
 Slope (%): 0% Lat: 40.63534 Long: -83.79773 Datum: NGS84  
 Soil Map Unit Name: (Ln)Linwood Muck NWI classification: Non

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☒ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? ☒ (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>1 of 3 wetland criteria have been met. Area is not a wetland. Active farm</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
1. <u>/</u>				
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				
1. <u>/</u>				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				
1. <u>Glycine max</u>	<u>50</u>	<input checked="" type="checkbox"/>	<u>UPL</u>	Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>50</u> = Total Cover				
1. <u>/</u>				
2. <u>/</u>	<u>0</u>		<u>0</u> = Total Cover	
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



## SOIL

Sampling Point: UPL-HS-ML

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-4"	10YR 2/2	100					silt loam	
4-18"	10YR 2/2	90	7.5YR 5/6	10	C	M	silty clay	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (inches): N/A

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒  
 Water Table Present? Yes ☐ No ☒  
 Saturation Present? Yes ☐ No ☒  
 (includes capillary fringe)

Depth (inches): N/A  
 Depth (inches): N/A  
 Depth (inches): N/A

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has not been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/2018  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HS-JA  
 Investigator(s): JP/DK Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): DEPRESSION Local relief (concave, convex, none): CONCAVE  
 Slope (%): 0 Lat: 40.6259656 Long: -83.8058854 Datum: WGS84  
 Soil Map Unit Name: LNI - LINWOOD MUCK NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) \*

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Remarks: All 3 wetland criteria have been met. Area is a wetland.  
 \* WETLAND IS LOCATED WITHIN CROPPED FIELD; NOT THE "NORMAL CIRCUMSTANCE".

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>/</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. <u>/</u>				Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. <u>/</u>				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				Prevalence Index worksheet:
1. <u>/</u>				Total % Cover of: Multiply by:
2. <u>/</u>				OBL species <u>      </u> x 1 = <u>      </u>
3. <u>/</u>				FACW species <u>      </u> x 2 = <u>      </u>
4. <u>/</u>				FAC species <u>      </u> x 3 = <u>      </u>
5. <u>/</u>				FACU species <u>      </u> x 4 = <u>      </u>
				UPL species <u>      </u> x 5 = <u>      </u>
				Column Totals: <u>      </u> (A) <u>      </u> (B)
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				Prevalence Index = B/A = <u>      </u>
1. <u>Panicum dichotomiflorum</u>	<u>70</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	Hydrophytic Vegetation Indicators:
2. <u>Andropogon dubius</u>	<u>45</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	<input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
3. <u>Cyperus esculentus</u>	<u>10</u>		<u>FACW</u>	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
4. <u>/</u>				<u>      </u> 3 - Prevalence Index is ≤3.0 <sup>1</sup>
5. <u>/</u>				<u>      </u> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
6. <u>/</u>				<u>      </u> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
7. <u>/</u>				
8. <u>/</u>				
9. <u>/</u>				
10. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>125</u> = Total Cover				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>/</u>				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. <u>/</u>				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has been met.</u>				



## SOIL

Sampling Point: WET-HS-JA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-16	2.5Y 2.5/1	90	2.5YR 3/2	10	C	PL	ORGANIC	
16-20	10YR 8/3	100						
20-24	10YR 3/2	95	7.5YR 3/4	5	C	M	SILTY	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☒ Histosol (A1) ☐ Sandy Gleyed Matrix (S4)  
☐ Histic Epipedon (A2) ☐ Sandy Redox (S5)  
☐ Black Histic (A3) ☐ Stripped Matrix (S6)  
☐ Hydrogen Sulfide (A4) ☐ Loamy Mucky Mineral (F1)  
☐ Stratified Layers (A5) ☐ Loamy Gleyed Matrix (F2)  
☐ 2 cm Muck (A10) ☐ Depleted Matrix (F3)  
☐ Depleted Below Dark Surface (A11) ☐ Redox Dark Surface (F6)  
☐ Thick Dark Surface (A12) ☐ Depleted Dark Surface (F7)  
☐ Sandy Mucky Mineral (S1) ☐ Redox Depressions (F8)  
☐ 5 cm Mucky Peat or Peat (S3)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (inches): NONE

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1) ☐ Water-Stained Leaves (B9)  
☐ High Water Table (A2) ☐ Aquatic Fauna (B13)  
☐ Saturation (A3) ☐ True Aquatic Plants (B14)  
☐ Water Marks (B1) ☐ Hydrogen Sulfide Odor (C1)  
☐ Sediment Deposits (B2) ☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Drift Deposits (B3) ☐ Presence of Reduced Iron (C4)  
☐ Algal Mat or Crust (B4) ☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Iron Deposits (B5) ☐ Thin Muck Surface (C7)  
☐ Inundation Visible on Aerial Imagery (B7) ☐ Gauge or Well Data (D9)  
☐ Sparsely Vegetated Concave Surface (B8) ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☒ Stunted or Stressed Plants (D1)  
☒ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A  
 Water Table Present? Yes ☐ No ☒ Depth (inches): N/A  
 Saturation Present? Yes ☒ No ☐ Depth (inches): 16"  
 (Includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HS-JA  
 Investigator(s): JP/DK Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): NONE Local relief (concave, convex, none): NONE  
 Slope (%): 0 Lat: 40.62642705 Long: -83.80543765 Datum: WGS84  
 Soil Map Unit Name: Ln - LINWOOD MUCK NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) ☒

**SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Remarks: <u>0 of 3 wetland criteria have been met. Area is not a wetland. * FARMLAND (ACTIVE CROPPING)</u>			

**VEGETATION - Use scientific names of plants.**

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. <u>/</u>				
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				
1. <u>/</u>				Hydrophytic Vegetation Indicators: <u>1 - Rapid Test for Hydrophytic Vegetation N</u> <u>2 - Dominance Test is &gt;50% N</u> <u>3 - Prevalence Index is ≤3.0 N</u> <u>4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)</u> <u>Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</u> <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				
1. <u>Glycine max</u>	<u>75</u>	<input checked="" type="checkbox"/>	<u>UPL</u>	Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. <u>/</u>				
3. <u>/</u>				
4. <u>/</u>				
5. <u>/</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>75</u> = Total Cover				
1. <u>/</u>				
2. <u>/</u>				
<u>0</u> = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation criterion has NOT BEEN met.



# SOIL

Sampling Point UPL-HS-JA

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18	10 YR 3/1	100					S, Lo	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

## Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
Depth (inches): NONE

Hydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has NOT BEEN met.

# HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A  
Water Table Present? Yes ☐ No ☒ Depth (inches): N/A  
Saturation Present? Yes ☐ No ☒ Depth (inches): N/A  
(Includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has NOT BEEN met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/18  
 Applicant/Owner: TRC/Invenenergy, LLC. State: OH Sampling Point: WET-HS-JB  
 Investigator(s): JP/DK Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): DEPRESSION Local relief (concave, convex, none): CONCAVE  
 Slope (%): 0 Lat: 40.62716460 Long: -83.80368124 Datum: NGS84  
 Soil Map Unit Name: LN - LINWOOD MUCK NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) \*

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Remarks: All 3 wetland criteria have been met. Area is a wetland.  
 \* WETLAND IS LOCATED WITHIN CROPPED FIELD; NOT THE "NORMAL CIRCUMSTANCES".

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1.				
2.				
3.				
4.				
5.				

Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: (A) <u>0</u> (B) <u>0</u> Prevalence Index = B/A = <u>0</u>
1.				
2.				
3.				
4.				
5.				

Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <input type="checkbox"/> <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Cyperus esculentus</u>	<u>100</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1.				
2.				

Remarks: (Include photo numbers here or on a separate sheet.)  
Hydrophytic vegetation criterion has been met.



## SOIL

Sampling Point: WET-HS-JB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-6	2.5Y 2.5/1	90	2.5YR 3/2	10	C	PL	ORGANIC	
6-20	10YR 3/2	90	7.5YR 3/4	10	C	M	SILT	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (inches): NONE

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☒ Surface Water (A1)  
☒ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☒ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☒ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☒ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☒ Stunted or Stressed Plants (D1)  
☒ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): @ SURFACE  
 Water Table Present? Yes ☒ No ☐ Depth (inches): @ SURFACE  
 Saturation Present? Yes ☒ No ☐ Depth (inches): @ SURFACE  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/18  
 Applicant/Owner: TRC/Invenergy, LLC. State: OH Sampling Point: UPL-HS-JB  
 Investigator(s): JP/DK Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): NONE Local relief (concave, convex, none): NONE  
 Slope (%): 0 Lat: 40.62721887 Long: -83.80438021 Datum: WGS84  
 Soil Map Unit Name: Ln - LINWOOD Muck NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) \*

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>2 of 3 wetland criteria have been met. Area is not a wetland. * FARMLAND (ACTIVE CROPPING)</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. <u>[diagonal line]</u>				
2. <u>[diagonal line]</u>				
3. <u>[diagonal line]</u>				
4. <u>[diagonal line]</u>				
5. <u>[diagonal line]</u>				
Sapling/Shrub Stratum (Plot size: <u>15'</u> ) <u>0</u> = Total Cover				Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <u>2</u> - Dominance Test is >50% <u>3</u> - Prevalence Index is ≤3.0' <u>4</u> - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <u>Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</u>  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>[diagonal line]</u>				
2. <u>[diagonal line]</u>				
3. <u>[diagonal line]</u>				
4. <u>[diagonal line]</u>				
Herb Stratum (Plot size: <u>5'</u> ) <u>0</u> = Total Cover				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1. <u>Glycine max</u>	<u>70</u>	<input checked="" type="checkbox"/>	<u>UPL</u>	
2. <u>[diagonal line]</u>				Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has NOT BEEN met.</u>
3. <u>[diagonal line]</u>				
Woody Vine Stratum (Plot size: <u>30'</u> ) <u>70</u> = Total Cover				
1. <u>[diagonal line]</u>				
2. <u>[diagonal line]</u>				
3. <u>[diagonal line]</u> <u>0</u> = Total Cover				



# SOIL

Sampling Point UPL-HS-JB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-20	10YR 3/1	100					SILT	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

## Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE

Depth (inches): NONE

Hydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has NOT BEEN met.

# HYDROLOGY

## Wetland Hydrology Indicators:

### Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

### Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A

Water Table Present? Yes ☐ No ☒ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): N/A

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has NOT BEEN met.

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/18  
Applicant/Owner: TRC/Invenergy, LLC. State: OK Sampling Point: WET-HS-JC  
Investigator(s): JP/DK Section, Township, Range: N/A  
Landform (hill/slope, terrace, etc.): DEPRESSION Local relief (concave, convex, none): CONCAVE  
Slope (%): 0 Lat: 40.62780443 Long: -83.80607322 Datum: WGS84  
Soil Map Unit Name: LN - LINWOOD MUCK NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☒, or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) \*

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: All 3 wetland criteria have been met. Area is a wetland. * THE WETLAND IS LOCATED WITHIN CROPPED FIELD; NOT THE "NORMAL			

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)														
2. _____				Total Number of Dominant Species Across All Strata: <u>1</u> (B)														
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)														
4. _____																		
5. _____																		
<b>Sapling/Shrub Stratum</b> (Plot size: <u>15'</u> )				<b>Prevalence Index worksheet:</b> <table style="width: 100%;"> <thead> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: _____</td> <td>(A) _____ (B) _____</td> </tr> </tbody> </table>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = _____	FACW species _____	x 2 = _____	FAC species _____	x 3 = _____	FACU species _____	x 4 = _____	UPL species _____	x 5 = _____	Column Totals: _____	(A) _____ (B) _____
Total % Cover of:	Multiply by:																	
OBL species _____	x 1 = _____																	
FACW species _____	x 2 = _____																	
FAC species _____	x 3 = _____																	
FACU species _____	x 4 = _____																	
UPL species _____	x 5 = _____																	
Column Totals: _____	(A) _____ (B) _____																	
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
<b>Herb Stratum</b> (Plot size: <u>5'</u> )				<b>Prevalence Index = B/A = _____</b>  <b>Hydrophytic Vegetation Indicators:</b> <u>  </u> 1 - Rapid Test for Hydrophytic Vegetation <u>  </u> 2 - Dominance Test is >60% <u>  </u> 3 - Prevalence Index is ≤3.0' <u>  </u> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) *  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
1. <u>Glycine max</u>	<u>10</u>	<input checked="" type="checkbox"/>	<u>UPL</u>															
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
<b>Woody Vine Stratum</b> (Plot size: <u>30'</u> )				<b>Hydrophytic Vegetation Present?</b> Yes _____ No <input checked="" type="checkbox"/>														
1. _____																		
2. _____																		
<b>Woody Vine Stratum</b> (Plot size: <u>30'</u> )																		
1. _____																		
2. _____																		
<b>Woody Vine Stratum</b> (Plot size: <u>30'</u> )																		
1. _____																		
2. _____																		

Remarks: (Include photo numbers here or on a separate sheet.)  
Hydrophytic vegetation criterion has been met.  
\*\* WETLAND LOCATED IN CROPPED FIELD; LACKS A NATURAL PLANT COMMUNITY.



## SOIL

Sampling Point: WET-HS-JC

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6	2.5Y 2.5/1	90	2.5YR 3/2	10	C	PL	ORGANIC	
6-20	10YR 3/2	90	7.5YR 3/4	10	C	m	SILT	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☒ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (Inches): NONE

Hydric Soil Present? Yes ☒ No ☐

## Remarks:

Hydric soil criterion has been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☒ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☒ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☒ Saturation Visible on Aerial Imagery (C9)  
☒ Stunted or Stressed Plants (D1)  
☒ Geomorphic Position (D2)  
☒ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (Inches): N/A  
 Water Table Present? Yes ☐ No ☒ Depth (Inches): N/A  
 Saturation Present? Yes ☒ No ☐ Depth (Inches): 6"  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

## Remarks:

Wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM - Midwest Region

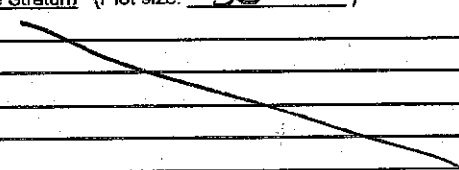
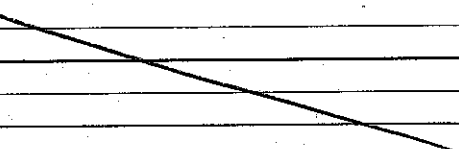
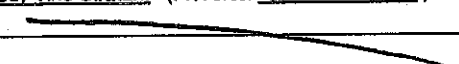
Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 9/14/18  
 Applicant/Owner: TRC/Invenergy, LLC State: OH Sampling Point: UPL-HS-JC  
 Investigator(s): JP/DK Section, Township, Range: N/A  
 Landform (hillslope, terrace, etc.): NONE Local relief (concave, convex, none): NONE  
 Slope (%): 0 Lat: 40.62799089 Long: -83.80682519 Datum: WGS84  
 Soil Map Unit Name: Lh - Linwood Muck NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☒ Soil ☒ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☒  
 Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.) ☒

## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>0 of 3 wetland criteria have been met. Area is not a wetland. * ACTIVE CROPPING</u>		

## VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. 				
2.				
3.				
4.				
5.				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				
1. 				
2.				
3.				
4.				
5.				
Herb Stratum (Plot size: <u>5'</u> )				
1. <u>Glycine max</u>	<u>70</u>	<input checked="" type="checkbox"/>	<u>UPL</u>	Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation <u>N</u> 2 - Dominance Test is >50% <u>N</u> 3 - Prevalence Index is ≤3.0 <u>N</u> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Woody Vine Stratum (Plot size: <u>30'</u> )				
1. 				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2.				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation criterion has NOT BEEN met.



## SOIL

Sampling Point: UPL-HS-JC

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-20	10YR 3/1	100					S, Lo	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: NONE  
 Depth (inches): NONE

Hydric Soil Present? Yes ☐ No ☒

## Remarks:

Hydric soil criterion has NOT BEEN met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☐ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)

- ☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): N/A  
 Water Table Present? Yes ☐ No ☒ Depth (inches): N/A  
 Saturation Present? Yes ☐ No ☒ Depth (inches): N/A  
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has NOT BEEN met.

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/21/18  
 Applicant/Owner: TRC/Invenergy, LLC State: OH Sampling Point: UPL-DR-VI  
 Investigator(s): JAN, L.M., J.A. Section, Township, Range: S3, T55, R9E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): concave  
 Slope (%): 0-5 Lat: 40.63257 Long: -83.818431 Datum: NGS84  
 Soil Map Unit Name: PKA - Panama silty clay loam, 0 to 1 percent, slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>1 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>25%</u> (A/B)
1. <u>None</u>				
2. _____				
3. _____				
4. _____				
5. _____				
= Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )				
1. <u>None</u>				
2. _____				
3. _____				
4. _____				
5. _____				
= Total Cover				
Herb Stratum (Plot size: <u>5'</u> )				
1. <u>Barbarea vulgaris</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Taraxacum officinale</u>	<u>15</u>	<u>Y</u>	<u>FACW</u>	
3. <u>Gallium aparine</u>	<u>15</u>	<u>Y</u>	<u>FACW</u>	
4. <u>Hulusia lanatus</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	
5. <u>Potentilla hydropiperoides</u>	<u>8</u>	<u>N</u>	<u>OBL</u>	
6. <u>Cirsium arvense</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
7. <u>Symphoricarpos latiflorum</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
8. _____				
9. _____				
10. _____				
= Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )				
1. <u>None</u>				
2. _____				
= Total Cover				
Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0' ___ 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.				
Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



Sampling Point: UPL-OP-V1

## HYDROLOGY

Primary Indicators (minimum of one is required: check all that apply)

Field Observations:

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: wetland hydrology criterion has been met.

# WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 302899: Hardin Solar II City/County: Hardin County Sampling Date: 5/22/18  
 Applicant/Owner: TRC/Invenergy, LLC State: OH Sampling Point: UPL-DR-V2  
 Investigator(s): TAV, LM, TR Section, Township, Range: S10, T55, R9E  
 Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): Concave  
 Slope (%): 0-5 Lat: 40.62585 Long: -83.81725 Datum: NGS84  
 Soil Map Unit Name: PKA- Pebrano silty clay loam, 0 to 1 percent slopes NWI classification: None  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>1 of 3 wetland criteria have been met. Area is not a wetland.</u>		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>8</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
1. <u>Quercus alba</u>	<u>35</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Juglans nigra</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>	
3. <u>Acer rubrum</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
= Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>35</u> x 2 = <u>70</u> FAC species <u>30</u> x 3 = <u>90</u> FACU species <u>88</u> x 4 = <u>352</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>153</u> (A) <u>512</u> (B)  Prevalence Index = B/A = <u>3.35</u>
1. <u>Cornus amomum</u>	<u>25</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Quercus alba</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
= Total Cover				
Herb Stratum (Plot size: <u>5'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0 <sup>1</sup> 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Urtica dioica</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Alliaria petiolata</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Quercus alba</u>	<u>8</u>	<u>Y</u>	<u>FACW</u>	
4. <u>Parthenocissus quinquefolia</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
= Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1. <u>N/A</u>	_____	_____	_____	
2. _____	_____	_____	_____	
= Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) <u>Hydrophytic vegetation criterion has not been met.</u>				



## SOIL

Sampling Point: UPL-DP-V2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-8	10YR 3/2	100					S.I	
8-16	2.5Y 3/1	100					S.I CL	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

## Hydric Soil Indicators:

- ☐ Histosol (A1)  
☐ Histic Epipedon (A2)  
☐ Black Histic (A3)  
☐ Hydrogen Sulfide (A4)  
☐ Stratified Layers (A5)  
☐ 2 cm Muck (A10)  
☐ Depleted Below Dark Surface (A11)  
☐ Thick Dark Surface (A12)  
☐ Sandy Mucky Mineral (S1)  
☐ 5 cm Mucky Peat or Peat (S3)

- ☐ Sandy Gleyed Matrix (S4)  
☐ Sandy Redox (S5)  
☐ Stripped Matrix (S6)  
☐ Loamy Mucky Mineral (F1)  
☐ Loamy Gleyed Matrix (F2)  
☐ Depleted Matrix (F3)  
☐ Redox Dark Surface (F6)  
☐ Depleted Dark Surface (F7)  
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- ☐ Coast Prairie Redox (A16)  
☐ Dark Surface (S7)  
☐ Iron-Manganese Masses (F12)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

## Restrictive Layer (if observed):

Type: \_\_\_\_\_

Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes \_\_\_\_\_ No ☒

## Remarks:

Hydric soil criterion has not been met.

## HYDROLOGY

## Wetland Hydrology Indicators:

## Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)  
☐ High Water Table (A2)  
☒ Saturation (A3)  
☐ Water Marks (B1)  
☐ Sediment Deposits (B2)  
☐ Drift Deposits (B3)  
☐ Algal Mat or Crust (B4)  
☐ Iron Deposits (B5)  
☐ Inundation Visible on Aerial Imagery (B7)  
☐ Sparsely Vegetated Concave Surface (B8)  
☐ Water-Stained Leaves (B9)  
☐ Aquatic Fauna (B13)  
☐ True Aquatic Plants (B14)  
☐ Hydrogen Sulfide Odor (C1)  
☐ Oxidized Rhizospheres on Living Roots (C3)  
☐ Presence of Reduced Iron (C4)  
☐ Recent Iron Reduction in Tilled Soils (C6)  
☐ Thin Muck Surface (C7)  
☐ Gauge or Well Data (D9)  
☐ Other (Explain in Remarks)

## Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)  
☐ Drainage Patterns (B10)  
☐ Dry-Season Water Table (C2)  
☐ Crayfish Burrows (C8)  
☐ Saturation Visible on Aerial Imagery (C9)  
☐ Stunted or Stressed Plants (D1)  
☐ Geomorphic Position (D2)  
☐ FAC-Neutral Test (D5)

## Field Observations:

Surface Water Present? Yes \_\_\_\_\_ No ☒ Depth (inches): \_\_\_\_\_Water Table Present? Yes \_\_\_\_\_ No ☒ Depth (inches): \_\_\_\_\_Saturation Present? Yes ☒ No \_\_\_\_\_ Depth (inches): 7

(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No \_\_\_\_\_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

N/A

## Remarks:

Wetland hydrology criterion has been met.

## **Appendix D**

### **Ohio EPA ORAM Data Forms**



Category 1

Wetland HS-MA

Site: 302899 Hardin Solar II

Rater(s): MMM SKB

Date: 5/22/18

0	0
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### Metric 1. Wetland Area (size).

max 6 pts.

subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☒ <0.1 acres (0.04ha) (0 pts)

1	1
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### Metric 2. Upland buffers and surrounding land use.

max 14 pts.

subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

4	5
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### Metric 3. Hydrology.

max 30 pts.

subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☒ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> ditch | <input type="checkbox"/> point source (nonstormwater) |
| <input checked="" type="checkbox"/> tile  | <input type="checkbox"/> filling/grading              |
| <input type="checkbox"/> dike             | <input type="checkbox"/> road bed/RR track            |
| <input type="checkbox"/> weir             | <input type="checkbox"/> dredging                     |
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> other                        |

3	8
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### Metric 4. Habitat Alteration and Development.

max 20 pts.

subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input type="checkbox"/> mowing               | <input type="checkbox"/> shrub/sapling removal          |
| <input type="checkbox"/> grazing              | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input type="checkbox"/> clearcutting         | <input checked="" type="checkbox"/> sedimentation       |
| <input type="checkbox"/> selective cutting    | <input checked="" type="checkbox"/> dredging            |
| <input type="checkbox"/> woody debris removal | <input checked="" type="checkbox"/> farming             |
| <input type="checkbox"/> toxic pollutants     | <input checked="" type="checkbox"/> nutrient enrichment |

8
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subtotal this page

Site: 302899	Rater(s): MMM, JKB	Date: 5/22/18
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8

subtotal this page

0 8

max 10 pts.

subtotal

**Metric 5. Special Wetlands.**

Check all that apply and score as indicated.

- ☐ Bog (10)  
☐ Fen (10)  
☐ Old growth forest (10)  
☐ Mature forested wetland (5)  
☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)  
☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)  
☐ Lake Plain Sand Prairies (Oak Openings) (10)  
☐ Relict Wet Prairies (10)  
☐ Known occurrence state/federal threatened or endangered species (10)  
☐ Significant migratory songbird/water fowl habitat or usage (10)  
☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1 9

max 20 pts.

subtotal

**Metric 6. Plant communities, interspersions, microtopography.****6a. Wetland Vegetation Communities.**

Score all present using 0 to 3 scale.

- ☐ Aquatic bed  
☒ Emergent  
☐ Shrub  
☐ Forest  
☐ Mudflats  
☐ Open water  
☐ Other

**6b. horizontal (plan view) Interspersions.**

Select only one.

- ☐ High (5)  
☐ Moderately high (4)  
☐ Moderate (3)  
☐ Moderately low (2)  
☐ Low (1)  
☒ None (0)

**6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage**

- ☐ Extensive >75% cover (-5)  
☐ Moderate 25-75% cover (-3)  
☐ Sparse 5-25% cover (-1)  
☒ Nearly absent <5% cover (0)  
☐ Absent (1)

**6d. Microtopography.**

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/tussucks  
☐ Coarse woody debris >15cm (6in)  
☐ Standing dead >25cm (10in) dbh  
☐ Amphibian breeding pools

**Vegetation Community Cover Scale**

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

**Narrative Description of Vegetation Quality**

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

**Mudflat and Open Water Class Quality**

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

**Microtopography Cover Scale**

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

9

**GRAND TOTAL(max 100 pts)**



Modified Cat. 2

Wetland HS-MB

Site: 302899 Hardin Solar II Rater(s): MMM SKB Date: 5/22/18

2 2  
max 6 pts. subtotal

### Metric 1. Wetland Area (size).

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

2

Circle: PEM PSS PFO  
Circle: Isolated Adjacent  
Abutting

Continues off-site: NO

# of flags: 22

7 9  
max 14 pts. subtotal

### Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☒ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

4

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☒ LOW. Old field (>10 years), shrubland, young second growth forest (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

3

VN  
W + W  
N

9 18  
max 30 pts. subtotal

### Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

1

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☒ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☐ <0.4m (<15.7in) (1)

2

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

1

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

1

3d. Duration inundation/saturation. Score one or dbl check.

- ☒ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

4

Check all disturbances observed

- ☐ ditch
- ☐ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☒ point source (nonstormwater)
- ☒ filling/grading
- ☒ road bed/RR track
- ☒ dredging
- ☐ other

8 26  
max 20 pts. subtotal

### Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

1

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☒ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☐ Poor (1)

4

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

3

Check all disturbances observed

- ☒ mowing
- ☒ grazing
- ☒ clearcutting
- ☒ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☒ sedimentation
- ☐ dredging
- ☐ farming
- ☒ nutrient enrichment

26

subtotal this page

Site: 302899 Rater(s): MMM, SKB Date: 5/22/18

26

subtotal this page

0 26

max 10 pts.

subtotal

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

11 37

max 20 pts.

subtotal

6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☒ Shrub
- ☒ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☒ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☒ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/tussocks
- ☒ Coarse woody debris >15cm (6in)
- ☒ Standing dead >25cm (10in) dbh
- ☒ Amphibian breeding pools

Metric 6. Plant communities, interspersion, microtopography.

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

37 GRAND TOTAL(max 100 pts)



Site: 302899 Hardin Solar II Rater(s): Date:

2 2

### Metric 1. Wetland Area (size).

max 6 pts.

subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

5 7

### Metric 2. Upland buffers and surrounding land use.

max 14 pts.

subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☒ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☒ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☐ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

18 25

### Metric 3. Hydrology.

max 30 pts.

subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☒ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☒ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☐ ditch
- ☐ file
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☐ other

14 39

### Metric 4. Habitat Alteration and Development.

max 20 pts.

subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☒ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☒ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☒ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☐ farming
- ☐ nutrient enrichment

39

subtotal this page

Wetland HS-MC

Site: 302899 Rater(s): MMM, SKB Date: 5/22/18

39

subtotal this page

5 44

max 10 pts.

subtotal

### Metric 5. Special Wetlands.

Check all that apply and score as indicated.

5

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☒ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

10 55

max 20 pts.

subtotal

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

3

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☒ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersion.

Select only one.

4

- ☐ High (5)
- ☒ Moderately high (4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

0

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

4

- ☒ Vegetated hummocks/tussucks
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☒ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

55

GRAND TOTAL(max 100 pts)



Wetland HS MD

Site: 302899 Hardin Solar II Rater(s): MMM, SKR Date: 3/22/18

1	1
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## Metric 1. Wetland Area (size).

max 6 pts. subtotal Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☒ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

7	8
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## Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal 2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☒ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☒ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☒ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

8	16
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## Metric 3. Hydrology.

max 30 pts. subtotal 3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☒ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☒ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> ditch | <input type="checkbox"/> point source (nonstormwater) |
| <input type="checkbox"/> tile             | <input checked="" type="checkbox"/> filling/grading   |
| <input type="checkbox"/> dike             | <input checked="" type="checkbox"/> road bed/RR track |
| <input type="checkbox"/> weir             | <input type="checkbox"/> dredging                     |
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> other                        |

9	25
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## Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal 4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☒ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☒ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> mowing       | <input type="checkbox"/> shrub/sapling removal                     |
| <input checked="" type="checkbox"/> grazing      | <input checked="" type="checkbox"/> herbaceous/aquatic bed removal |
| <input checked="" type="checkbox"/> clearcutting | <input checked="" type="checkbox"/> sedimentation                  |
| <input type="checkbox"/> selective cutting       | <input type="checkbox"/> dredging                                  |
| <input type="checkbox"/> woody debris removal    | <input type="checkbox"/> farming                                   |
| <input type="checkbox"/> toxic pollutants        | <input type="checkbox"/> nutrient enrichment                       |

25
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subtotal this page

Site: 302899 Rater(s): MMSKB Date: 5/22/18

25

subtotal this page

0 25

max 10 pts.

subtotal

### Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

6 31

max 20 pts.

subtotal

### Metric 6. Plant communities, interspersions, microtopography.

#### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☒ Emergent
- ☐ Shrub
- ☒ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

#### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☒ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

#### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☒ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

#### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/tussocks
- ☒ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☒ Amphibian breeding pools

#### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

#### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

#### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

#### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

31 GRAND TOTAL(max 100 pts)



Site: <u>Hardin Solar II</u>	Rater(s): <u>MM, SKB</u>	Date: <u>6/13/18</u>
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2	2
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### Metric 1. Wetland Area (size).

max 6 pts. subtotal Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)  
☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)  
☐ 10 to <25 acres (4 to <10.1ha) (4 pts)  
☐ 3 to <10 acres (1.2 to <4ha) (3 pts)  
☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)  
☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)  
☐ <0.1 acres (0.04ha) (0 pts)

1	3
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### Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal 2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)  
☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)  
☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)  
☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)  
☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)  
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)  
☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

6	9
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### Metric 3. Hydrology.

max 30 pts. subtotal 3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)  
☐ Other groundwater (3)  
☒ Precipitation (1)  
☐ Seasonal/intermittent surface water (3)  
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)  
☐ 0.4 to 0.7m (15.7 to 27.6in) (2)  
☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)  
☐ Recovered (7)  
☐ Recovering (3)  
☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)  
☒ Between stream/lake and other human use (1)  
☐ Part of wetland/upland (e.g. forest), complex (1)  
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)  
☐ Regularly inundated/saturated (3)  
☒ Seasonally inundated (2)  
☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> ditch            | <input type="checkbox"/> point source (nonstormwater) |
| <input checked="" type="checkbox"/> tile             | <input checked="" type="checkbox"/> filling/grading   |
| <input type="checkbox"/> dike                        | <input type="checkbox"/> road bed/RR track            |
| <input type="checkbox"/> weir                        | <input type="checkbox"/> dredging                     |
| <input checked="" type="checkbox"/> stormwater input | <input type="checkbox"/> other                        |

3	12
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### Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal 4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)  
☐ Recovered (3)  
☐ Recovering (2)  
☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)  
☐ Very good (6)  
☐ Good (5)  
☐ Moderately good (4)  
☐ Fair (3)  
☐ Poor to fair (2)  
☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)  
☐ Recovered (6)  
☐ Recovering (3)  
☒ Recent or no recovery (1)

Check all disturbances observed

- |  |   |
|--|---|
| <input type="checkbox"/> mowing                  | <input type="checkbox"/> shrub/sapling removal          |
| <input type="checkbox"/> grazing                 | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input checked="" type="checkbox"/> clearcutting | <input checked="" type="checkbox"/> sedimentation       |
| <input type="checkbox"/> selective cutting       | <input type="checkbox"/> dredging                       |
| <input type="checkbox"/> woody debris removal    | <input checked="" type="checkbox"/> farming             |
| <input type="checkbox"/> toxic pollutants        | <input type="checkbox"/> nutrient enrichment            |

12
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subtotal this page

HS-MQ

Site: Hardin Solar II Rater(s): MMM, SKB Date: 6/13/18

12

subtotal this page

0 12

max 10 pts.

subtotal

## Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1 13

max 20 pts.

subtotal

## Metric 6. Plant communities, interspersions, microtopography.

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high (4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☒ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/tussucks
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

13 GRAND TOTAL(max 100 pts)



Wetland 115-14

Site: 302899 Hardin Solar II	Rater(s): JAV L M TR	Date: 11/1/14
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3	5
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### Metric 1. Wetland Area (size).

Circle: PEM PSS PFO  
Circle: Isolated Adjacent  
Abutting

Continues off-site: No

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☒ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

7	5
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### Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☒ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☒ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☐ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

9	14
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### Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/Intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☒ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☒ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☐ <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☒ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

<input checked="" type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input checked="" type="checkbox"/> tile	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input checked="" type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> other <u>water mining</u>

7.5	21.5
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### Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☒ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

<input checked="" type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input checked="" type="checkbox"/> sedimentation
<input type="checkbox"/> selective cutting	<input type="checkbox"/> dredging
<input type="checkbox"/> woody debris removal	<input checked="" type="checkbox"/> farming
<input type="checkbox"/> toxic pollutants	<input checked="" type="checkbox"/> nutrient enrichment

21.5
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subtotal this page

Site: 302899 Hardin Solar II Rater(s): JAV, LM, TR Date: 5/20/2015

21.5

subtotal this page

0 21.5

max 10 pts. subtotal

## Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3 24.5

max 20 pts. subtotal

## Metric 6. Plant communities, interspersions, microtopography.

6a. Wetland Vegetation Communities.  
Score all present using 0 to 3 scale.

- ☒ 1 Aquatic bed
- ☒ 2 Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

6b. horizontal (plan view) Interspersions.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☒ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☒ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ 0 Vegetated hummocks/tussocks
- ☐ 0 Coarse woody debris >15cm (6in)
- ☐ 0 Standing dead >25cm (10in) dbh
- ☐ 1 Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

24.5 GRAND TOTAL(max 100 pts)



Wetland 15-VB

Site: 302899 Hardinsolar II Rater(s): JDK LM TR Date: 5/20/2018

2 2

## Metric 1. Wetland Area (size).

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

2 4

## Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☒ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

15 19

## Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☒ Seasonal/Intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☒ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☐ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☒ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☒ ditch
- ☒ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☒ other historic farming

11 30

## Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☒ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☒ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☒ sedimentation
- ☐ dredging
- ☒ farming
- ☒ nutrient enrichment

30

subtotal this page

Site: 302549 Hardin Solar II Rater(s): JMV LM TR Date: 5/22/2018

30

subtotal this page

0 30

max 10 pts.

subtotal

## Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

7 37

max 20 pts.

subtotal

## Metric 6. Plant communities, interspersions, microtopography.

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☒ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☒ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersions.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☒ Low (1)
- ☐ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☒ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/tussucks
- ☒ Coarse woody debris >15cm (6in)
- ☒ Standing dead >25cm (10in) dbh
- ☒ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

37 GRAND TOTAL(max 100 pts)



Wetland HS-VC

Site: 302899 Hardin Solar II

Rater(s): THU, LM, TR

Date: 5/23/18

2 2

## Metric 1. Wetland Area (size).

Circle: PEM PSS (PFO)

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

9 11

## Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☒ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☒ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☐ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

12 23

## Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/Intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- ☒ ditch
- ☒ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☒ other historic farming

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☒ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

11.5 34.5

## Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☒ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☒ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☒ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☒ farming
- ☒ nutrient enrichment

34.5

subtotal this page

Wetland HS-VC

Site: 702894 Hardin Solar II

Rater(s): JNV, LM, TR

Date: 5/23/18

74.5

subtotal this page

0

74.5

max 10 pts.

subtotal

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

6

40.5

max 20 pts.

subtotal

## Metric 6. Plant communities, interspersions, microtopography.

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☒ Emergent
- ☐ Shrub
- ☒ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersions.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☒ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☒ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/tussocks
- ☐ Coarse woody debris >15cm (6in)
- ☒ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

40.5

GRAND TOTAL(max 100 pts)



Wetland HS-VN

Site: <u>302899 Hardinsolar II</u>	Rater(s): <u>JOU, LM, TR</u>	Date: <u>5/23/18</u>
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0	6
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### Metric 1. Wetland Area (size).

Circle: PEM PSS (PFO)

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☒ <0.1 acres (0.04ha) (0 pts)

Continues off-site: No

4	4
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### Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☒ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☒ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

11	15
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### Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/Intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input type="checkbox"/> ditch            | <input type="checkbox"/> point source (nonstormwater)             |
| <input checked="" type="checkbox"/> tile  | <input type="checkbox"/> filling/grading                          |
| <input type="checkbox"/> dike             | <input type="checkbox"/> road bed/RR track                        |
| <input type="checkbox"/> weir             | <input type="checkbox"/> dredging                                 |
| <input type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> other <u>historic farming</u> |

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☒ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

9.5	24.5
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### Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☒ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☒ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☒ Recovered (6)
- ☒ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input type="checkbox"/> mowing                       | <input type="checkbox"/> shrub/sapling removal          |
| <input type="checkbox"/> grazing                      | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input type="checkbox"/> clearcutting                 | <input type="checkbox"/> sedimentation                  |
| <input checked="" type="checkbox"/> selective cutting | <input type="checkbox"/> dredging                       |
| <input type="checkbox"/> woody debris removal         | <input checked="" type="checkbox"/> farming             |
| <input type="checkbox"/> toxic pollutants             | <input checked="" type="checkbox"/> nutrient enrichment |

24.5
------

subtotal this page

Wetland HS-VN

Site: 202899 Hardin Solar II

Rater(s): JMV, LM, RA

Date: 5/23/18

24.5

subtotal this page

0

24.5

max 10 pts.

subtotal

## Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

4

28.5

max 20 pts.

subtotal

## Metric 6. Plant communities, interspersions, microtopography.

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☒ Emergent
- ☐ Shrub
- ☒ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☒ Low (1)
- ☐ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/tussocks
- ☒ Coarse woody debris >15cm (6in)
- ☒ Standing dead >25cm (10in) dbh
- ☒ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

28.5

GRAND TOTAL(max 100 pts)



Category 1

Wetland HW-MH

Site: 302899 Hardin Solar II Rater(s): M. Molnar Date: 5/15/18

2 2

Metric 1. Wetland Area (size).

max 6 pts.

subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

2

Circle: PEM PSS PFO  
Circle: Isolated Adjacent  
Abutting

Continues off-site: Yes

1 3

Metric 2. Upland buffers and surrounding land use.

max 14 pts.

subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

11 14

Metric 3. Hydrology.

max 30 pts.

subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☒ Seasonal/Intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☒ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☐ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☒ 100 year floodplain (1)
- ☒ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☒ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☒ ditch
- ☒ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☒ filling/grading
- ☐ road bed/RR track
- ☒ dredging
- ☐ other

4 18

Metric 4. Habitat Alteration and Development.

max 20 pts.

subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☒ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☒ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☒ sedimentation
- ☒ dredging
- ☒ farming
- ☒ nutrient enrichment

18

subtotal this page

Site: 302899

Rater(s): M. Molnar

Date: 5/18/18

18

subtotal this page

0 18

max 10 pts.

subtotal

**Metric 5. Special Wetlands.**

Check all that apply and score as indicated.

- ☐ Bog (10)  
☐ Fen (10)  
☐ Old growth forest (10)  
☐ Mature forested wetland (5)  
☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)  
☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)  
☐ Lake Plain Sand Prairies (Oak Openings) (10)  
☐ Relict Wet Prairies (10)  
☐ Known occurrence state/federal threatened or endangered species (10)  
☐ Significant migratory songbird/water fowl habitat or usage (10)  
☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

2 20

max 20 pts.

subtotal

**Metric 6. Plant communities, interspersions, microtopography.****6a. Wetland Vegetation Communities.**

Score all present using 0 to 3 scale.

- ☐ Aquatic bed  
☒ Emergent  
☐ Shrub  
☐ Forest  
☐ Mudflats  
☒ Open water  
☐ Other \_\_\_\_\_

**6b. horizontal (plan view) Interspersion.**

Select only one.

- ☐ High (5)  
☐ Moderately high (4)  
☐ Moderate (3)  
☐ Moderately low (2)  
☒ Low (1)  
☐ None (0)

**6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage**

- ☐ Extensive >75% cover (-5)  
☒ Moderate 25-75% cover (-3)  
☐ Sparse 5-25% cover (-1)  
☐ Nearly absent <5% cover (0)  
☐ Absent (1)

**6d. Microtopography.**

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/tussocks  
☒ Coarse woody debris >15cm (6in)  
☐ Standing dead >25cm (10in) dbh  
☒ Amphibian breeding pools

**Vegetation Community Cover Scale**

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

**Narrative Description of Vegetation Quality**

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

**Mudflat and Open Water Class Quality**

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

**Microtopography Cover Scale**

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

20 GRAND TOTAL(max 100 pts)



Wetland HW-M4

Site: 302899 Hardin Solar II Rater(s): MMM Date: 5/17/18

1	1
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**Metric 1. Wetland Area (size).**

Circle: PEM PSS PFO  
 Circle: Isolated Adjacent  
 Abutting  
 Continues off-site: Yes

max 6 pts. subtotal

Select one size class and assign score.

1

☐ >50 acres (>20.2ha) (6 pts)  
☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)  
☐ 10 to <25 acres (4 to <10.1ha) (4 pts)  
☐ 3 to <10 acres (1.2 to <4ha) (3 pts)  
☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)  
☒ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)  
☐ <0.1 acres (0.04ha) (0 pts)

1	2
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**Metric 2. Upland buffers and surrounding land use.**

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

0

☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)  
☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)  
☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)  
☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

1

☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)  
☐ LOW. Old field (>10 years), shrubland, young second growth forest (5)  
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)  
☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

8	10
---	----

**Metric 3. Hydrology.**

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

1

☐ High pH groundwater (5)  
☐ Other groundwater (3)  
☒ Precipitation (1)  
☐ Seasonal/intermittent surface water (3)  
☐ Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

1

☐ 100 year floodplain (1)  
☒ Between stream/lake and other human use (1)  
☐ Part of wetland/upland (e.g. forest), complex (1)  
☐ Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1

☐ >0.7 (27.6in) (3)  
☐ 0.4 to 0.7m (15.7 to 27.6in) (2)  
☒ <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

2

☐ Semi- to permanently inundated/saturated (4)  
☐ Regularly inundated/saturated (3)  
☒ Seasonally inundated (2)  
☐ Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3

☐ None or none apparent (12)  
☒ Recovered (7)  
☒ Recovering (3)  
☐ Recent or no recovery (1)

Check all disturbances observed

☒ ditch  
☐ tile  
☐ dike  
☐ weir  
☐ stormwater input

☐ point source (nonstormwater)  
☒ filling/grading  
☐ road bed/RR track  
☒ dredging  
☐ other \_\_\_\_\_

8	18
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**Metric 4. Habitat Alteration and Development.**

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

2

☐ None or none apparent (4)  
☐ Recovered (3)  
☒ Recovering (2)  
☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

3

☐ Excellent (7)  
☐ Very good (6)  
☐ Good (5)  
☐ Moderately good (4)  
☒ Fair (3)  
☐ Poor to fair (2)  
☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

3

☐ None or none apparent (9)  
☐ Recovered (6)  
☒ Recovering (3)  
☐ Recent or no recovery (1)

Check all disturbances observed

☐ mowing  
☐ grazing  
☒ clearcutting  
☐ selective cutting  
☐ woody debris removal  
☐ toxic pollutants

☐ shrub/sapling removal  
☐ herbaceous/aquatic bed removal  
☒ sedimentation  
☐ dredging  
☐ farming  
☒ nutrient enrichment

18
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Site: 302899 Rater(s): MMM Date: 5/17/18

18

subtotal this page

0 18

max 10 pts.

subtotal

### Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

4 22

max 20 pts.

subtotal

### Metric 6. Plant communities, interspersions, microtopography.

#### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

#### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high (4)
- ☐ Moderate (3)
- ☒ Moderately low (2)
- ☐ Low (1)
- ☐ None (0)

#### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☒ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

#### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/mounds
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

#### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

#### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

#### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

#### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

22 GRAND TOTAL(max 100 pts)



Site: 302899 Hardin Solar II Rater(s): JP/DK Date: 9/14/2018

2 2

Metric 1. Wetland Area (size).

Circle: PEM PSS PFO  
Circle: Isolated Adjacent  
Abutting  
Continues off-site: NO

max 6 pts. subtotal Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)  
☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)  
☐ 10 to <25 acres (4 to <10.1ha) (4 pts)  
☐ 3 to <10 acres (1.2 to <4ha) (3 pts)  
☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)  
☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)  
☐ <0.1 acres (0.04ha) (0 pts)

1 3

Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal 2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)  
☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)  
☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)  
☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)  
☐ LOW. Old field (>10 years), shrubland, young second growth forest (5)  
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)  
☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

5 8

Metric 3. Hydrology.

max 30 pts. subtotal 3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)  
☐ Other groundwater (3)  
☒ Precipitation (1)  
☐ Seasonal/intermittent surface water (3)  
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)  
☐ 0.4 to 0.7m (15.7 to 27.6in) (2)  
☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)  
☐ Recovered (7)  
☐ Recovering (3)  
☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)  
☐ Between stream/lake and other human use (1)  
☒ Part of wetland/upland (e.g. forest), complex (1)  
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)  
☐ Regularly inundated/saturated (3)  
☐ Seasonally inundated (2)  
☒ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☒ ditch  
☒ tile  
☐ dike  
☐ weir  
☐ stormwater input  
☐ point source (nonstormwater)  
☐ filling/grading  
☐ road bed/RR track  
☐ dredging  
☐ other

4 12

Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal 4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)  
☐ Recovered (3)  
☐ Recovering (2)  
☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)  
☐ Very good (6)  
☐ Good (5)  
☐ Moderately good (4)  
☐ Fair (3)  
☒ Poor to fair (2)  
☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)  
☐ Recovered (6)  
☐ Recovering (3)  
☒ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing  
☐ grazing  
☐ clearcutting  
☐ selective cutting  
☐ woody debris removal  
☐ toxic pollutants  
☐ shrub/sapling removal  
☐ herbaceous/aquatic bed removal  
☐ sedimentation  
☐ dredging  
☒ farming  
☒ nutrient enrichment

12  
subtotal this page

Site: **B02899 HARDIN SOLAR II** Rater(s): **JP/DK** Date: **9/14/2018**

12

subtotal this page

0 12

max 10 pts.

subtotal

## Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☒ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

2 14

max 20 pts.

subtotal

## Metric 6. Plant communities, interspersions, microtopography.

### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☒ Low (1)
- ☐ None (0)

### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/tussucks
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

14 GRAND TOTAL(max 100 pts)



Site: 302899 Hardin Solar II Rater(s): JP/DK Date:

2 2

## Metric 1. Wetland Area (size).

Circle: PEM PSS PEO  
Circle: Isolated Adjacent  
Abutting  
Continues off-site: NO

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☒ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

1 3

## Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

6 9

## Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☒ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☒ ditch
- ☒ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☐ other

4 13

## Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☒ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☒ farming
- ☒ nutrient enrichment

13

subtotal this page

Site: 302899 HARDIN SOLAR II Rater(s): JP/DN Date: 9/14/18

13

subtotal this page

0 13

max 10 pts.

subtotal

### Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3 16

max 20 pts.

subtotal

### Metric 6. Plant communities, interspersions, microtopography.

#### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

#### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☒ Low (1)
- ☐ None (0)

#### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☒ Absent (1)

#### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/mounds
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

#### Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

#### Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

#### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

#### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

16

GRAND TOTAL(max 100 pts)



Site: 302899 Hardin Solar II Rater(s): JP/DK Date: 9/14/2018

1	1
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### Metric 1. Wetland Area (size).

Circle: PEM PSS PFO  
Circle: Isolated Adjacent  
Abutting  
Continues off-site: NO

max 6 pts. subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☒ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

1	2
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### Metric 2. Upland buffers and surrounding land use.

max 14 pts. subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

5	7
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### Metric 3. Hydrology.

max 30 pts. subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☐ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☒ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☒ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input type="checkbox"/> ditch            | <input type="checkbox"/> point source (nonstormwater) |
| <input checked="" type="checkbox"/> tile  | <input type="checkbox"/> filling/grading              |
| <input type="checkbox"/> dike             | <input type="checkbox"/> road bed/RR track            |
| <input type="checkbox"/> weir             | <input type="checkbox"/> dredging                     |
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> other                        |

3	10
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### Metric 4. Habitat Alteration and Development.

max 20 pts. subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- |   |   |
|---|---|
| <input type="checkbox"/> mowing               | <input type="checkbox"/> shrub/sapling removal          |
| <input type="checkbox"/> grazing              | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input type="checkbox"/> clearcutting         | <input type="checkbox"/> sedimentation                  |
| <input type="checkbox"/> selective cutting    | <input type="checkbox"/> dredging                       |
| <input type="checkbox"/> woody debris removal | <input checked="" type="checkbox"/> farming             |
| <input type="checkbox"/> toxic pollutants     | <input checked="" type="checkbox"/> nutrient enrichment |

10
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subtotal this page

Site: 302899 HARDIN SOLAR II Rater(s): JP/DK Date: 9/14/2018

10

subtotal this page

0 10

max 10 pts.

subtotal

### Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
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- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
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- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1 11

max 20 pts.

subtotal

### Metric 6. Plant communities, interspersions, microtopography.

#### 6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

#### 6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☒ None (0)

#### 6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☒ Absent (1)

#### 6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/tussocks
- ☐ Coarse woody debris >15cm (6in)
- ☐ Standing dead >25cm (10in) dbh
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#### Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

#### Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

11

GRAND TOTAL(max 100 pts)



**Appendix E**

**Ohio EPA Stream Data Forms**

Stream & Location: HS-M1RM:      Date 05/18/18Scioto RiverScorers Full Name & Affiliation: M. Molnar, TRCRiver Code:      STORET #:     Lat./Long.: 40.0638183.7926Office verified location ☐1) **SUBSTRATE** Check **ONLY** Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 &amp; average)

- | BEST TYPES                                | POOL RIFFLE | OTHER TYPES                                  | POOL RIFFLE  |
|---|-------------|--|--------------|
| <input type="checkbox"/> BLDR /SLABS [10] | <u>    </u> | <input type="checkbox"/> HARDPAN [4]         | <u>    </u>  |
| <input type="checkbox"/> BOULDER [9]      | <u>    </u> | <input type="checkbox"/> DETRITUS [3]        | <u>    </u>  |
| <input type="checkbox"/> COBBLE [8]       | <u>5 5</u>  | <input checked="" type="checkbox"/> MUCK [2] | <u>30 30</u> |
| <input type="checkbox"/> GRAVEL [7]       | <u>    </u> | <input checked="" type="checkbox"/> SILT [2] | <u>50 60</u> |
| <input type="checkbox"/> SAND [6]         | <u>    </u> | <input type="checkbox"/> ARTIFICIAL [0]      | <u>5 5</u>   |
| <input type="checkbox"/> BEDROCK [5]      | <u>    </u> |  |              |

ORIGIN

QUALITY

☐ LIMESTONE [1]☐ HEAVY [-2]☒ TILLS [1]☒ MODERATE [-1]☐ WETLANDS [0]☐ NORMAL [0]☐ HARDPAN [0]☐ FREE [1]☐ SANDSTONE [0]☐ EXTENSIVE [-2]☐ RIP/RAP [0]☒ MODERATE [-1]☐ LACUSTURINE [0]☐ NORMAL [0]☐ SHALE [-1]☐ NONE [1]☐ COAL FINES [-2]NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

2 + 2 + 1 + 1 + 1 + 02) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 &amp; average)

- |                                       |                           |                                   |
|---------------------------------------|---------------------------|-----------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>1</u> POOLS > 70cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>0</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]     | <u>0</u> AQUATIC MACROPHYTES [1]  |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]     | <u>0</u> LOGS OR WOODY DEBRIS [1] |
| <u>0</u> ROOTMATS [1]                 |                           |                                   |

Comments

1 + 2 + 13) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

- | SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION  | STABILITY                                   |
|--|--|---|---|
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                             | <input type="checkbox"/> HIGH [3]           |
| <input type="checkbox"/> MODERATE [3]        | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]                        | <input type="checkbox"/> MODERATE [2]       |
| <input type="checkbox"/> LOW [2]             | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]                       | <input checked="" type="checkbox"/> LOW [1] |
| <input checked="" type="checkbox"/> NONE [1] | <input checked="" type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] |   |

Comments

1 + 1 + 1 + 14) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for **EACH BANK** (Or 2 per bank & average)

River right looking downstream

- | EROSION  | RIPIARIAN WIDTH  | FLOOD PLAIN QUALITY   | CONSERVATION                                       |
|--|--|---|--|
| <input type="checkbox"/> NONE / LITTLE [3]       | <input type="checkbox"/> WIDE > 50m [4]                  | <input type="checkbox"/> FOREST, SWAMP [3]                    | <input type="checkbox"/> CONSERVATION TILLAGE [1]  |
| <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3]             | <input type="checkbox"/> SHRUB OR OLD FIELD [2]               | <input type="checkbox"/> URBAN OR INDUSTRIAL [0]   |
| <input type="checkbox"/> HEAVY / SEVERE [1]      | <input type="checkbox"/> NARROW 5-10m [2]                | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]     | <input type="checkbox"/> MINING / CONSTRUCTION [0] |
|  | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1]                   |  |
|  | <input type="checkbox"/> NONE [0]                        | <input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0] |  |

Comments

2 + 1 + 05) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY)

Check ONE (Or 2 &amp; average)

Check ALL that apply

- ☐ > 1m [6]
- ☐ 0.7-1m [4]
- ☒ 0.4-0.7m [2]
- ☐ 0.2-0.4m [1]
- ☐ < 0.2m [0]

- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

- ☐ TORRENTIAL [-1]
- ☒ SLOW [1]
- ☐ VERY FAST [1]
- ☐ INTERSTITIAL [-1]
- ☐ FAST [1]
- ☐ INTERMITTENT [-2]
- ☒ MODERATE [1]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

**Recreation Potential**  
**Primary Contact**  
**Secondary Contact**  
 (circle one and comment on back)

Comments

2 + 1 + 1 + 1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH

RUN DEPTH

RIFFLE / RUN SUBSTRATE

RIFFLE / RUN EMBEDDEDNESS

- |  |   |   |   |
|--|---|---|---|
| <input type="checkbox"/> BEST AREAS > 10cm [2]       | <input type="checkbox"/> MAXIMUM > 50cm [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]     | <input type="checkbox"/> NONE [2]       |
| <input type="checkbox"/> BEST AREAS 5-10cm [1]       | <input type="checkbox"/> MAXIMUM < 50cm [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]   | <input type="checkbox"/> LOW [1]        |
| <input type="checkbox"/> BEST AREAS < 5cm [metric=0] |   | <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] | <input type="checkbox"/> MODERATE [0]   |
|  |   |   | <input type="checkbox"/> EXTENSIVE [-1] |

Comments

6) **GRADIENT**

DRAINAGE AREA

(55 m<sup>2</sup>)☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]%POOL:     %GLIDE:     %RUN: 100%RIFFLE: 8

Gradient

Maximum 10

**4**



# AJ SAMPLED REACH

Check ALL that apply

## METHOD STAGE

- 1st-sample pass-- 2nd
- ☐ BOAT ☐ HIGH ☐ UP ☐ NORMAL ☐ LOW ☐ DRY
- ☐ WADE ☐ L. LINE ☐ OTHER
- DISTANCE
- ☐ 0.5 Km ☐ 0.2 Km ☐ 0.15 Km ☐ 0.12 Km ☐ OTHER

## CLARITY

- 1st-sample pass-- 2nd
- ☐ < 20 cm ☐ 20-40 cm ☐ 40-70 cm ☐ > 70 cm/ CTB ☐ SECCHI DEPTH ☐

## CANOPY

- ☐ > 85% - OPEN ☐ 55%-<85% ☐ 30%-<55% ☐ 10%-<30% ☐ <10% - CLOSED

## CJ RECREATION

AREA DEPTH POOL: ☐ >100ft<sup>2</sup> ☐ >3ft

## BJ AESTHETICS

- ☐ NUISANCE ALGAE ☐ INVASIVE MACROPHYTES ☐ EXCESS TURBIDITY ☐ DISCOLORATION ☐ FOAM / SCUM ☐ OIL SHEEN ☐ TRASH / LITTER ☐ NUISANCE ODOR ☐ SLUDGE DEPOSITS ☐ CSOs/SSOs/OUTFALLS

## DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA ☐ ACTIVE / HISTORIC / BOTH / NA ☐ YOUNG-SUCCESSION-OLD ☐ SPRAY / SNAG / REMOVED ☐ MODIFIED / DIPPED OUT / NA ☐ LEVEED / ONE SIDED ☐ RELOCATED / CUTOFFS ☐ MOVING-BEDLOAD-STABLE ☐ ARMoured / SLUMPS ☐ ISLANDS / DESICCATED ☐ FLOOD CONTROL / DRAINAGE

## EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY

## FJ MEASUREMENTS

- ☐ width ☐ depth max. depth ☐ bankfull width ☐ bankfull x depth ☐ W/D ratio ☐ bankfull max. depth ☐ floodprone x<sup>2</sup> width ☐ entrench. ratio

Legacy Tree:

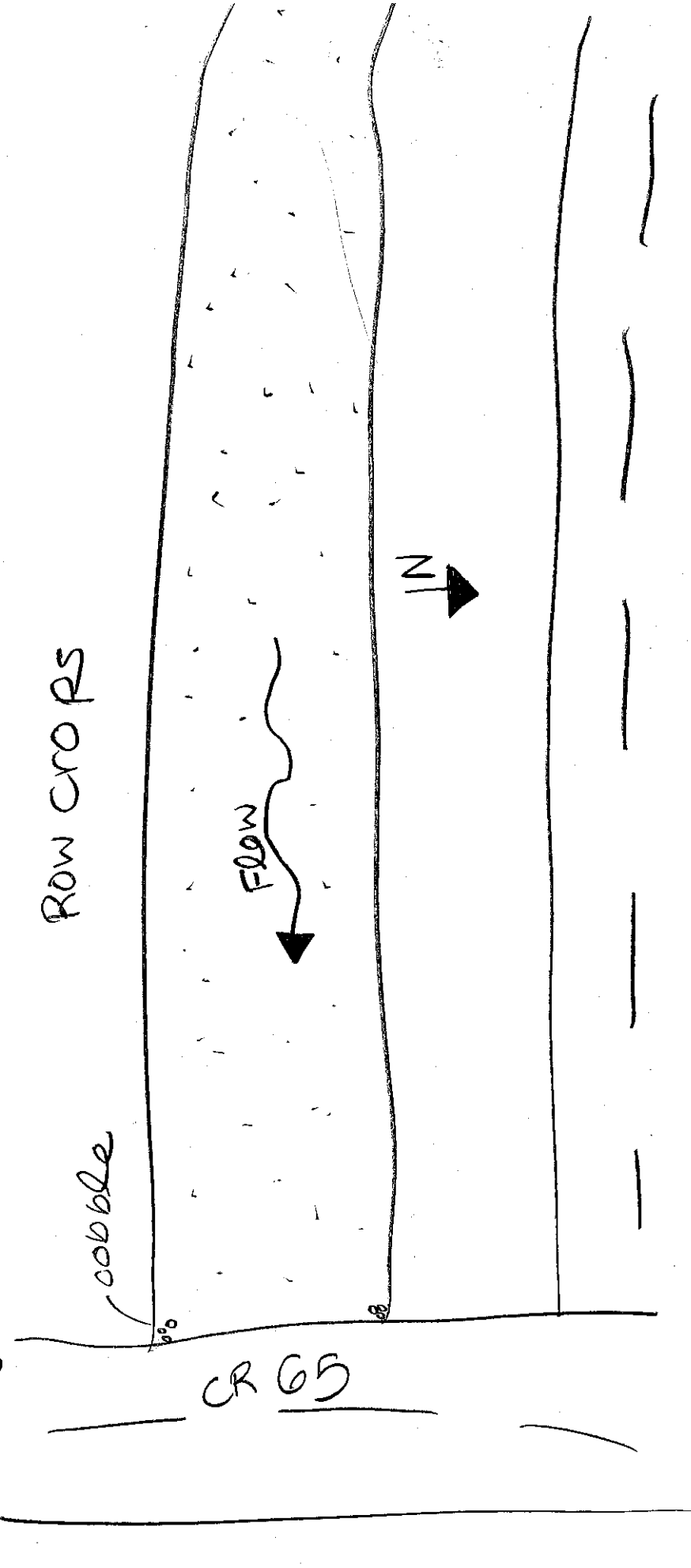
Comment RE: Reach consistency/Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

*Lampsilis radiata leucolea, waterbed*

OTWM width: 20'

OTWM depth: 4'

## Stream Drawing:



Flow regime: Intermittent  
Mod. Class I



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

20

SITE NAME/LOCATION Hardin Solar II  
302899 SITE NUMBER 45-M2 RIVER BASIN \_\_\_\_\_ DRAINAGE AREA (mi<sup>2</sup>) 5.1  
LENGTH OF STREAM REACH (ft) 50' LAT. 40.662 LONG. 83.796 RIVER CODE \_\_\_\_\_ RIVER MILE \_\_\_\_\_  
DATE 5/18/18 SCORER M. Molnd COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY  
MODIFICATIONS: Culvert

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	_____	<input type="checkbox"/> SILT [3 pts]	<u>40</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	_____	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	_____
<input type="checkbox"/> BEDROCK [16 pts]	_____	<input type="checkbox"/> FINE DETRITUS [3 pts]	<u>10</u>
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	_____	<input type="checkbox"/> CLAY or HARDPAN [0 pts]	_____
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	_____	<input type="checkbox"/> MUCK [0 pts]	<u>20</u>
<input type="checkbox"/> SAND (<2 mm) [8 pts]	_____	<input checked="" type="checkbox"/> ARTIFICIAL [3 pts]	<u>30</u>

Total of Percentages of  
Blkr Slabs, Boulder, Cobble, Bedrock

0

(A)

6

(B)

4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):
- |  |  |
|--|--|
| <input type="checkbox"/> > 30 centimeters [20 pts] | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]   | <input checked="" type="checkbox"/> < 5 cm [5 pts]         |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]   | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_

MAXIMUM POOL DEPTH (inches):

2"

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):
- |   |   |
|---|---|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]              | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]   | <input checked="" type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]       |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts] |   |

COMMENTS \_\_\_\_\_

AVERAGE BANKFULL WIDTH (feet):

2'

HHEI  
Metric  
Points

Substrate  
Max = 40

10

A + B

Pool Depth  
Max = 30

5

Bankfull  
Width  
Max=30

5

This information must also be completed

## RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

### RIPARIAN WIDTH

- |                                     |                                     |                |
|-------------------------------------|-------------------------------------|----------------|
| L                                   | R                                   | (Per Bank)     |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Wide >10m      |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Moderate 5-10m |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Narrow <5m     |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | None           |

COMMENTS \_\_\_\_\_

### FLOODPLAIN QUALITY

- |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|
| L                                   | R                                   | (Most Predominant per Bank)         |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Mature Forest, Wetland              |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Immature Forest, Shrub or Old Field |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Residential, Park, <u>New Field</u> |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Fenced Pasture                      |

- |                          |                          |                        |
|--------------------------|--------------------------|------------------------|
| L                        | R                        |                        |
| <input type="checkbox"/> | <input type="checkbox"/> | Conservation Tillage   |
| <input type="checkbox"/> | <input type="checkbox"/> | Urban or Industrial    |
| <input type="checkbox"/> | <input type="checkbox"/> | Open Pasture, Row Crop |
| <input type="checkbox"/> | <input type="checkbox"/> | Mining or Construction |

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Stream Flowing                          | <input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                     |

COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- |  |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5             | <input type="checkbox"/> 1.5 | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3  |

### STREAM GRADIENT ESTIMATE

- ☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)



**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)**DOWNSTREAM DESIGNATED USE(S)**

☐ WWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

☐ CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

☐ EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: \_\_\_\_\_ NRCS Soil Map Page: N/A NRCS Soil Map Stream Order N/A

County: Hardin County Township / City: Marion Township

**MISCELLANEOUS**Base Flow Conditions? (Y/N): Y Date of last precipitation: 5/18/18 Quantity: <.5"

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 100%Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_Field Measures: Temp (°C) N/A Dissolved Oxygen (mg/l) N/A pH (S.U.) N/A Conductivity (µmhos/cm) N/AIs the sampling reach representative of the stream (Y/N): Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: \_\_\_\_\_

**BIOTIC EVALUATION**Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

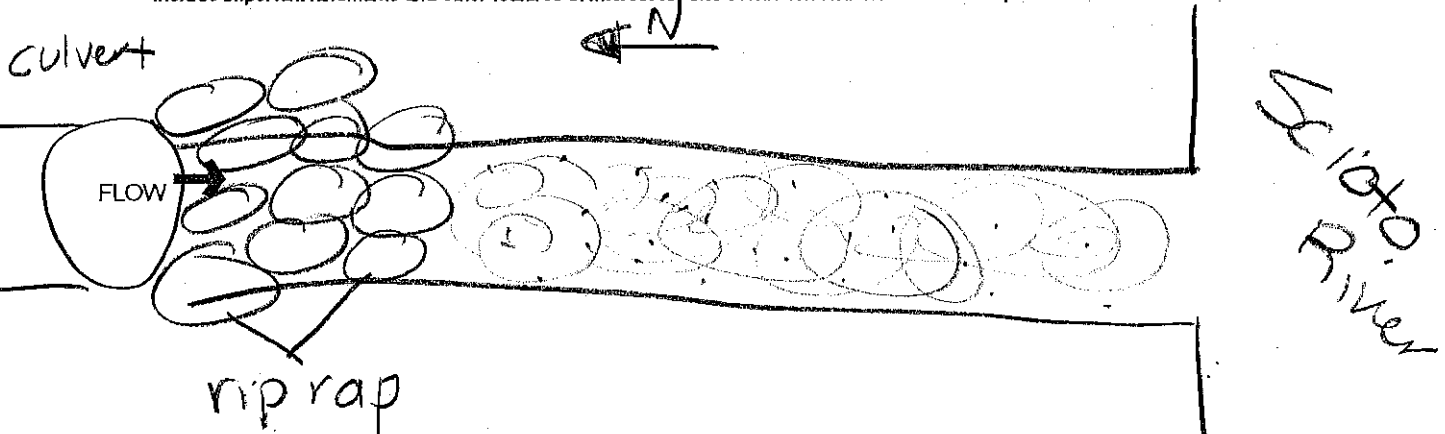
Fish Observed? (Y/N) N Voucher? (Y/N) NA Salamanders Observed? (Y/N) N Voucher? (Y/N) NA

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) NA Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) NA

Comments Regarding Biology: \_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Stream HS-M3  
Flow regime: Intermittent  
Mod. Class I



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

17

SITE NAME/LOCATION Hardin Solar II  
302899 SITE NUMBER HS-M3 RIVER BASIN \_\_\_\_\_ DRAINAGE AREA (mi<sup>2</sup>) 5.1  
LENGTH OF STREAM REACH (ft) 40' LAT. 40.661 LONG. -83.797 RIVER CODE \_\_\_\_\_ RIVER MILE \_\_\_\_\_  
DATE 5/18/18 SCORER M. Molnar COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY  
MODIFICATIONS: Culvert + tiled

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]		<input checked="" type="checkbox"/> SILT [3 pts]	<u>40</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]		<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<u>10</u>
<input type="checkbox"/> BEDROCK [16 pts]		<input type="checkbox"/> FINE DETRITUS [3 pts]	
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]		<input type="checkbox"/> CLAY or HARDPAN [0 pts]	
<input type="checkbox"/> GRAVEL (2-84 mm) [9 pts]		<input checked="" type="checkbox"/> MUCK [0 pts]	<u>30</u>
<input type="checkbox"/> SAND (<2 mm) [8 pts]	<u>10</u>	<input type="checkbox"/> ARTIFICIAL [3 pts]	

Total of Percentages of  
Bldr Slabs, Boulder, Cobble, Bedrock

0

(A)

3

(B)

4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI  
Metric  
Points

Substrate  
Max = 40

7

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):
- |  |  |
|--|--|
| <input type="checkbox"/> > 30 centimeters [20 pts] | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]   | <input checked="" type="checkbox"/> < 5 cm [5 pts]         |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]   | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS

MAXIMUM POOL DEPTH (centimeters):

2"

Pool Depth  
Max = 30

5

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):
- |   |   |
|---|---|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]              | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]   | <input checked="" type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]       |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts] |   |

COMMENTS

AVERAGE BANKFULL WIDTH (meters):

1.5'

Bankfull  
Width  
Max=30

5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

## RIPARIAN WIDTH

- |                                     |                                     |                |
|-------------------------------------|-------------------------------------|----------------|
| L                                   | R                                   | (Per Bank)     |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Wide >10m      |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Moderate 5-10m |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Narrow <5m     |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | None           |

COMMENTS

## FLOODPLAIN QUALITY

- |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|
| L                                   | R                                   | (Most Predominant per Bank)         |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Mature Forest, Wetland              |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Immature Forest, Shrub or Old Field |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Residential, Park, New Field        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Fenced Pasture                      |

- |                          |                          |                        |
|--------------------------|--------------------------|------------------------|
| L                        | R                        |                        |
| <input type="checkbox"/> | <input type="checkbox"/> | Conservation Tillage   |
| <input type="checkbox"/> | <input type="checkbox"/> | Urban or Industrial    |
| <input type="checkbox"/> | <input type="checkbox"/> | Open Pasture, Row Crop |
| <input type="checkbox"/> | <input type="checkbox"/> | Mining or Construction |

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Stream Flowing                          | <input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                     |

COMMENTS

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- |  |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5             | <input type="checkbox"/> 1.5 | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3  |

STREAM GRADIENT ESTIMATE

- |   |  |   |   |  |
|---|--|---|---|--|
| <input type="checkbox"/> Flat (0.5 ft/100 ft) | <input checked="" type="checkbox"/> Flat to Moderate | <input type="checkbox"/> Moderate (2 ft/100 ft) | <input type="checkbox"/> Moderate to Severe | <input type="checkbox"/> Severe (10 ft/100 ft) |
|---|--|---|---|--|



# Stream HS-M3

## ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)

### DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
☐ CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
☐ EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

### MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: \_\_\_\_\_ NRCS Soil Map Page: N/A NRCS Soil Map Stream Order N/A  
 County: Hardin County Township / City: Marion Township

### MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 5/18/18 Quantity: <.1

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: N/A

Field Measures: Temp (°C) N/A Dissolved Oxygen (mg/l) N/A pH (S.U.) N/A Conductivity (µmhos/cm) N/A

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: \_\_\_\_\_

### BIOTIC EVALUATION

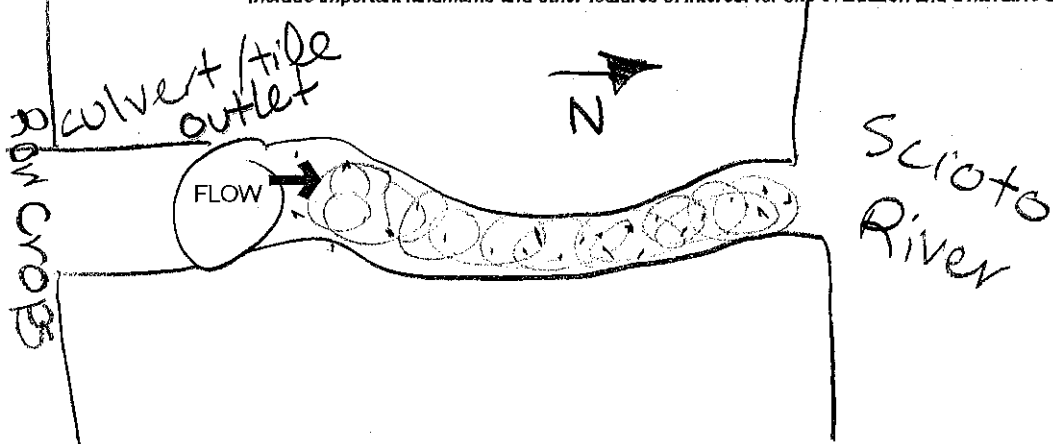
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) N Voucher? (Y/N) N/A Salamanders Observed? (Y/N) N Voucher? (Y/N) N/A  
 Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N/A Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N/A

Comments Regarding Biology: \_\_\_\_\_

### DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Stream &amp; Location:

RM: \_\_\_\_\_

Date: 05/18/18

Stream HS-M4

Scorers Full Name &amp; Affiliation: M. M. Dinar, TRC

River Code: \_\_\_\_\_

STORET #: \_\_\_\_\_

Lat./ Long.: 40.6598 183.7978

Office verified location ☐1] SUBSTRATE Check ONLY Two substrate TYPE BOXES;  
estimate % or note every type present

Check ONE (Or 2 &amp; average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDR / SLABS [10]	_____	<input type="checkbox"/> HARDPAN [4]	_____
<input type="checkbox"/> BOULDER [9]	_____	<input type="checkbox"/> DETRITUS [3]	10 10
<input type="checkbox"/> COBBLE [8]	_____	<input checked="" type="checkbox"/> MUCK [2]	20 20
<input checked="" type="checkbox"/> GRAVEL [7]	10 40	<input type="checkbox"/> SILT [2]	20 30
<input type="checkbox"/> SAND [6]	20	<input type="checkbox"/> ARTIFICIAL [0]	_____
<input type="checkbox"/> BEDROCK [5]	_____	(Score natural substrates; ignore sludge from point-sources)	

ORIGIN
<input type="checkbox"/> LIMESTONE [1]
<input checked="" type="checkbox"/> TILLS [1]
<input type="checkbox"/> WETLANDS [0]
<input type="checkbox"/> HARDPAN [0]
<input type="checkbox"/> SANDSTONE [0]
<input type="checkbox"/> RIP/RAP [0]
<input type="checkbox"/> LACUSTURINE [0]
<input type="checkbox"/> SHALE [-1]
<input type="checkbox"/> COAL FINES [-2]

QUALITY
<input type="checkbox"/> HEAVY [-2]
<input checked="" type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> FREE [1]
<input type="checkbox"/> EXTENSIVE [-2]
<input checked="" type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> NONE [1]

Substrate  
Maximum  
20  
7NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

7+2+0+0-1

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 &amp; average)

<input checked="" type="checkbox"/> UNDERCUT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70cm [2]	<input checked="" type="checkbox"/> OXBOWS, BACKWATERS [1]
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input checked="" type="checkbox"/> ROOTWADS [1]	<input checked="" type="checkbox"/> AQUATIC MACROPHYTES [1]
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS [1]
<input checked="" type="checkbox"/> ROOTMATS [1]		

<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SPARSE 5-<25% [3]
<input checked="" type="checkbox"/> NEARLY ABSENT <5% [1]

Cover  
Maximum  
20  
2

Comments

1+1

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 &amp; average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Channel  
Maximum  
20  
6

Comments

1+1+3+

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank &amp; average)

River right looking downstream

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> MINING / CONSTRUCTION [0]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	
	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]	
	<input type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s)  
past 100m riparian.Riparian  
Maximum  
10  
3

Comments

2+1+0

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

<input type="checkbox"/> > 1m [6]
<input type="checkbox"/> 0.7-<1m [4]
<input type="checkbox"/> 0.4-<0.7m [2]
<input type="checkbox"/> 0.2-<0.4m [1]
<input checked="" type="checkbox"/> < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 &amp; average)

<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]
<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]
<input checked="" type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

<input type="checkbox"/> TORRENTIAL [-1]	<input checked="" type="checkbox"/> SLOW [1]
<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]
<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential  
Primary Contact  
Secondary Contact  
(circle one and comment on back)Pool /  
Current  
Maximum  
12  
2

Comments

0+0+1+1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

RUN DEPTH

RIFFLE / RUN SUBSTRATE

RIFFLE / RUN EMBEDDEDNESS

<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]

☒ EXTENSIVE [-1]Riffle /  
Run  
Maximum  
8  
1

Comments

0+1+1+1

6] GRADIENT (3.05 ft/mi)

DRAINAGE AREA

3.41 m<sup>2</sup>

<input checked="" type="checkbox"/> VERY LOW - LOW [2-4]
<input type="checkbox"/> MODERATE [6-10]
<input type="checkbox"/> HIGH - VERY HIGH [10-6]

%POOL:

10

%GLIDE:

20

%RUN:

30

%RIFFLE:

40

Gradient  
Maximum  
10  
4



Comment RE: Reach consistency/Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

## AJ SAMPLED REACH

Check ALL that apply

### METHOD

- ☐ BOAT  
☐ WADE  
☐ L. LINE  
☐ OTHER
- STAGE**
- 1st - sample pass-- 2nd  
☐ HIGH  
☐ UP  
☐ NORMAL  
☐ LOW  
☐ DRY
- CLARITY**
- 1st - sample pass-- 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm / CTB  
☐ SECCHI DEPTH

### DISTANCE

- ☐ 0.5 Km  
☐ 0.2 Km  
☐ 0.15 Km  
☐ 0.12 Km  
☐ OTHER

### CANOPY

- ☐ > 85% - OPEN  
☐ 55% - 85%  
☐ 30% - 55%  
☐ 10% - 30%  
☐ < 10% - CLOSED

### CJ RECREATION

- AREA DEPTH  
POOL: ☐ > 100 ft<sup>2</sup> ☐ > 3 ft

### BJ AESTHETICS

- ☐ NUISANCE ALGAE  
☐ INVASIVE MACROPHYTES  
☐ EXCESS TURBIDITY  
☐ DISCOLORATION  
☐ FOAM / SCUM  
☐ OIL SHEEN  
☐ TRASH / LITTER  
☐ NUISANCE ODOR  
☐ SLUDGE DEPOSITS  
☐ CSOs/SSOs/OUTFALLS

### DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA  
☐ ACTIVE / HISTORIC / BOTH / NA  
☐ YOUNG-SUCCESSION-OLD  
☐ SPRAY / SNAG / REMOVED  
☐ MODIFIED / DIPPED OUT / NA  
☐ LEVEED / ONE SIDED  
☐ RELOCATED / CUTOFFS  
☐ MOVING-BEDLOAD-STABLE  
☐ ARMORED / SLUMPS  
☐ ISLANDS / DESICCATED  
☐ FLOOD CONTROL / DRAINAGE

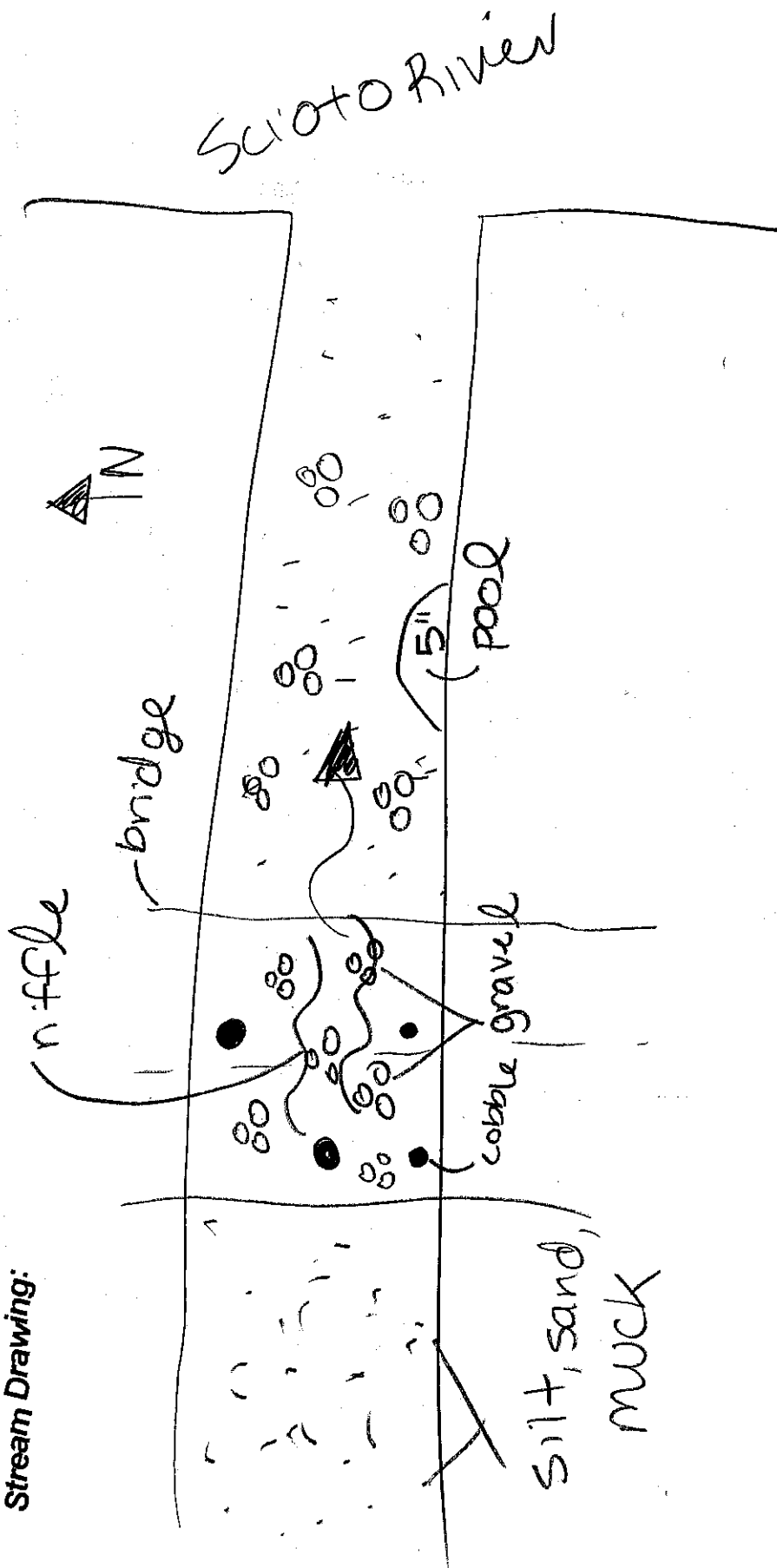
### EJ ISSUES

- ☐ WWTP / CSO / NPDES / INDUSTRY  
☐ HARDENED / URBAN / DIRT & GRIME  
☐ CONTAMINATED / LANDFILL  
☐ BMPs-CONSTRUCTION-SEDIMENT  
☐ LOGGING / IRRIGATION / COOLING  
☐ BANK / EROSION / SURFACE  
☐ FALSE BANK / MANURE / LAGOON  
☐ WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE  
☐ ACID / MINE / QUARRY / FLOW  
☐ NATURAL / WETLAND / STAGNANT  
☐ PARK / GOLF / LAWN / HOME  
☐ ATMOSPHERE / DATA PAUCITY

### FJ MEASUREMENTS

- ☐ width  
☐ depth  
☐ max. depth  
☐ bankfull width  
☐ bankfull x depth  
☐ W/D ratio  
☐ bankfull max. depth  
☐ floodprone x<sup>2</sup> width  
☐ entrench. ratio  
Legacy Tree:

## Stream Drawing:



Stream & Location: STR-HS-MC6RM: --- Date: 05/23/18Edder CreekScorers Full Name & Affiliation: M. Molnar, TRCRiver Code: --- STORET #: ---Lat./Long.: 40.6411 183.8349Office verified location ☐1) **SUBSTRATE** Check **ONLY** Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 &amp; average)

- | BEST TYPES                                     | PPOOL RIFFLE | OTHER TYPES                             | PPOOL RIFFLE |
|--|--------------|---|--------------|
| <input type="checkbox"/> BLDR/SLABS [10]       | <u>5</u>     | <input type="checkbox"/> HARDPAN [4]    | <u>---</u>   |
| <input type="checkbox"/> BOULDER [9]           | <u>20</u>    | <input type="checkbox"/> DETRITUS [3]   | <u>---</u>   |
| <input type="checkbox"/> COBBLE [8]            | <u>20</u>    | <input type="checkbox"/> MUCK [2]       | <u>---</u>   |
| <input checked="" type="checkbox"/> GRAVEL [7] | <u>20</u>    | <input type="checkbox"/> SILT [2]       | <u>20</u>    |
| <input checked="" type="checkbox"/> SAND [6]   | <u>15</u>    | <input type="checkbox"/> ARTIFICIAL [0] | <u>---</u>   |
| <input type="checkbox"/> BEDROCK [5]           | <u>---</u>   |   |              |

ORIGIN

☐ LIMESTONE [1]☒ TILLS [1]☐ WETLANDS [0]☐ HARDPAN [0]☐ SANDSTONE [0]☐ RIP/RAP [0]☐ LACUSTURINE [0]☐ SHALE [-1]☐ COAL FINES [-2]

QUALITY

☐ HEAVY [-2]☒ MODERATE [-1]☐ NORMAL [0]☐ FREE [1]☐ EXTENSIVE [-2]☒ MODERATE [-1]☐ NORMAL [0]☐ NONE [1]

Substrate

**14**

Maximum

20

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments

2+6+7+1-1-12) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 &amp; average)

- |                                       |                             |                                     |
|---------------------------------------|-----------------------------|-------------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>---</u> POOLS > 70cm [2] | <u>1</u> OXBOWS, BACKWATERS [1]     |
| <u>---</u> OVERHANGING VEGETATION [1] | <u>---</u> ROOTWADS [1]     | <u>---</u> AQUATIC MACROPHYTES [1]  |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]       | <u>---</u> LOGS OR WOODY DEBRIS [1] |
| <u>---</u> ROOTMATS [1]               |                             |                                     |

☐ EXTENSIVE >75% [11]☒ MODERATE 25-75% [7]☐ SPARSE 5-<25% [3]☐ NEARLY ABSENT <5% [1]

Comments

1+7+1+1+1+7

Cover

Maximum

20

**12**

20

3) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

- | SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY  |
|--|--|--|--|
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]                |
| <input type="checkbox"/> MODERATE [3]        | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input checked="" type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2]             | <input checked="" type="checkbox"/> FAIR [3] | <input checked="" type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1]      |
| <input checked="" type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |  |

Comments

1+3+3+1.5

Channel

Maximum

20

**8.5**

34.5

4) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

- | EROSION  | RIPARIAN WIDTH   | FLOOD PLAIN QUALITY   | CONSERVATION TILLAGE                               |
|--|--|---|--|
| <input type="checkbox"/> NONE / LITTLE [3]       | <input type="checkbox"/> WIDE > 50m [4]                  | <input type="checkbox"/> FOREST, SWAMP [3]                    | <input type="checkbox"/> URBAN OR INDUSTRIAL [0]   |
| <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3]             | <input type="checkbox"/> SHRUB OR OLD FIELD [2]               | <input type="checkbox"/> MINING / CONSTRUCTION [0] |
| <input type="checkbox"/> HEAVY / SEVERE [1]      | <input type="checkbox"/> NARROW 5-10m [2]                | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]     |  |
|  | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1]                   |  |
|  | <input type="checkbox"/> NONE [0]                        | <input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0] |  |

Indicate predominant land use(s) past 100m riparian.

Riparian

Maximum

10

**3**

37.5

Comments

2+1+05) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH

Check ONE (ONLY!)

☐ > 1m [6]☐ 0.7-<1m [4]☒ 0.4-<0.7m [2]☐ 0.2-<0.4m [1]☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 &amp; average)

☒ POOL WIDTH > RIFFLE WIDTH [2]☐ POOL WIDTH = RIFFLE WIDTH [1]☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]☐ VERY FAST [1]☐ FAST [1]☒ MODERATE [1]☒ SLOW [1]☐ INTERSTITIAL [-1]☐ INTERMITTENT [-2]☒ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Pool /

Current

Maximum

12

**7**

44.5

Comments

2+2+3

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

RUN DEPTH

RIFFLE / RUN SUBSTRATE

RIFFLE / RUN EMBEDDEDNESS

☒ BEST AREAS > 10cm [2]☐ BEST AREAS 5-10cm [1]☐ BEST AREAS < 5cm [metric=0]☒ MAXIMUM > 50cm [2]☐ MAXIMUM < 50cm [1]☐ STABLE (e.g., Cobble, Boulder) [2]☒ MOD. STABLE (e.g., Large Gravel) [1]☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]☐ NONE [2]☐ LOW [1]☒ MODERATE [0]☐ EXTENSIVE [-1]

Riffle /

Run

Maximum

8

**5**

49.5

Comments

2+2+1+06) **GRADIENT** (4.85 ft/mi)

DRAINAGE AREA

16.39 mi<sup>2</sup>☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL:

10

%GLIDE:

40

%RUN:

35

%RIFFLE:

15

Gradient

Maximum

10

**4**

53.5



# AJ SAMPLED REACH

Check ALL that apply

## METHOD

- ☐ BOAT  
☐ WADE  
☐ L. LINE  
☐ OTHER
- ☐ DISTANCE  
☐ 0.5 Km  
☐ 0.2 Km  
☐ 0.15 Km  
☐ 0.12 Km  
☐ OTHER

## STAGE

- 1st sample pass-- 2nd  
☐ HIGH  
☐ UP  
☐ NORMAL  
☐ LOW  
☐ DRY

## CLARITY

- 1st sample pass-- 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm / CTB  
☐ SECCHI DEPTH

## CANOPY

- ☐ > 85% - OPEN  
☐ 55% - 85%  
☐ 30% - 55%  
☐ 10% - 30%  
☐ < 10% - CLOSED

## CJ RECREATION

- AREA DEPTH  
☐ > 100R2  
☐ > 3ft

## BJ AESTHETICS

- ☐ NUISANCE ALGAE  
☐ INVASIVE MACROPHYTES  
☐ EXCESS TURBIDITY  
☐ DISCOLORATION  
☐ FOAM / SCUM  
☐ OIL SHEEN  
☐ TRASH / LITTER  
☐ NUISANCE ODOR  
☐ SLUDGE DEPOSITS  
☐ CSOs/SSOs/OUTFALLS

## DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA  
☐ ACTIVE / HISTORIC / BOTH / NA  
☐ YOUNG-SUCCESSION-OLD  
☐ SPRAY / SNAG / REMOVED  
☐ MODIFIED / DIPPED OUT / NA  
☐ LEVEED / ONE SIDED  
☐ RELOCATED / CUTOFFS  
☐ MOVING-BEDLOAD-STABLE  
☐ ARMoured / SLUMPS  
☐ ISLANDS / DESICCATED  
☐ FLOOD CONTROL / DRAINAGE

## EJ ISSUES

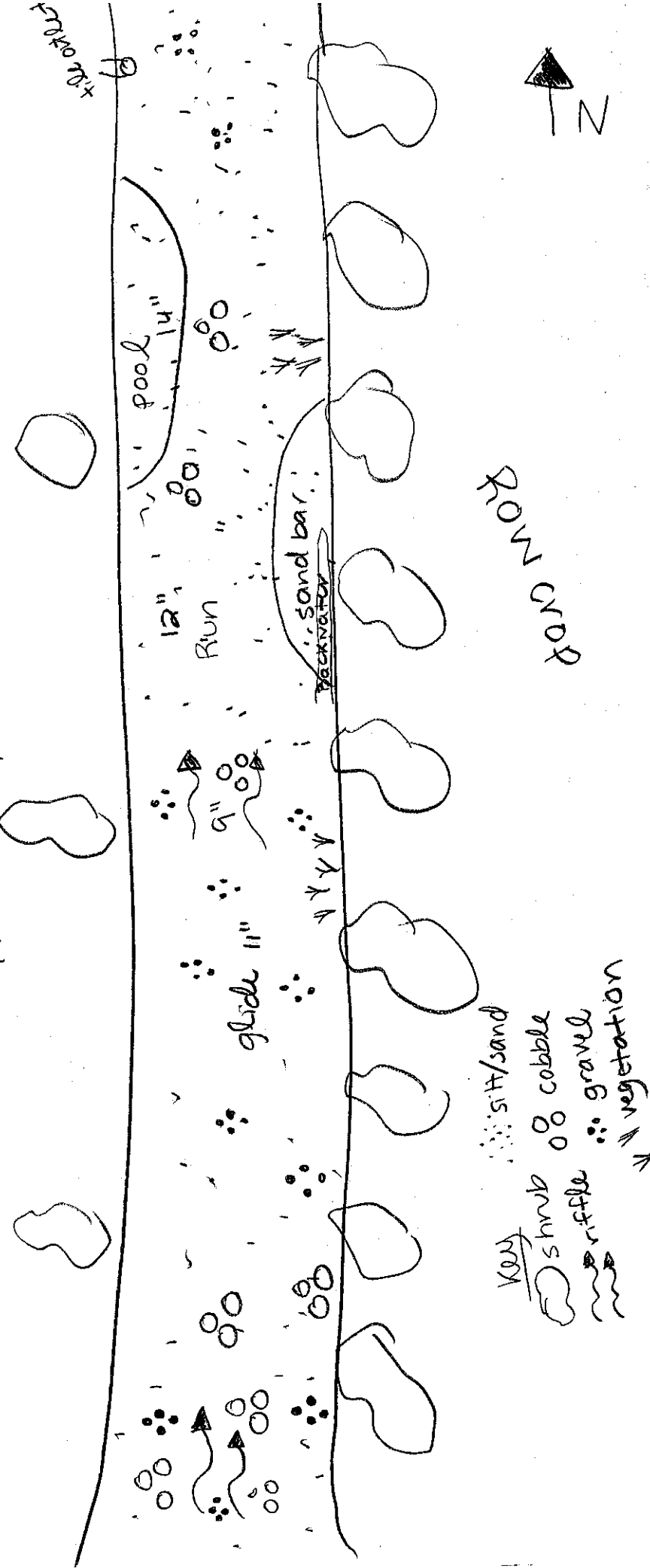
- ☐ WWTP / CSO / NPDES / INDUSTRY  
☐ HARDENED / URBAN / DIRT & GRIME  
☐ CONTAMINATED / LANDFILL  
☐ BMPs-CONSTRUCTION-SEDIMENT  
☐ LOGGING / IRRIGATION / COOLING  
☐ BANK / EROSION / SURFACE  
☐ FALSE BANK / MANURE / LAGOON  
☐ WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE  
☐ ACID / MINE / QUARRY / FLOW  
☐ NATURAL / WETLAND / STAGNANT  
☐ PARK / GOLF / LAWN / HOME  
☐ ATMOSPHERE / DATA PAUCITY

## FJ MEASUREMENTS

- ☐ width  
☐ depth  
☐ max. depth  
☐ bankfull width  
☐ bankfull x depth  
☐ W/D ratio  
☐ bankfull max. depth  
☐ floodprone x<sup>2</sup> width  
☐ entrench. ratio  
☐ Legacy Tree:

## Stream Drawing:

Row crop



Stream & Location: Stream HS-MN

RM: --- Date: 06/21/8

Gottabrunnchen

Scorers Full Name & Affiliation: M. Molnar

River Code: - STORET #: -

Lat./ Long.: 40.6746 183.8090

Office verified location ☐

1) **SUBSTRATE** Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES		OTHER TYPES	
<input type="checkbox"/> BLDR/SLABS [10]	<input type="checkbox"/> POOL RIFFLE	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> POOL RIFFLE
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/>	<input checked="" type="checkbox"/> SILT [2]	<input type="checkbox"/>
<input checked="" type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>	(Score natural substrates; ignore sludge from point-sources)	

**ORIGIN**

☐ LIMESTONE [1]

☒ TILLS [1]

☐ WETLANDS [0]

☐ HARDPAN [0]

☐ SANDSTONE [0]

☐ RIP/RAP [0]

☐ LACUSTURINE [0]

☐ SHALE [-1]

☐ COAL FINES [-2]

**QUALITY**

☒ HEAVY [-2]

☐ MODERATE [-1]

☐ NORMAL [0]

☐ FREE [1]

☒ EXTENSIVE [-2]

☐ MODERATE [-1]

☐ NORMAL [0]

☐ NONE [1]

Substrate  
Maximum  
20  
**5**

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

6+2+1+2+2

2) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

**AMOUNT**

Check ONE (Or 2 & average)

<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]
<input type="checkbox"/> ROOTMATS [1]		

☐ EXTENSIVE >75% [11]

☐ MODERATE 25-75% [7]

☐ SPARSE 5-<25% [3]

☒ NEARLY ABSENT <5% [1]

Cover  
Maximum  
20  
**5**

Comments

1+1+2+1

3) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Channel  
Maximum  
20  
**4**

Comments

1+1+1+1

4) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream		RIPARIAN WIDTH		FLOOD PLAIN QUALITY		CONSERVATION TILLAGE [1]	
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input type="checkbox"/> MINING / CONSTRUCTION [0]
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/> FENCED PASTURE [1]		
		<input checked="" type="checkbox"/> NONE [0]		<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]			

Indicate predominant land use(s) past 100m riparian.

Riparian  
Maximum  
10  
**2**

Comments

2+0+0

5) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

**MAXIMUM DEPTH**

Check ONE (ONLY!)

☐ > 1m [6]

☐ 0.7-<1m [4]

☒ 0.4-<0.7m [2]

☐ 0.2-<0.4m [1]

☐ < 0.2m [0]

**CHANNEL WIDTH**

Check ONE (Or 2 & average)

☒ POOL WIDTH > RIFFLE WIDTH [2]

☐ POOL WIDTH = RIFFLE WIDTH [1]

☐ POOL WIDTH < RIFFLE WIDTH [0]

**CURRENT VELOCITY**

Check ALL that apply

☐ TORRENTIAL [-1]

☒ SLOW [1]

☐ VERY FAST [1]

☐ INTERSTITIAL [-1]

☐ FAST [1]

☐ INTERMITTENT [-2]

☐ MODERATE [1]

☐ EDDIES [1]

Indicate for reach - pools and riffles.

**Recreation Potential**  
Primary Contact  
Secondary Contact  
(circle one and comment on back)

Pool / Current  
Maximum  
12  
**5**

Comments

2+2+1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Riffle / Run  
Maximum  
8  
**0**

Comments

6) **GRADIENT** (1.75 ft/mi) ☒ VERY LOW - LOW [2-4]

**DRAINAGE AREA** (2.2 m<sup>2</sup>) ☐ MODERATE [6-10]

☐ HIGH - VERY HIGH [10-6]

%POOL: 10 %GLIDE: 80

%RUN: 10 %RIFFLE: 0

Gradient  
Maximum  
10  
**4**



stream HS-M9

**AJ SAMPLED REACH**

Check ALL that apply

**METHOD**

- ☐ BOAT  
☐ WADE  
☐ L. LINE  
☐ OTHER  
☐ DISTANCE  
☐ 0.5 Km  
☐ 0.2 Km  
☐ 0.15 Km  
☐ 0.12 Km  
☐ OTHER

**CLARITY**

- 1st sample pass-- 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm/CTB  
☐ SECCHI DEPTH  
☐ meters

**CANOPY**

- ☐ > 85% - OPEN  
☐ 55% - 85%  
☐ 30% - 55%  
☐ 10% - 30%  
☐ < 10% - CLOSED

**CJ RECREATION**

- 1st sample pass-- 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm/CTB  
☐ SECCHI DEPTH  
☐ meters

**Stream Drawing:**

Recent rain

OHWM: 8' wide

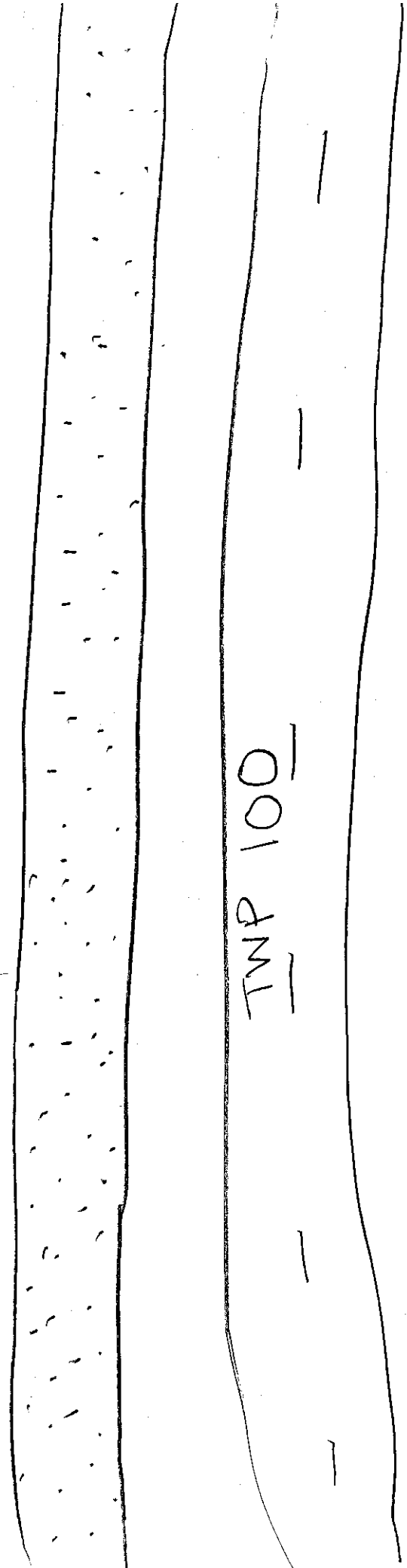
Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

FJ MEASUREMENTS	
WWTP / CSO / NPDES / INDUSTRY	WASH H <sub>2</sub> O / TILE / H <sub>2</sub> O TABLE
HARDENED / URBAN / DIRT & GRIME	ACID / MINE / QUARRY / FLOW
CONTAMINATED / LANDFILL	NATURAL / WETLAND / STAGNANT
BMPs-CONSTRUCTION / SEDIMENT	PARK / GOLF / LAWN / HOME
LOGGING / IRRIGATION / COOLING	ATMOSPHERE / DATA PAUCITY
BANK / EROSION / SURFACE	
FALSE BANK / MANURE / LAGOON	
WASH H <sub>2</sub> O / TILE / H <sub>2</sub> O TABLE	
ACID / MINE / QUARRY / FLOW	
NATURAL / WETLAND / STAGNANT	
PARK / GOLF / LAWN / HOME	
ATMOSPHERE / DATA PAUCITY	

EJ ISSUES	
Public / Private / Both / NA	Recreation / Observed - Inferred
Active / Historic / Both / NA	Other / Sampling observations
Young-Succession-Old	Concerns
Spray / Snag / Removed	Access directions
Modified / Dipped Out / NA	
Leveed / One Sided	
Relocated / Cutoffs	
Moving-Bedload-Stable	
Armoured / Slumps	
Islands / Scoured	
Impounded / Desiccated	
Flood Control / Drainage	

DJ MAINTENANCE	
Nuisance Algae	Wash H <sub>2</sub> O / Tile / H <sub>2</sub> O Table
Invasive Macrophytes	Acid / Mine / Quarry / Flow
Excess Turbidity	Natural / Wetland / Stagnant
Discoloration	Park / Golf / Lawn / Home
Foam / Scum	Atmosphere / Data Paucity
Oil Sheen	
Trash / Litter	
Nuisance Odor	
Sludge Deposits	
CSOs/SSOs/Outfalls	

Row Crop  
corn



STR-HS-M10



## Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

58

SITE NAME/LOCATION Hardin Solar II  
302899 SITE NUMBER RIVER BASIN DRAINAGE AREA (mi<sup>2</sup>) 0.99  
 LENGTH OF STREAM REACH (ft) 200 LAT. 40.6665 LONG. -83.8413 RIVER CODE RIVER MILE  
 DATE 6/14/18 SCORER M. Molnar COMMENTS

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☒ RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]		<input checked="" type="checkbox"/> SILT [3 pt]	<u>60</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]		<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	
<input type="checkbox"/> BEDROCK [16 pt]		<input type="checkbox"/> FINE DETRITUS [3 pts]	
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<u>5</u>	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<u>15</u>	<input type="checkbox"/> MUCK [0 pts]	
<input checked="" type="checkbox"/> SAND (<2 mm) [6 pts]	<u>20</u>	<input type="checkbox"/> ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock

5

(A)

9

(B)

4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI  
Metric  
PointsSubstrate  
Max = 4013

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):
- |   |  |
|---|--|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

Pool Depth  
Max = 3025

COMMENTS

MAXIMUM POOL DEPTH (centimeters):

inches8"

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):
- |  |   |
|--|---|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts] |   |

Bankfull  
Width  
Max=3020

COMMENTS

AVERAGE BANKFULL WIDTH (meters)

feet6'

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH		FLOODPLAIN QUALITY	
L	R	L	R
<input type="checkbox"/> Wide >10m	<input type="checkbox"/> (Per Bank)	<input type="checkbox"/> Mature Forest, Wetland	<input type="checkbox"/> Conservation Tillage
<input type="checkbox"/> Moderate 5-10m	<input type="checkbox"/> Moderate 5-10m	<input type="checkbox"/> Immature Forest, Shrub or Old Field	<input type="checkbox"/> Urban or Industrial
<input checked="" type="checkbox"/> Narrow <5m	<input checked="" type="checkbox"/> Narrow <5m	<input type="checkbox"/> Residential, Park, New Field	<input checked="" type="checkbox"/> Open Pasture, Row Crop
<input type="checkbox"/> None	<input type="checkbox"/> None	<input type="checkbox"/> Fenced Pasture	<input type="checkbox"/> Mining or Construction

COMMENTS

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS Recent rain events

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input checked="" type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)



# Stream HS-M10

## ADDITIONAL STREAM INFORMATION (This information must also be completed):

QHEI PERFORMED? - ☐ Yes ☐ No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)

### DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
☐ CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
☐ EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

### MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: \_\_\_\_\_ NRCS Soil Map Page: N/A NRCS Soil Map Stream Order N/A  
 County: Hardin County Township / City: Marion Township

### MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: 6/11/18 Quantity: 1"

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): \_\_\_\_\_ Canopy (% open): 100%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) N/A Dissolved Oxygen (mg/l) N/A pH (S.U.) N/A Conductivity (µmhos/cm) N/A

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: \_\_\_\_\_

### BIOTIC EVALUATION

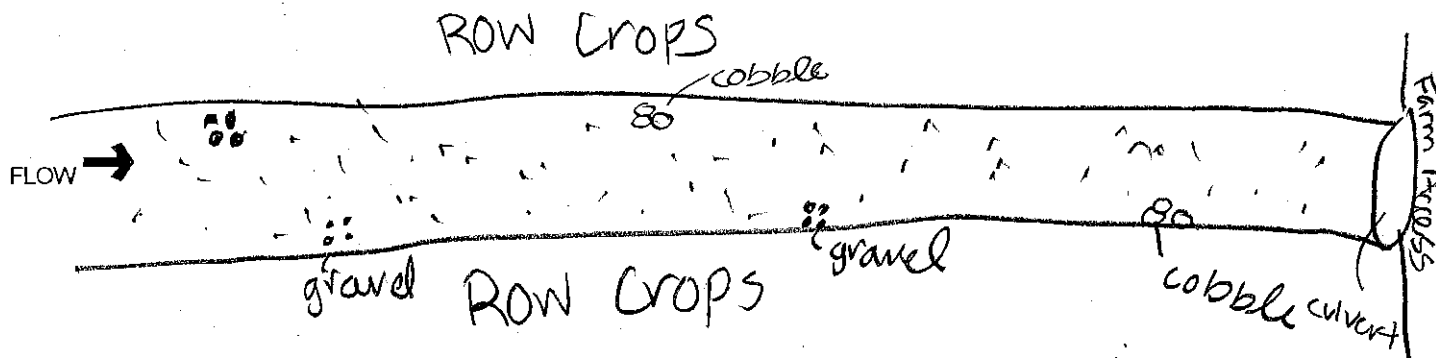
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) N Voucher? (Y/N) N/A Salamanders Observed? (Y/N) N Voucher? (Y/N) N/A  
 Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N/A Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N/A

Comments Regarding Biology: \_\_\_\_\_

### DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Stream &amp; Location: STR-HS-M11

RM: Date: 6/14/18

River Code: STORET #:

Scorers Full Name &amp; Affiliation: M. Molnar, TRC

Lat./ Long.: 40.625 183.8376

Office verified location ☐1) **SUBSTRATE** Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 &amp; average)

- | BEST TYPES                                     | POOL RIFFLE                          | OTHER TYPES                             | POOL RIFFLE                          |
|--|--------------------------------------|---|--------------------------------------|
| <input type="checkbox"/> BLDR /SLABS [10]      | <input type="checkbox"/> POOL RIFFLE | <input type="checkbox"/> HARDPAN [4]    | <input type="checkbox"/> POOL RIFFLE |
| <input type="checkbox"/> BOULDER [9]           | <input type="checkbox"/> POOL RIFFLE | <input type="checkbox"/> DETRITUS [3]   | <input type="checkbox"/> POOL RIFFLE |
| <input type="checkbox"/> COBBLE [8]            | <input type="checkbox"/> POOL RIFFLE | <input type="checkbox"/> MUCK [2]       | <input type="checkbox"/> POOL RIFFLE |
| <input checked="" type="checkbox"/> GRAVEL [7] | <input type="checkbox"/> POOL RIFFLE | <input type="checkbox"/> SILT [2]       | <input type="checkbox"/> POOL RIFFLE |
| <input type="checkbox"/> SAND [6]              | <input type="checkbox"/> POOL RIFFLE | <input type="checkbox"/> ARTIFICIAL [0] | <input type="checkbox"/> POOL RIFFLE |
| <input type="checkbox"/> BEDROCK [5]           | <input type="checkbox"/> POOL RIFFLE |   |                                      |

- ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

- QUALITY
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate  
Maximum  
20NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments

7+2+2+1-1-1

2) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 &amp; average)

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> UNDERCUT BANKS [1]           | <input type="checkbox"/> POOLS > 70cm [2] | <input type="checkbox"/> OXBOWS, BACKWATERS [1]   |
| <input type="checkbox"/> OVERHANGING VEGETATION [1]   | <input type="checkbox"/> ROOTWADS [1]     | <input type="checkbox"/> AQUATIC MACROPHYTES [1]  |
| <input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> BOULDERS [1]     | <input type="checkbox"/> LOGS OR WOODY DEBRIS [1] |
| <input type="checkbox"/> ROOTMATS [1]                 |   |   |

- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

1+1+1+1+1+7

Cover  
Maximum  
203) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

- | SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY  |
|---|--|--|--|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]                |
| <input type="checkbox"/> MODERATE [3]       | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input checked="" type="checkbox"/> MODERATE [2] |
| <input checked="" type="checkbox"/> LOW [2] | <input checked="" type="checkbox"/> FAIR [3] | <input checked="" type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1]      |
| <input type="checkbox"/> NONE [1]           | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |  |

Comments

2+3+3+1.5

Channel  
Maximum  
204) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

- | EROSION  | RIPARIAN WIDTH   | FLOOD PLAIN QUALITY   |  |
|--|--|---|--|
| <input type="checkbox"/> NONE / LITTLE [3]       | <input type="checkbox"/> WIDE > 50m [4]                  | <input type="checkbox"/> FOREST, SWAMP [3]                    | <input type="checkbox"/> CONSERVATION TILLAGE [1]  |
| <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3]             | <input type="checkbox"/> SHRUB OR OLD FIELD [2]               | <input type="checkbox"/> URBAN OR INDUSTRIAL [0]   |
| <input type="checkbox"/> HEAVY / SEVERE [1]      | <input type="checkbox"/> NARROW 5-10m [2]                | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]     | <input type="checkbox"/> MINING / CONSTRUCTION [0] |
|  | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1]                   |  |
|  | <input type="checkbox"/> NONE [0]                        | <input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0] |  |

Indicate predominant land use(s) past 100m riparian.

Comments

2+1+0

Riparian  
Maximum  
105) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY)

Check ONE (Or 2 &amp; average)

Check ALL that apply

- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☒ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

- ☒ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

- ☐ TORRENTIAL [-1]
- ☒ SLOW [1]
- ☐ VERY FAST [1]
- ☐ INTERSTITIAL [-1]
- ☐ FAST [1]
- ☐ INTERMITTENT [-2]
- ☒ MODERATE [1]
- ☒ EDDIES [1]

Indicate for reach - pools and riffles.

Comments

1+2+1+1+1

Pool / Current  
Maximum  
12

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

RUN DEPTH

RIFFLE / RUN SUBSTRATE

RIFFLE / RUN EMBEDDEDNESS

- ☐ BEST AREAS > 10cm [2]
- ☒ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

- ☐ MAXIMUM > 50cm [2]
- ☒ MAXIMUM < 50cm [1]

- ☒ STABLE (e.g., Cobble, Boulder) [2]
- ☒ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

- ☐ NONE [2]
- ☐ LOW [1]
- ☒ MODERATE [0]
- ☐ EXTENSIVE [-1]

Riffle / Run  
Maximum  
8

Comments

1+1+1.5+0

6) **GRADIENT** (4.83 ft/mi)

DRAINAGE AREA

(1.1 m<sup>2</sup>)

- ☒ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

% POOL:

15

% GLIDE:

45

% RUN:

30

% RIFFLE:

10

Gradient  
Maximum  
10



Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

## A) SAMPLED REACH

Check ALL that apply

### METHOD

BOAT

WADE

L. LINE

OTHER

### DISTANCE

0.5 Km

0.2 Km

0.15 Km

0.12 Km

OTHER

### STAGE

1st - sample pass - 2nd

HIGH

UP

NORMAL

LOW

DRY

### CLARITY

1st - sample pass - 2nd

< 20 cm

20-40 cm

40-70 cm

> 70 cm/ CTB

SECCHI DEPTH

meters

### CANOPY

> 85% - OPEN

55% - 85%

30% - 55%

10% - 30%

< 10% - CLOSED

### CJ RECREATION

AREA DEPTH

POOL: < 100ft<sup>2</sup> > 3ft

### BJ AESTHETICS

NUISANCE ALGAE

INVASIVE MACROPHYTES

EXCESS TURBIDITY

DISCOLORATION

FOAM / SCUM

OIL SHEEN

TRASH / LITTER

NUISANCE ODOR

SLUDGE DEPOSITS

CSOs/SSOs/OUTFALLS

### DJ MAINTENANCE

PUBLIC / PRIVATE / BOTH / NA

ACTIVE / HISTORIC / BOTH / NA

YOUNG-SUCCESSION-OLD

SPRAY / SNAG / REMOVED

MODIFIED / DIPPED OUT / NA

LEVEED / ONE SIDED

RELOCATED / CUTOFFS

MOVING-BED/LOAD-STABLE

ARMOURED / SLUMPS

ISLANDS / SCoured

IMPOUNDED / DESICCATED

FLOOD CONTROL / DRAINAGE

### EJ ISSUES

WWTP / CSO / NPDES / INDUSTRY

HARDENED / URBAN / DIRT & GRIME

CONTAMINATED / LANDFILL

BMPs-CONSTRUCTION-SEDIMENT

LOGGING / IRRIGATION / COOLING

BANK / EROSION / SURFACE

FALSE BANK / MANURE / LAGOON

WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE

ACID / MINE / QUARRY / FLOW

NATURAL / WETLAND / STAGNANT

PARK / GOLF / LAWN / HOME

ATMOSPHERE / DATA PAUCITY

### FJ MEASUREMENTS

$\bar{x}$  width

$\bar{x}$  depth

max. depth

$\bar{x}$  bankfull width

bankfull  $\bar{x}$  depth

W/D ratio

bankfull max. depth

floodprone  $\bar{x}^2$  width

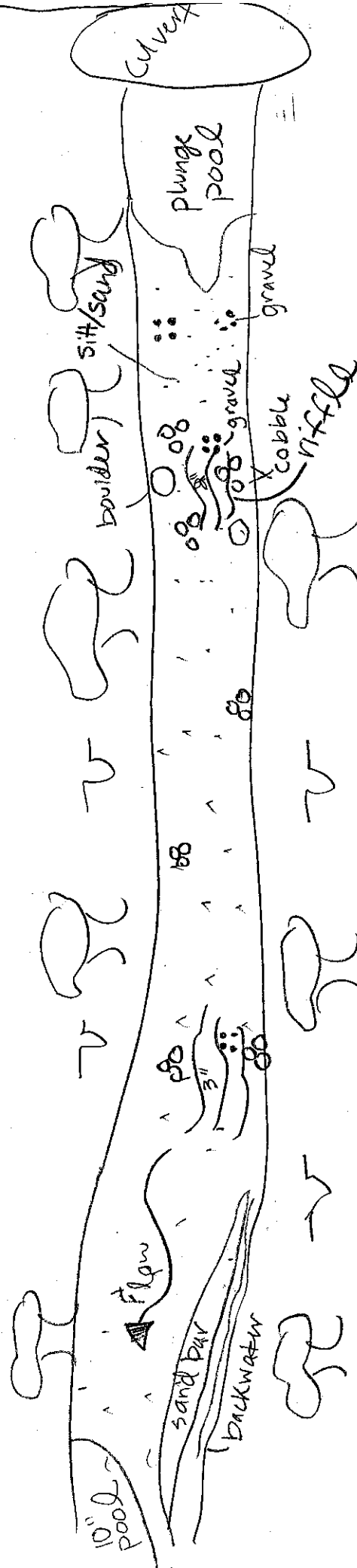
entrench. ratio

Legacy Tree:

## Stream Drawing:

Row Crop

Row Crop



Stream & Location: Stream HW-M9

RM:      Date: 5/14/18

Scorers Full Name & Affiliation: M. Molnar TRC

River Code:      STORET #:      Lat./Long.: 40.6747 183.8268 Office verified location ☐

1] **SUBSTRATE** Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

BEST TYPES		OTHER TYPES		ORIGIN		QUALITY	
<input type="checkbox"/> BLDG/SLABS [10]	<input type="checkbox"/> POOL RIFFLE	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> POOL RIFFLE	<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/> SILT	<input type="checkbox"/> HEAVY [-2]	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Substrate</b>  <span style="font-size: 2em;">3</span>                      Maximum 20                 </div>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> NORMAL [0]	<input type="checkbox"/> MODERATE [-1]	
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> FREE [1]	<input type="checkbox"/> EXTENSIVE [-2]	<input type="checkbox"/> MODERATE [-1]	
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/> SILT [2]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> LAGUSTURINE [0]	<input type="checkbox"/> EXTENSIVE [-2]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> MODERATE [-1]	
<input type="checkbox"/> SAND [6]	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> MODERATE [-1]	
<input type="checkbox"/> BEDROCK [5]		<input type="checkbox"/> COAL FINES [-2]	<input type="checkbox"/> NONE [1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> MODERATE [-1]	

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments: 2+2+1-1-1

2] **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT		Check ONE (Or 2 & average)	
<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE > 75% [11]
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> SPARSE 5-25% [3]
<input type="checkbox"/> ROOTMATS [1]			<input type="checkbox"/> NEARLY ABSENT < 5% [1]

Comments: 1+1+1+1

**Cover**  
4  
 Maximum 20

3] **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments: 1+1+1+2

**Channel**  
5  
 Maximum 20

4] **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION		RIPARIAN WIDTH		FLOOD PLAIN QUALITY		CONSERVATION TILLAGE [1]	
<input checked="" type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]				
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0]				
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/> MINING / CONSTRUCTION [0]				
	<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]					
	<input checked="" type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE / ROWCROP [0]					

Comments: 3+0+0+0

**Riparian**  
3  
 Maximum 10

5] **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH		CHANNEL WIDTH		CURRENT VELOCITY		Recreation Potential	
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]	<input checked="" type="checkbox"/> SLOW [1]	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Primary Contact</b>  <b>Secondary Contact</b>                      (circle one and comment on back)                 </div>		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Pool / Current</b>  <span style="font-size: 2em;">4</span>                      Maximum 12                 </div>	
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]				
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]				
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]				

Comments: 0+2+1+1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH		RUN DEPTH		RIFFLE / RUN SUBSTRATE		RIFFLE / RUN EMBEDDEDNESS	
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]				
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]				
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]				
			<input type="checkbox"/> EXTENSIVE [-1]				

Comments:     

**Riffle / Run**  
0  
 Maximum 8

6] **GRADIENT** (1.64 ft/mi) ☒ VERY LOW - LOW [2-4]  
**DRAINAGE AREA** (1.97 mi<sup>2</sup>) ☐ MODERATE [6-10]  
☐ HIGH - VERY HIGH [10-6]

%POOL:      %GLIDE: 100  
 %RUN:      %RIFFLE:     

**Gradient**  
 Maximum 10 4



# A1 SAMPLED REACH

Check ALL that apply

## METHOD

- ☐ BOAT  
☐ WADE  
☐ L. LINE  
☐ OTHER

## STAGE

- 1st - sample pass - 2nd  
☐ HIGH  
☐ UP  
☐ NORMAL  
☐ LOW  
☐ DRY

## DISTANCE

- ☐ 0.5 Km  
☐ 0.2 Km  
☐ 0.15 Km  
☐ 0.12 Km  
☐ OTHER

## CLARITY

- 1st - sample pass - 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm / CTB  
☐ SECCHI DEPTH

meters

## CANOPY

- ☐ > 85% - OPEN  
☐ 85% - < 85%  
☐ 30% - < 55%  
☐ 10% - < 30%  
☐ < 10% - CLOSED

## C1 RECREATION

POOL: ☐ > 100ft<sup>2</sup> ☐ > 3ft

## B1 AESTHETICS

- ☐ NUISANCE ALGAE  
☐ INVASIVE MACROPHYTES  
☐ EXCESS TURBIDITY  
☐ DISCOLORATION  
☐ FOAM / SCUM  
☐ OIL SHEEN  
☐ TRASH / LITTER  
☐ NUISANCE ODOR  
☐ SLUDGE DEPOSITS  
☐ CSOs / SSOs / OUTFALLS

## D1 MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA  
☐ ACTIVE / HISTORIC / BOTH / NA  
☐ YOUNG-SUCCESSION-OLD  
☐ SPRAY / SNAG / REMOVED  
☐ MODIFIED / DIPPED OUT / NA  
☐ LEVEED / ONE SIDED  
☐ RELOCATED / CUTOFFS  
☐ MOVING-BEDLOAD-STABLE  
☐ ARMOURD / SLUMPS  
☐ ISLANDS / SCoured  
☐ IMPOUNDED / DESICCATED  
☐ FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

## E1 ISSUES

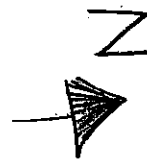
- WWTP / CSO / NPDES / INDUSTRY  
 HARDENED / URBAN / DIRT & GRIME  
 CONTAMINATED / LANDFILL  
 BMPs-CONSTRUCTION-SEDIMENT  
 LOGGING / IRRIGATION / COOLING  
 BANK / EROSION / SURFACE  
 FALSE BANK / MANURE / LAGOON  
 WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE  
 ACID / MINE / QUARRY / FLOW  
 NATURAL / WETLAND / STAGNANT  
 PARK / GOLF / LAWN / HOME  
 ATMOSPHERE / DATA PAUCITY

## F1 MEASUREMENTS

- ☐ width  
☐ depth  
☐ max. depth  
☐ bankfull width  
☐ bankfull depth  
☐ W/D ratio  
☐ bankfull max. depth  
☐ flood prone x width  
☐ entrench. ratio  
 Legacy Tree:

Stream Drawing:

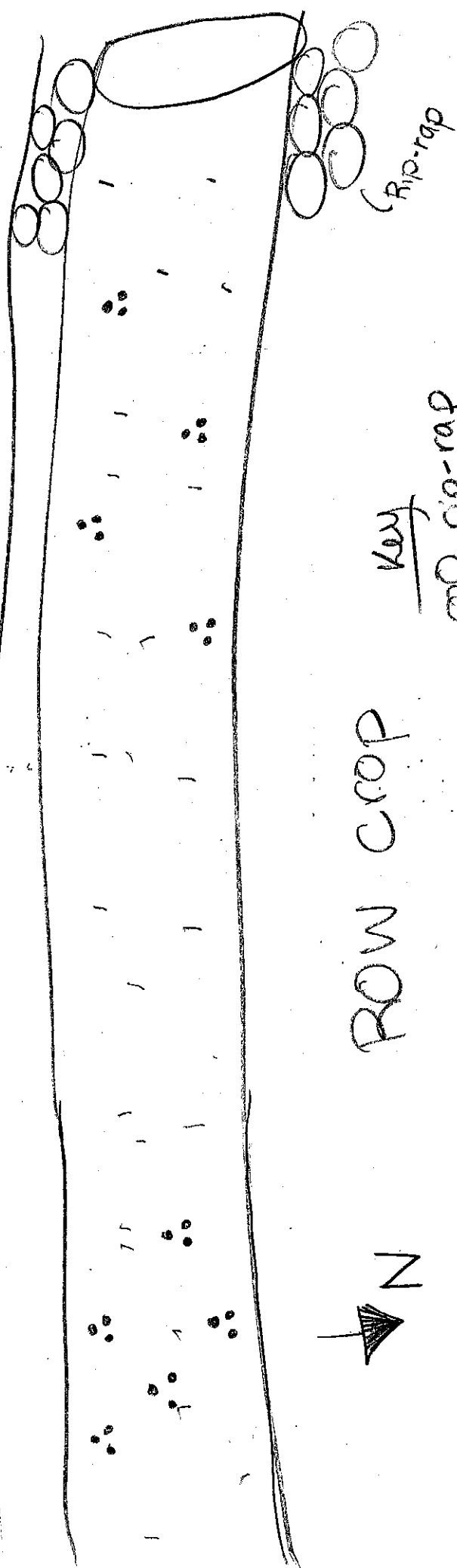
CR 110



ROW CROP

key  
 ○ rip-rap

● gravel  
 ○ silt/sand



Comment RE: Reach consistency/Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

DOCK OBSERVED

Stream &amp; Location: HW-MIO VT Reservoir River

RM: Date 5/16/19

River Code: -

STORET #: -

Scorers Full Name &amp; Affiliation: M. Molnar TRC

Lat./Long.: 40.6600 183.8201

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;  
estimate % or note every type present

Check ONE (Or 2 &amp; average)

## BEST TYPES

## POOL RIFFLE

## OTHER TYPES

## POOL RIFFLE

## ORIGIN

## QUALITY

- ☐ BLDG/SLABS [10]  
☐ BOULDER [9]  
☐ COBBLE [8]  
☐ GRAVEL [7]  
☐ SAND [6]  
☐ BEDROCK [5]

- ☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE

- ☐ HARDPAN [4]  
☐ DETRITUS [3]  
☐ MUCK [2]  
☒ SILT [2]  
☐ ARTIFICIAL [0]

- ☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE  
☐ POOL RIFFLE

- ☐ LIMESTONE [1]  
☒ TILLS [1]  
☐ WETLANDS [0]  
☐ HARDPAN [0]  
☐ SANDSTONE [0]  
☐ RIP/RAP [0]  
☐ LACUSTURINE [0]  
☐ SHALE [1]  
☐ COAL FINES [2]

SILT

EMBEDDEDNESS

- ☐ HEAVY [-2]  
☒ MODERATE [-1]  
☐ NORMAL [0]  
☐ FREE [1]  
☒ EXTENSIVE [-2]  
☒ MODERATE [-1]  
☐ NORMAL [0]  
☐ NONE [1]

Substrate

3

Maximum 20

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

2+2+0+1+1+1

## 2) INSTREAM COVER

Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

## AMOUNT

Check ONE (Or 2 &amp; average)

0 UNDERCUT BANKS [1]

0 POOLS &gt; 70cm [2]

0 OXBOWS, BACKWATERS [1]

1 OVERHANGING VEGETATION [1]

0 ROOTWADS [1]

1 AQUATIC MACROPHYTES [1]

0 SHALLOWS (IN SLOW WATER) [1]

0 BOULDERS [1]

0 LOGS OR WOODY DEBRIS [1]

0 ROOTMATS [1]

Comments

1+1+1

Cover  
Maximum 20

3

## 3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 &amp; average)

## SINUOSITY

## DEVELOPMENT

## CHANNELIZATION

## STABILITY

- ☐ HIGH [4]  
☐ MODERATE [3]  
☐ LOW [2]  
☒ NONE [1]

- ☐ EXCELLENT [7]  
☐ GOOD [5]  
☐ FAIR [3]  
☒ POOR [1]

- ☐ NONE [6]  
☐ RECOVERED [4]  
☐ RECOVERING [3]  
☒ RECENT OR NO RECOVERY [1]

- ☐ HIGH [3]  
☐ MODERATE [2]  
☒ LOW [1]

Channel  
Maximum 20

4

## 4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank &amp; average)

River right looking downstream

## RIPARIAN WIDTH

## FLOOD PLAIN QUALITY

- ☐ NONE / LITTLE [3]  
☒ MODERATE [2]  
☐ HEAVY / SEVERE [1]

- ☐ WIDE > 50m [4]  
☐ MODERATE 10-50m [3]  
☐ NARROW 5-10m [2]  
☐ VERY NARROW < 5m [1]  
☒ NONE [0]

- ☐ FOREST, SWAMP [3]  
☐ SHRUB OR OLD FIELD [2]  
☐ RESIDENTIAL, PARK, NEW FIELD [1]  
☐ FENCED PASTURE [1]  
☒ OPEN PASTURE, ROWCROP [0]

- ☐ CONSERVATION TILLAGE [1]  
☐ URBAN OR INDUSTRIAL [0]  
☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s)  
past 100m riparian.Riparian  
Maximum 10

2

Comments

2+0+0

## 5) POOL / GLIDE AND RIFFLE / RUN QUALITY

## MAXIMUM DEPTH

## CHANNEL WIDTH

## CURRENT VELOCITY

## Recreation Potential

## Primary Contact

## Secondary Contact

(circle one and comment on back)

Check ONE (ONLY!)

Check ONE (Or 2 &amp; average)

Check ALL that apply

- ☐ > 1m [6]  
☐ 0.7-1m [4]  
☐ 0.4-0.7m [2]  
☐ 0.2-0.4m [1]  
☒ < 0.2m [0]

- ☒ POOL WIDTH > RIFFLE WIDTH [2]  
☐ POOL WIDTH = RIFFLE WIDTH [1]  
☐ POOL WIDTH < RIFFLE WIDTH [0]

- ☐ TORRENTIAL [-1]  
☐ VERY FAST [1]  
☐ FAST [1]  
☐ MODERATE [1]  
☐ SLOW [1]  
☐ INTERSTITIAL [-1]  
☐ INTERMITTENT [-2]  
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Pool /  
Current  
Maximum 12

3

Comments

0+2+1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 &amp; average).

☒ NO RIFFLE [metric=0]

## RIFFLE DEPTH

## RUN DEPTH

## RIFFLE / RUN SUBSTRATE

## RIFFLE / RUN EMBEDDEDNESS

- ☐ BEST AREAS > 10cm [2]  
☐ BEST AREAS 5-10cm [1]  
☐ BEST AREAS < 5cm [metric=0]

- ☐ MAXIMUM > 50cm [2]  
☐ MAXIMUM < 50cm [1]

- ☐ STABLE (e.g., Cobble, Boulder) [2]  
☐ MOD. STABLE (e.g., Large Gravel) [1]  
☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

- ☐ NONE [2]  
☐ LOW [1]  
☐ MODERATE [0]  
☐ EXTENSIVE [-1]

Riffle /  
Run  
Maximum 8

0

Comments

## 6) GRADIENT

(3.45 ft/mi)

## DRAINAGE AREA

(1.67 mi<sup>2</sup>)☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL: 0

%GLIDE: 100

%RUN: 0

%RIFFLE: 0

Gradient  
Maximum 10

4



# AJ SAMPLED REACH

Check ALL that apply

## METHOD

- ☐ BOAT  
☐ WADE  
☐ L. LINE  
☐ OTHER

## DISTANCE

- ☐ 0.5 Km  
☐ 0.2 Km  
☐ 0.15 Km  
☐ 0.12 Km  
☐ OTHER

## CLARITY

- 1st sample pass-- 2nd  
☐ < 20 cm  
☐ 20-40 cm  
☐ 40-70 cm  
☐ > 70 cm/ CTB  
☐ SECCHI DEPTH

meters

## CANOPY

- ☐ > 85% - OPEN  
☐ 55%-85%  
☐ 30%-55%  
☐ 10%-30%  
☐ <10% - CLOSED

## CJ RECREATION

POOL: ☐ >100ft<sup>2</sup> ☐ >3ft

## STAGE

- 1st sample pass-- 2nd  
☐ HIGH  
☐ UP  
☐ NORMAL  
☐ LOW  
☐ DRY

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

6' OTWM width  
 1' OTWM depth

## BJ AESTHETICS

- ☐ NUISANCE ALGAE  
☐ INVASIVE MACROPHYTES  
☐ EXCESS TURBIDITY  
☐ DISCOLORATION  
☐ FOAM / SCUM  
☐ OIL SHEEN  
☐ TRASH / LITTER  
☐ NUISANCE ODOR  
☐ SLUDGE DEPOSITS  
☐ CSOs/SSOs/OUTFALLS

## DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA  
☐ ACTIVE / HISTORIC / BOTH / NA  
☐ YOUNG-SUCCESSION-OLD  
☐ SPRAY / SNAG / REMOVED  
☐ MODIFIED / DIPPED OUT / NA  
☐ LEVEED / ONE SIDED  
☐ RELOCATED / CUTOFFS  
☐ MOVING-BEDLOAD-STABLE  
☐ ARMoured / SLUMPS  
☐ ISLANDS / SCOURED  
☐ IMPOUNDED / DESICCATED  
☐ FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

## EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY  
 HARDENED / URBAN / DIRT&GRIME  
 CONTAMINATED / LANDFILL  
 BMPs-CONSTRUCTION-SEDIMENT  
 LOGGING / IRRIGATION / COOLING  
 BANK / EROSION / SURFACE  
 FALSE BANK / MANURE / LAGOON  
 WASH H<sub>2</sub>O / TILE / H<sub>2</sub>O TABLE  
 ACID / MINE / QUARRY / FLOW  
 NATURAL / WETLAND / STAGNANT  
 PARK / GOLF / LAWN / HOME  
 ATMOSPHERE / DATA PAUCITY

## FJ MEASUREMENTS

- ☐ width  
☐ depth  
☐ max. depth  
☐ bankfull width  
☐ bankfull x depth  
☐ W/D ratio  
☐ bankfull max. depth  
☐ floodprone x<sup>2</sup> width  
☐ entrench, ratio  
 Legacy Tree:

Stream Drawing:

Row crops

TWP 120

Row crops

## **Exhibit I**

### **PJM Feasibility Study AD1-130 May 2018**

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*Attorneys for Hardin Solar Energy II LLC*



***Generation Interconnection  
Feasibility Study Report***

***For***

***PJM Generation Interconnection Request  
Queue Position AD1-130***

***Hardin Switch 345 kV***

**May 2018**

## Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.



## General

Invenenergy Solar Development North America, LLC proposes to install PJM Project #AD1-130, a 170.0 MW (115.0 MW Capacity) solar generating facility in Hardin County, OH (see Figure 2). The point of interconnection for the generating facility will be to interconnect to the proposed Hardin Switch 345 kV switching station connecting to AEP's East Lima – Marysville 345 kV line being built for PJM Project #U2-041 (See Figure 1).

The requested in service date is December 31, 2019.

## Attachment Facilities

### Point of Interconnection (Hardin Switch 345 kV)

To be constructed by PJM Project #U2-041.

**Note:** It is assumed that the 345 kV revenue metering and gen lead installed for #U2-041 will be adequate for the additional generation.

## Interconnection Customer Requirements

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

### Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

# Revenue Metering and SCADA Requirements

## PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

## AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

<http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

## Network Impacts

The Queue Project AD1-130 was evaluated as a 170.0 MW (Capacity 115.0 MW) injection to the U2-041 345kV switching station in the AEP area. Project AD1-130 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-130 was studied with a commercial probability of 53%. Potential network impacts were as follows:

## Summer Peak Analysis – 2021

## Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
AEP_P1-2_#6497	CONTINGENCY 'AEP_P1-2_#6497' OPEN BRANCH FROM BUS 242939 TO BUS 247540 CKT 1 / 242939 05MARYSV 345 247506 U2-072 C 345 1 END
AEP_P1-2_#6496	CONTINGENCY 'AEP_P1-2_#6496' OPEN BRANCH FROM BUS 242935 TO BUS 247506 CKT 1 / 242935 05E LIMA 345 247506 U2-041 C 345 1 END

**Table 1**



## **Generator Deliverability**

*(Single or N-1 contingencies for the Capacity portion only of the interconnection)*

None

## **Multiple Facility Contingency**

*(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)*

None

## **Contribution to Previously Identified Overloads**

*(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)*

None

## **Steady-State Voltage Requirements**

None

## **Short Circuit**

*(Summary of impacted circuit breakers)*

New circuit breakers found to be over-duty:

None

## **Affected System Analysis & Mitigation**

### **LGEE Impacts:**

LGEE Impacts to be determined during later study phases (as applicable).

### **MISO Impacts:**

MISO Impacts to be determined during later study phases (as applicable).

### **Duke, Progress & TVA Impacts:**

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

### **OVEC Impacts:**

OVEC Impacts to be determined during later study phases (as applicable).

## **Delivery of Energy Portion of Interconnection Request**

*PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.*

*Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.*

Contingency				Bus		Loading		Rating				
#	Type	Name	Affected Area	Facility Description	From	To	PF	Initial	Final	Type	MVA	MW Con.
1	N-1	AEP_P1-2_#6497	AEP - AEP	U2-041 C-05ELIMA 345 kV line	247506	242935	DC	88.99	107.93	NR	897	169.96
2	N-1	AEP_P1-2_#6496	AEP-AEP	U2-072 C-05MARYSV 345 kV line	247540	242939	DC	88.99	107.93	NR	897	169.96

**Table 2**

## **System Reinforcements**

None

## **Schedule**

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

**Note:** The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

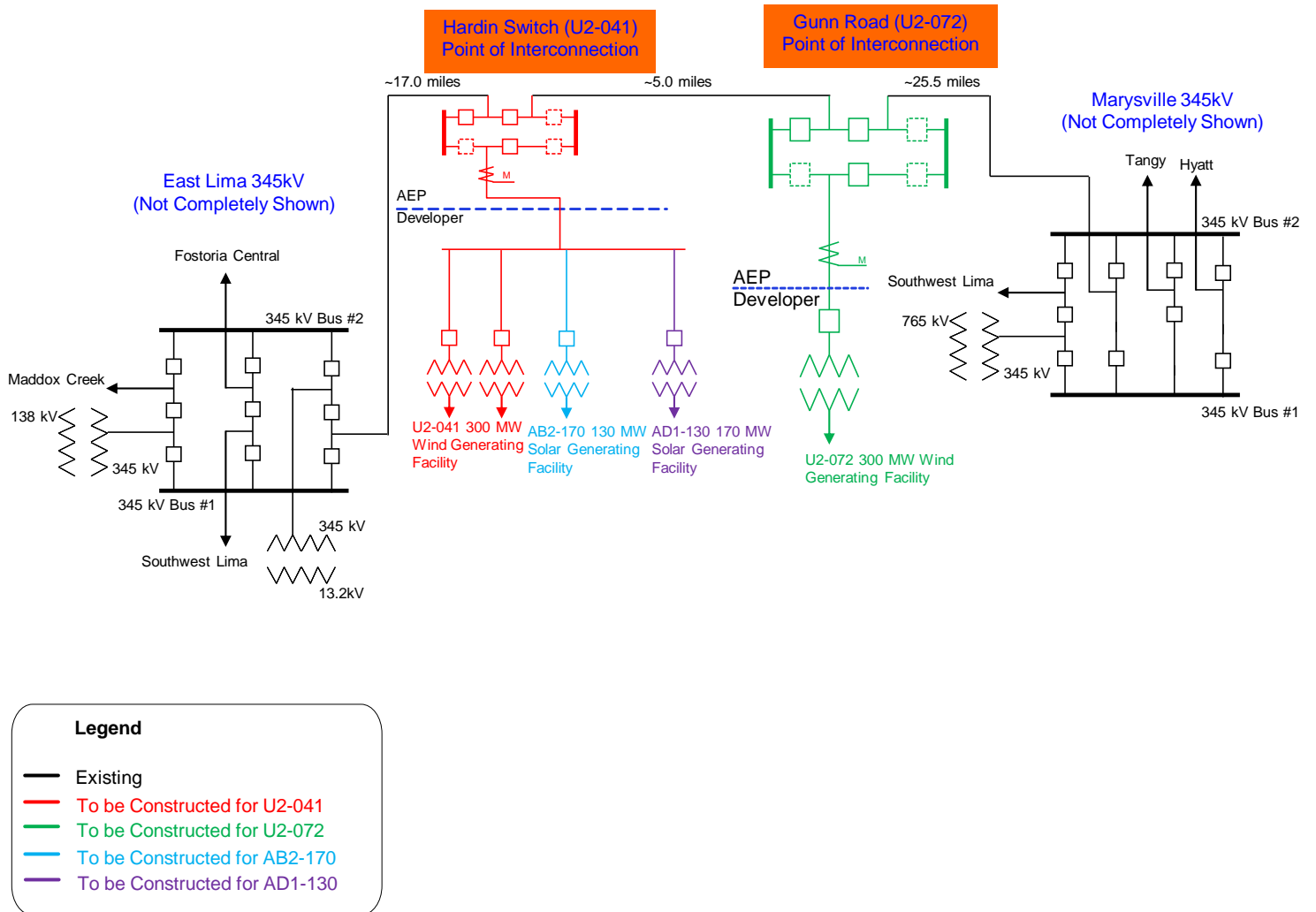
## **Conclusion**

Based upon the results of this Feasibility Study, the construction of the 170.0 MW (115.0 MW Capacity) solar generating facility of Invenergy Solar (PJM Project #AD1-130) will not require additional interconnection charges.

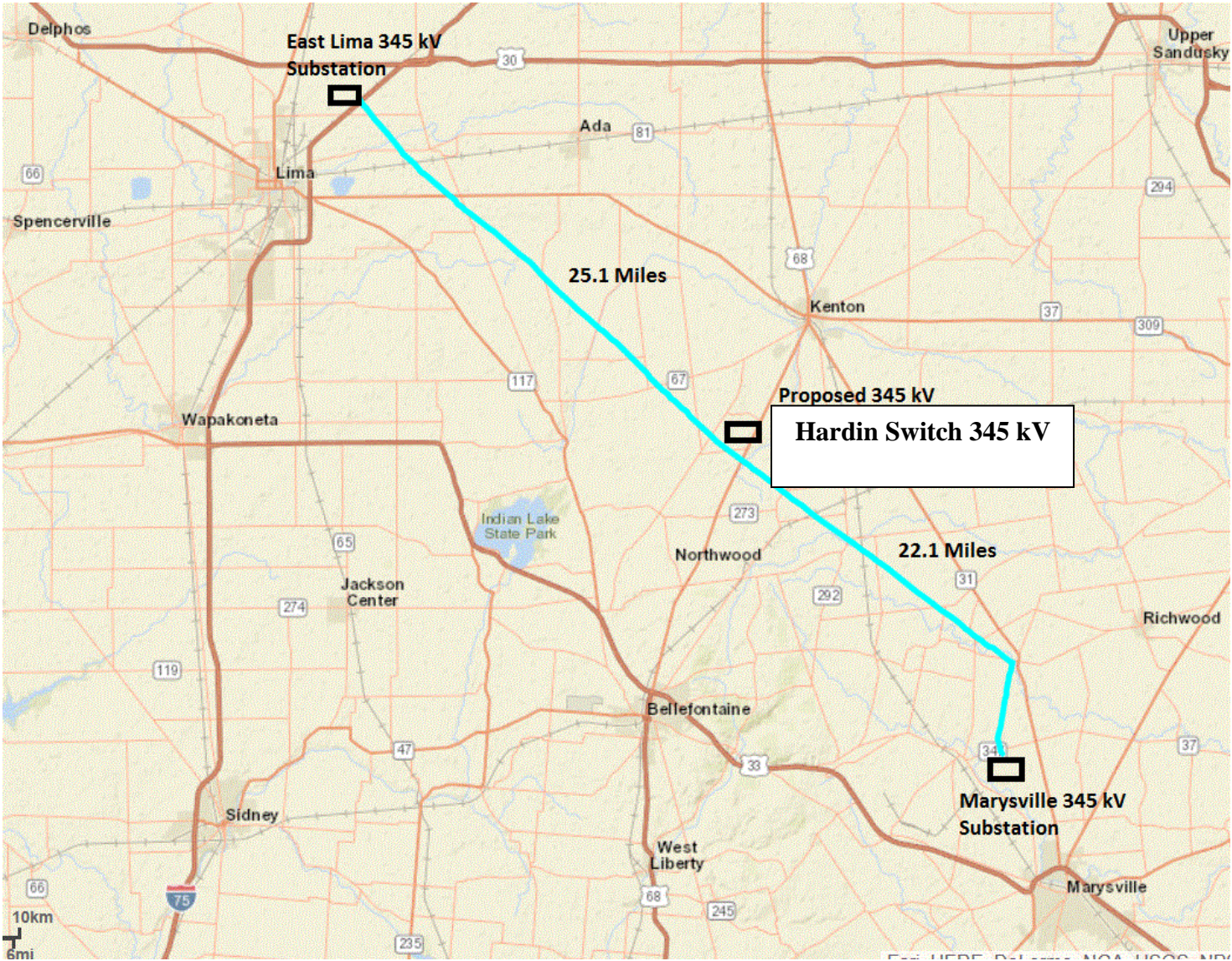


**Figure 1: Point of Interconnection (Hardin Switch 345 kV)**

**Single-Line Diagram**



**Figure 2: Point of Interconnection (Hardin Switch 345 kV)**



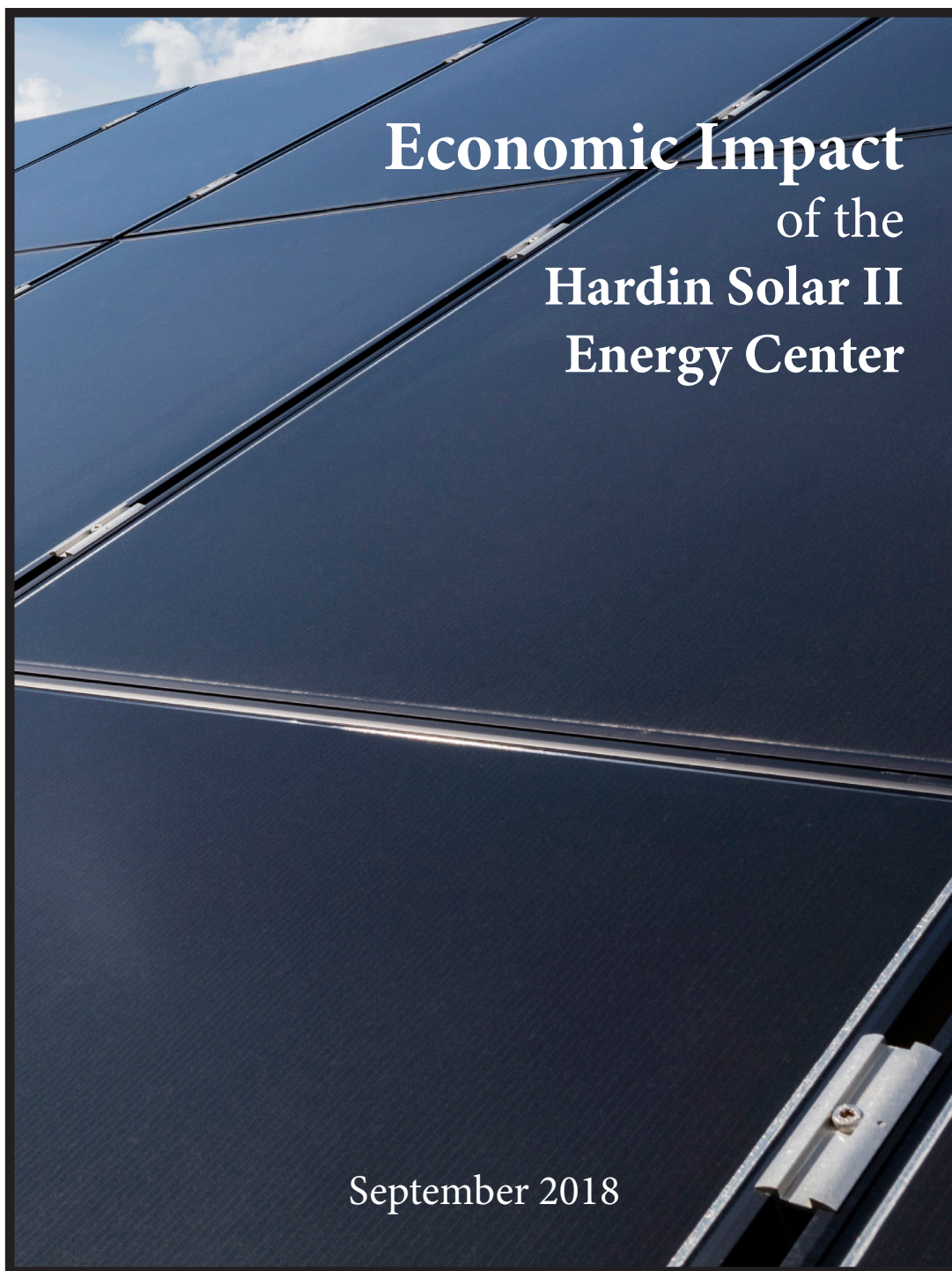


## **Exhibit J**

# **Economic Impact Report September 2018**

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## About the Author



Dr. David G. Loomis is President of Strategic Economic Research, LLC and Professor of Economics at Illinois State University and Co-Founder of the Center for Renewable Energy. He has over 10 years of experience in the renewable energy field and has performed economic analyses at the county, region, state and national levels for utility-scale wind and solar generation. In particular, he has performed economic impact analyses for renewable energy projects in

Illinois, Iowa, Kansas, Michigan, Nebraska, New Mexico, New York, Ohio, Pennsylvania, and South Dakota. He has served as a consultant for Apex, Clean Line Energy Partners, EDF Renewables, E.ON, Geronimo Energy, Invenergy, J-Power, the National Renewable Energy Laboratories, Ranger Power, State of Illinois, Tradewind, and others. Dr. Loomis is a widely recognized expert and has been quoted in the Wall Street Journal, Forbes Magazine, Associated Press, and Chicago Tribune as well as appearing on CNN.

Dr. Loomis has published over 25 peer-reviewed articles in leading energy policy and economics journals. He has raised and managed over \$7 million in grants and contracts from government, corporate and foundation sources. He received the 2011 Department of Energy's Midwestern Regional Wind Advocacy Award and the 2006 Best Wind Working Group Award. Dr. Loomis received his Ph.D. in economics from Temple University in 1995.

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# Executive Summary



Invenergy Solar Development LLC is developing the Hardin Solar II Energy Center, a second phase of the Hardin Solar Energy Center project in Hardin County, Ohio. Invenergy Solar Development North America LLC is North America's largest independent, privately held renewable energy provider. The Company develops, owns and operates large-scale renewable and other clean energy generation and storage facilities in North America, Latin America, Japan and Europe. The purpose of this report is to aid decision makers in evaluating the economic impact of this project on Hardin County and the State of Ohio. The basis of this analysis is to study the direct, indirect and induced impacts on job creation, wages and total economic output.

The Hardin Solar II is a 170 MWac solar project using the next generation of single-axis tracking panels. The project represents an investment in excess of \$200 million. The total development is anticipated to result in the following:

## Jobs

- 153 new local jobs during construction for Hardin County which is 2.1% of non-governmental employment
- 888 new local jobs during construction for the State of Ohio
- 17.4 new local long-term jobs for Hardin County
- 24.2 new local long-term jobs for the State of Ohio

## Earnings

- Almost \$4 million in new local earnings during construction for Hardin County
- Over \$52 million in new local earnings during construction for the State of Ohio
- Almost \$597 thousand in new local long-term earnings for Hardin County annually
- Over \$1.1 million in new local long-term earnings for the State of Ohio annually

Output - the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product.

- Almost \$11 million in new local output during construction for Hardin County
- Over \$87 million in new local output during construction for the State of Ohio
- Over \$2 million in new local long-term output for Hardin County annually
- Over \$3.5 million for the State of Ohio in new local long-term output annually

## Government Revenue

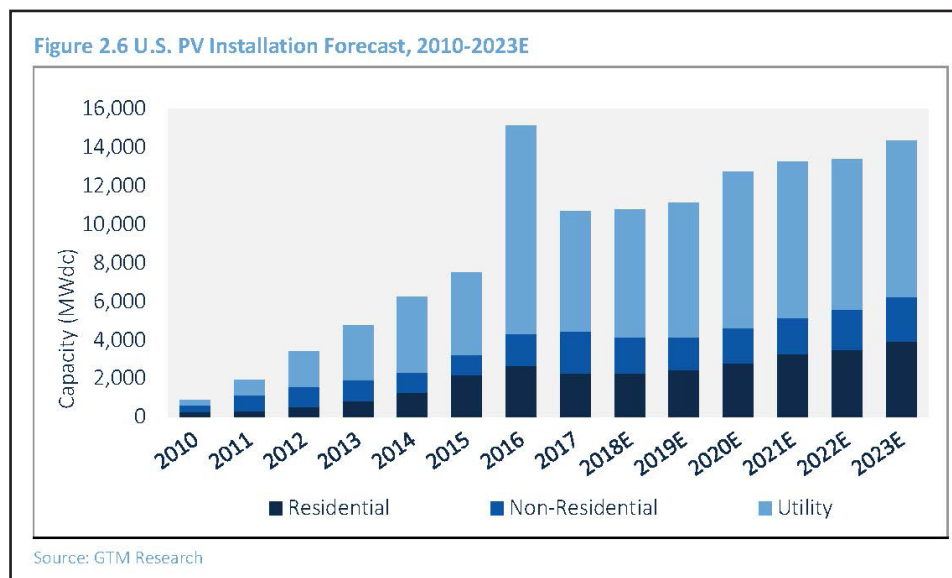
- Upper Scioto Valley School District will receive over \$706 thousand annually from the Project
- Hardin County General Fund will receive over \$63 thousand annually
- Total government revenue paid will exceed \$1.1 million annually.

The U.S. solar industry is growing at a rapid but uneven pace. From 2013 to 2016, the amount of electricity generated from solar had more than doubled increasing from 0.305 quadrillion Btu in 2013 to 0.624 quadrillion Btu in 2016 (EIA, 2018). The industry continued to add increasing numbers of PV systems to the grid. In 2016, the U.S. installed 15,128 MWdc of solar PV driven mostly by utility-scale PV. In 2017, the U.S. installed 10,608 MWdc of solar PV, a 30% decrease from 2016. Yet, as Figure 1 clearly shows, the capacity additions in 2017 still outpaced any previous year except the record-breaking 2016. The solar industry forecast is for slow but steady growth for the next five years.

The primary driver of this overall sharp pace of growth is large price declines. Since 2009, the price of solar PV has declined from about \$7.50/watt in 2009 to about \$1.50/watt in 2017 according to Figure 2. Solar PV also benefits from the Federal Investment Tax Credit (ITC) which provides 30 percent tax credit for residential and commercial properties. Still, various federal tax reform measures and new tariffs on imported solar panels by the Trump Administration may lessen the price declines in 2018 and beyond.

Utility-scale PV leads the installation growth in the U.S. A total of 6.2 GWdc of utility PV projects were completed in 2017 and accounted for 59% of the total installed capacity in 2017. An additional 2.0 GWdc are under construction and are expected to come on-line in 2018. According to Figure 3, there are 32,447 MWdc of utility-scale PV solar operating in the U.S. and an additional 19,331 MWdc has been contracted as well as another 30,121 MWdc announced.

**Figure 1.—Annual U.S. Solar PV Installations, 2010 – 2023**



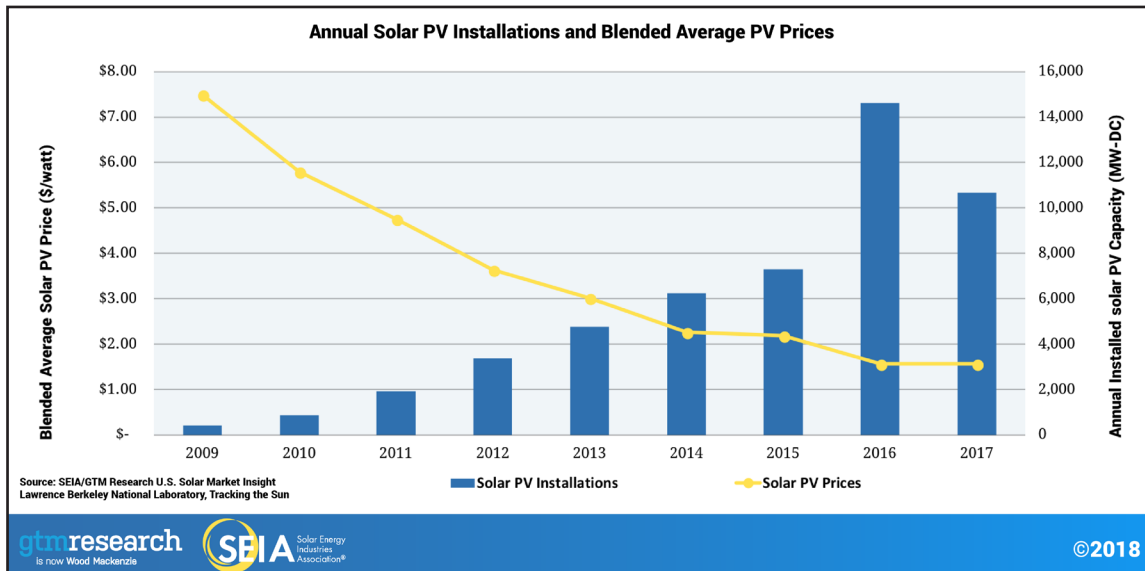
Source: Solar Energy Industries Association, Solar Market Insight Report 2018 Q2

## II. U.S. Solar PV Industry Growth and Economic Development

### a. U.S. Solar PV Industry Growth

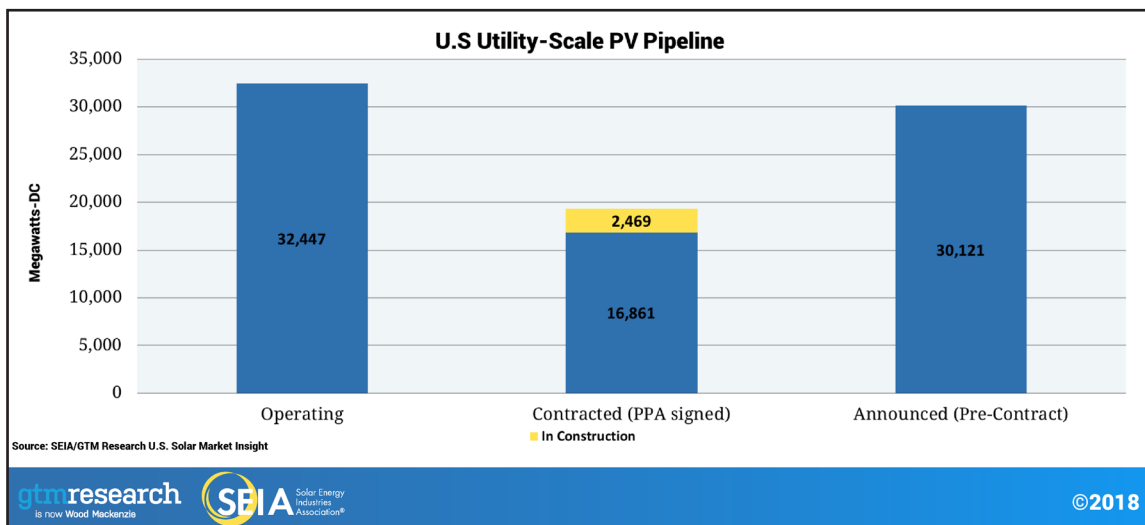


**Figure 2.—U.S. Annual Solar PV Installations and Prices**



Source: Solar Energy Industries Association, Solar Market Insight Report 2018 Q2

**Figure 3.—U.S. Utility PV Pipeline**



Source: Solar Energy Industries Association, Solar Market Insight Report 2018 Q2

## b. Ohio Solar Industry

According to SEIA, Ohio is ranked 28th among the states in cumulative installations of solar PV. California, North Carolina, and Arizona are the top 3 states for solar PV which may not be surprising because of the high solar radiation that they receive. However, other states with similar or lower solar potential rank highly including New Jersey (5th), Massachusetts (6th), New York (11th), and Maryland (13th). In 2017, Ohio installed 40.1 MW of solar electric capacity bringing its cumulative capacity to 175.9 MW.

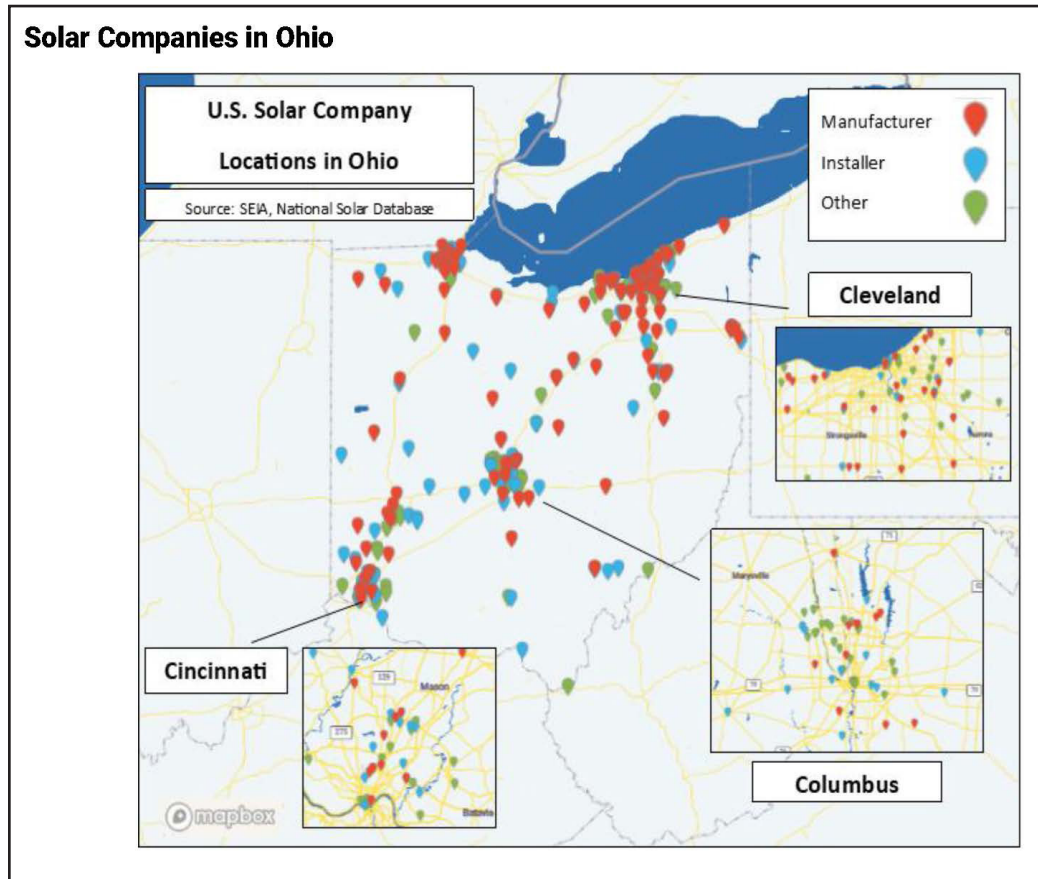
There are more than 274 solar companies in Ohio including 109 manufacturers, 89 installers/developers and 70 others. Figure 4 is a map showing the locations of solar companies in Ohio. Currently, there are 5,831 solar jobs in the State of Ohio according to SEIA.

Ohio has several sizeable solar projects. DG AMP Solar Bowling Green is a 20 MW project that went into operation in January, 2017 and was the largest solar installation in the State of Ohio at that time. A 10 MW solar PV project, BNB Napoleon Solar, was completed in 2014 by developer BNB Renewable Energy Holdings. Wyandot Solar facility is a 10 MW installation completed in 2010 by developer Juwi Solar, Inc. Many large Ohio companies have purchased solar energy including General Motors, IKEA, Assurant, Walmart and Staples. Campbell's Soup has installed a 10 MW system at their location in Napoleon, OH.

Figure 5 shows the Ohio historical installed capacity by year according to the SEIA. The large spike in 2017 is due top the DG AMP Solar Bowling Green project coming on-line. Hardin Solar II would almost double the present installed Ohio capacity of 175.9 MW with its 170 MW size.

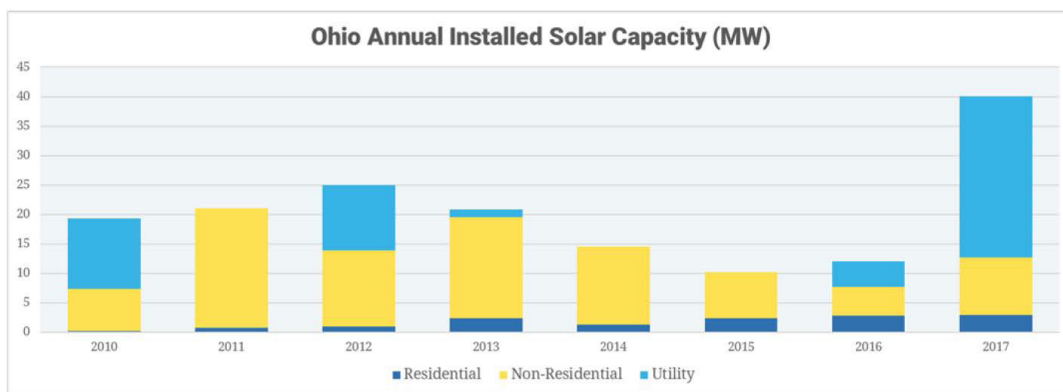


Figure 4. — Solar Company Locations in Ohio



Source: Solar Energy Industries Association, Solar Spotlight: Ohio

Figure 5. — Ohio Annual Solar Installations



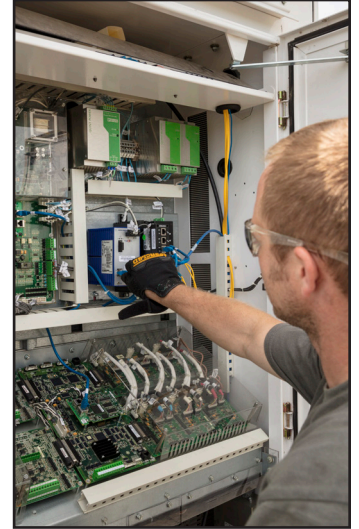
Source: Solar Energy Industries Association, Solar Spotlight: Ohio

Utility-scale solar energy projects have numerous economic benefits. Solar installations create job opportunities in the local area during both the short-term construction phase and the long-term operational phase. Solar projects strengthen the local tax base helping to improve county services, schools, police and fire departments and infrastructure improvements, such as public roads.

Numerous studies have quantified the economic benefits of Solar PV projects across the United States in peer-reviewed academic journals using the same methodology used in this report. Some of the studies examine smaller-scale solar systems and some studies utility-scale solar energy. Croucher (2012) uses JEDI modeling methodology to find which state will receive the greatest economic impact from installing one hundred 2.5 kW systems which are smaller residential systems. He shows that Pennsylvania ranked first supporting 28.98 jobs during installation and 0.20 jobs during operations. Virginia ranked thirty-sixth supporting 23.51 jobs during construction and 0.15 jobs during operations.

Jin (2016) analyzes the financing options and economic impact of solar photovoltaic systems in Normal, IL and uses the JEDI model to determine the county and state economic impact. The study examines the effect of 100 residential retrofit fixed-mount crystalline-silicone systems having a nameplate capacity of 5kW. Eight JEDI models estimated the economic impacts using different input assumptions. They found that county employment impacts varied from 377 to 1,059 job years during construction and 18.8 to 40.5 job years during the operating years.

### c. Economic Benefits of Utility-Scale Solar Energy





Loomis (2016) estimates the economic impact for the State of Illinois if the state were to reach its maximum potential for solar PV. They estimate the economic impact of three different scenarios for Illinois – building new solar installations of 2,292 MW, 2,714 MW or 11,265 MW. They assume the 60% of the capacity is utility-scale solar, 30% of the capacity is commercial, and 10% of the capacity of the systems are residential. They find the employment impacts vary from 26,753 to 131,779 job years during construction and from 1,223 to 6,010 job years during operating years.

Several other reports quantify the economic impact of solar energy. Bezdek (2006) estimated the economic impact for the State of Ohio. He estimated the PV market in Ohio to be \$25 million with 200 direct jobs and 460 total jobs. The Center for Competitive Florida (2009) estimated the impact if the state were to install 1,500 MW of solar. They found that 45,000 direct jobs and 50,000 indirect jobs could be created. The Solar Foundation (2013) used the JEDI modeling methodology to show that Colorado's solar PV installation to date created 10,790 job-years. They also analyzed what would happen if the state were to install 2,750 MW of solar PV from 2013 to 2030 and found that it would result in almost 32,500 job years. Berkman et. al (2011) estimate the economic and fiscal impacts of the Desert Sunlight Solar Farm. The project created approximately 440 construction jobs over a 26 month period, \$15 million in new sales tax revenues and \$12 million in new property revenues for Riverside County and \$336 million in indirect benefits to local businesses in the county.



## d. Solar PV and Ohio Taxes

A property tax is imposed on the value of taxable property located within a county or taxing jurisdiction. There are generally four different categories of property – real property, personal property, tangible property and intangible property. Real property is usually land, buildings or objects that cannot be moved from one location to another. Personal property is generally an object of value that can be moved such as a vehicle, table chair, etc. Intangible property does not exist in physical form but nevertheless has value such as trademarks, copyrights, etc. Each state or local government has its own definition for taxable property and how a particular asset will be classified and valued.

Property taxes are an important source of funds for county and other local units of government. In Ohio, most property taxes go to school districts. “On a statewide basis, approximately two-thirds of all real property taxes collected by counties are distributed to school districts.” (County Commissioners Association of Ohio, p.3). In Hardin County, the Upper Scioto Valley School District receives slightly less than two-thirds of all real property taxes. As a percentage of the total tax rate, Upper Scioto Valley School District receives approximately 57% to 61% of the total property taxes received depending on the township.

Generally, utility-scale power plants pay property taxes in the county in which they are located. Often, a state agency such as the Department of Revenue centrally assess the real and personal property of utilities but sometimes local tax assessors value utility property. In Ohio, generation facilities are valued by the Ohio Department of Taxation (Martin, p. 6). Public utility tangible personal property valuation is assessed at 24% of true value (County Commissioners Association of Ohio, p.15). Although the tax assessor will have the final say on the assessed value, it seems likely that the Hardin Solar Energy will be assessed like public utility property.

For the current project, Invenenergy plans to enter a Payment in Lieu of Taxes (PILOT) agreement via the Ohio Development Services Agency. The PILOT agreement will abate real property and tangible personal property taxes and replace them with a payment of \$7,000 to \$9,000 per MWac of installed capacity. For purposes of this report, we have assumed this payment to be \$7,000 per MWac and the installed capacity to be 170 MWac.

### III. Hardin Solar II Energy Center Project Description and Location

#### a. Hardin Solar II Energy Center Project Description



Invenergy Solar Development North America LLC is developing the Hardin Solar II Energy Center in Hardin County, Ohio. Hardin Solar II Energy Center is the next generation of single-axis tracking solar energy projects providing large-scale, low-cost energy in Ohio designed to fully capitalize on the federal Investment Tax Credit (ITC). The 170 MWac project will pursue commercial operations as early as the second quarter of 2020. The Project will interconnect to the existing East Lima to Marysville transmission line. Local permitting is superseded by the Ohio Power Siting Board (OPSB). The Project will require a Qualified Energy Project Certification from the OPSB. Invenergy will submit applications for this state permit in August 2018 and is targeting receipt of the permits in October 2019. To date, no significant environmental findings have been reported. The Project will capitalize on full utilization of the investment tax credit.

As shown later in the results section, the project will support 153 new local jobs during construction for Hardin County which is 2.1% of non-governmental employment; 888 new local jobs during construction for the State of Ohio; 17.4 new local long-term jobs for Hardin County which is 0.2% of non-governmental employment; and 24.2 new local long-term jobs for the State of Ohio.

Invenergy is North America's largest independent, privately held renewable energy provider. The Company develops, owns and operates large-scale renewable and other clean energy generation and storage facilities in North America, Latin America, Japan and Europe. Invenergy's expertise includes a complete range of fully integrated in-house capabilities, including: Project Development, Permitting, Transmission, Interconnection, Energy Marketing, Finance, Engineering, Project Construction, Operations and Maintenance. To date, the Company has developed more than 19,900 MW of large-scale wind, solar, natural gas and energy storage facilities in North America, Latin America, Japan and Europe. The 127 completed projects include:

- 93 Wind Projects – 13,058 MW
- 18 Solar Projects – 735 MW
- 12 Natural Gas Projects – 6,126 MW
- 4 Storage Projects – 68 MW

Invenergy is headquartered in Chicago with regional development offices in the United States, Canada, Latin America, Japan and Europe.

Hardin County is located in the west central part of Ohio (see Figure 6). It has a total area of 471 square miles and the U.S. Census estimates that the 2017 population was 31,364 with 13,100 housing units. The County has a population density of 27.8 (persons per square mile) compared to 282 for the State of Ohio. Median household income in the county was \$41,343 (2010).

Hardin County top employers include Ohio Northern University, International Paper, ADA technologies and Hardin Memorial Hospital. As shown in Table 2, the largest industry sector is educational services followed by manufacturing, retail trade, accommodations and food services, health care and social assistance, and administrative. The small number of workers in the construction sector (113) limits the local employment impacts from the solar energy project construction.

## b. Hardin County, Ohio

**Figure 6.—Map of Hardin County, Ohio**



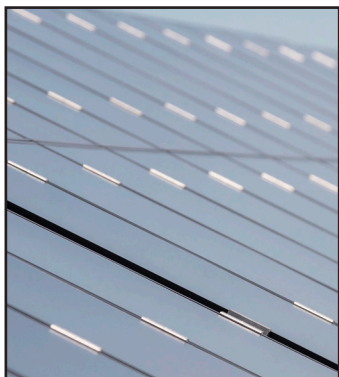
**Table 1. — Non-Governmental Employment by Industry in Hardin County**

Industry	Number	Percent
Educational Services	1,000-2,499	13.8-34.5%
Manufacturing	2,104	29.1%
Retail trade	869	12.0%
Accommodations and food services	811	11.2%
Health care and social assistance	664	9.2%
Transportation and warehousing	398	5.5%
Administrative	229	3.2%
Other services (except public administration)	228	3.2%
Finance and insurance	207	2.9%
Construction	113	1.6%
Wholesale trade	107	1.5%
Professional, Scientific, and Technical Services	81	1.1%
Arts, entertainment, and recreation	52	0.7%
Information	47	0.6%
Utilities	36	0.5%
Real estate and rental and leasing	31	0.4%
Mining, quarrying, and oil and gas extraction	0-19	0.0-0.3%
Other Services	0-19	0.0-0.3%

Source: 2016 County Business Patterns, U.S. Census



## IV. Methodology



NREL: National Renewable  
Energy Laboratory

JEDI: Jobs and Economic  
Development Impacts

IMPLAN: IMpact Analysis  
for PLANning

The economic analysis of solar PV project development presented here uses the NREL's latest Jobs and Economic Development Impacts (JEDI) PV Model (PV12.23.16). The JEDI PV Model is an input-output model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output. That is, the JEDI Model takes into account that the output of one industry can be used as an input for another. For example, when a PV system is installed, there are both soft costs consisting of permitting, installation and customer acquisition costs, and hardware costs, of which the PV module is the largest component. The purchase of a module not only increases demand for manufactured components and raw materials, but also supports labor. When an installer/developer purchases a module from a manufacturing facility, the manufacturer uses some of that money to pay employees. The employees use a portion of their compensation to purchase goods and services within their community. Likewise, when a developer pays workers to install the systems, those workers spend money in the local economy that boosts economic activity and employment in other sectors. The goal of economic impact analysis is to quantify all of those reverberations throughout the economy.

The first Jobs and Economic Development Impacts (JEDI) Model was developed in 2002 to demonstrate the economic benefits associated with developing wind farms in the United States. Since then, JEDI models have been developed for biofuels, natural gas, coal, transmission lines and many other forms of energy. These models were created by Marshall Goldberg of MRG & Associates, under contract with the National Renewable Energy Laboratory. The JEDI model utilizes state-specific industry multipliers obtained from IMPLAN (IMpact analysis for PLANning). IMPLAN software and data are managed and updated by the Minnesota IMPLAN Group, Inc., using data collected at federal, state, and local levels. This study analyzes the gross jobs that the new solar energy project development supports and does not analyze the potential loss of jobs due to declines in other forms of electric generation.

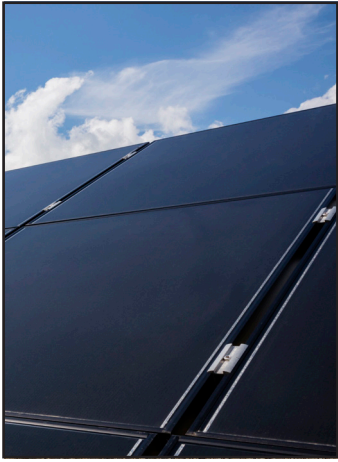
The total economic impact can be broken down into three distinct types: direct impacts; indirect impacts and induced impacts. **Direct impacts** during the construction period refer to the changes that occur in the onsite construction industries in which the direct final demand (i.e., spending on construction labor and services) change is made. Onsite construction-related services include installation labor, engineering, design, and other professional services. Direct impacts during operating years refer to the final demand changes that occur in the onsite spending for the solar operations and maintenance workers.

The initial spending on the construction and operation of the PV installation creates a second layer of impacts, referred to as “supply chain impacts” or “indirect impacts.” **Indirect impacts** during construction period consist of the changes in inter-industry purchases resulting from the direct final demand changes and include construction spending on materials and PV equipment and other purchases of goods and offsite services.

**Induced impacts** during construction refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects of final demand changes. Local spending by employees working directly or indirectly on the PV project who receive their paychecks and then spend money in the community is included. Additional local jobs and economic activity are supported by these purchases of goods and services.



## V. Results



The economic impact results were derived from detailed project estimates supplied by Invenergy. In addition, Invenergy also estimated the percentages of project materials and labor that will be coming from within Hardin County and the State of Ohio.

Two separate JEDI models produced results to show the economic impact of the Hardin Solar II Energy Center. The first JEDI model used the 2016 Hardin County multipliers from IMPLAN. The second JEDI model used the 2016 JEDI state multipliers for the State of Ohio and the same project costs.

Tables 2-4 show the output from these models. Table 2 lists the total employment impact from the Hardin Solar II Energy Center for Hardin County and the State of Ohio. Table 3 shows the impact on total earnings and Table 4 contains the impact on total output.

**Table 2. — Total Employment Impact from the Hardin Solar II Energy Center**

	Hardin County Jobs	State of Ohio Jobs
<b>Construction</b>		
Project Development and Onsite Labor Impacts (direct)	88	559
Turbine and Supply Chain Impacts (indirect)	51	161
Induced Impacts	14	168
<i>New Local Jobs during Construction</i>	153	888
<b>Operations</b>		
Onsite Labor Impacts (direct)	5.0	5.0
Local Revenue and Supply Chain Impacts (indirect)	8.7	10.9
Induced Impacts	3.7	8.3
<i>New Local Long Term Jobs</i>	17.4	24.2

The results from the JEDI model show significant employment impacts from the Hardin Solar II Energy Center. Employment impacts can be broken down into several different components. The employment numbers presented in Table 2 from the JEDI model are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 153 new direct jobs during construction in Hardin County, though the construction of the solar center may actually involve hiring closer to 306 half-time workers. Construction of this Project is expected to take 12-18 months.



As shown in Table 2, new local jobs created or retained during construction total 153 for Hardin County, and 888 for the State of Ohio. New local long-term jobs created from the Hardin Solar II Energy Center total 17.4 for Hardin County and 24.2 for the State of Ohio.

Direct jobs created during the operational phase last the life of the solar energy center, typically 20-30 years. Direct construction jobs and operations and maintenance jobs both require highly-skilled workers in the fields of construction, management, and engineering. These well-paid professionals boost economic development in rural communities where new employment opportunities are welcome due to economic downturns. Accordingly, it is important to not just look at the number of jobs but also the earnings that they produce. Table 3 shows the earnings impacts from the Hardin Solar II Energy Center, which are categorized by construction impacts and operations impacts. The new local earnings during construction total almost \$4 million for Hardin County and over \$52 million for the State of Ohio. The new local long-term earnings total almost \$597 thousand for Hardin County and over \$1.1 million for the State of Ohio.



**Table 3. — Total Earnings Impact from the Hardin Solar II Energy Center**

	Hardin County	State of Ohio
<b>Construction</b>		
Project Development and Onsite Earnings Impacts	\$1,860,409	\$36,332,153
Module and Supply Chain Impacts	\$1,671,453	\$7,997,496
Induced Impacts	\$396,333	\$7,722,325
<i>New Local Earnings during Construction</i>	\$3,928,195	\$52,051,974
<b>Operations</b>		
Onsite Labor Impacts	\$175,525	\$175,525
Local Revenue and Supply Chain Impacts	\$312,935	\$581,945
Induced Impacts	\$108,512	\$384,945
<i>New Local Long Term Earnings</i>	\$596,972	\$1,142,415

Output refers to economic activity or the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product, which measures output on a national basis. According to Table 4, the new local output during construction totals almost \$11 million for Hardin County and over \$87 million for the State of Ohio. The new local long-term output totals over \$2 million for Hardin County and over \$3.5 million for the State of Ohio.

**Table 4. — Total Output Impact from the Hardin Solar II Energy Center**

	Hardin County	State of Ohio
<b>Construction</b>		
Project Development and Onsite Jobs Impacts on Output	\$4,194,722	\$39,342,285
Module and Supply Chain Impacts	\$5,421,895	\$24,515,654
Induced Impacts	\$1,382,831	\$23,885,055
<i>New Local Jobs during Construction</i>	\$10,999,448	\$87,742,994
<b>Operations (Annual)</b>		
Onsite Labor Impacts	\$175,525	\$175,525
Local Revenue and Supply Chain Impacts	\$1,517,748	\$2,159,765
Induced Impacts	\$383,953	\$1,198,085
<i>New Local Long Term Jobs</i>	\$2,077,226	\$3,533,375

Solar PV projects increase the property tax base of a county, creating a new revenue source for education and other local government services. Although it is difficult to calculate the precise assessed value and taxes of the project until construction is completed, we can calculate the taxes on an illustrative example to get an idea of the size of the contributions that a project of this magnitude will have on the local tax base. The Hardin Solar II Energy Center is expected to represent an investment of over \$230 million and will be located in the Scioto Valley Local School District. Using a \$230 million cost basis, we can calculate the expected taxes paid by the project.

Table 5 details the government revenue implications of the Hardin Solar Energy Project. There are several important assumptions built into the analysis in this table. First, the analysis assumes that Invenenergy enters into Payment in Lieu of Taxes (PILOT) agreement via the Ohio Development Services Agency. The PILOT agreement will abate real property and tangible personal property taxes and replace them with a payment of \$7,000 to \$9,000 per MWac of installed capacity. For purposes of this report, we have assumed this payment to be \$7,000 per MWac and the installed capacity to be 170 MWac. . Second, the table assumes the Tax Year 2017 tax rates posted on the Ohio Department of Revenue website for each taxing body. Third, the projections assume that the tax rate and the cost do not change before the project is put into service in 2020. Fourth, the township revenue assumes that 59% of the assessed value will be in Marion Township, 23% of the assessed value will be in Roundhead Township, and 18% of the assessed value will be in McDonald Township.

According to Table 5, Upper Scioto Valley School District will receive over \$706 thousand annually from the Hardin Solar II Energy Project and the Hardin County General Fund will receive over \$63 thousand annually. The total taxes paid will exceed \$1.1 million annually. Other taxing districts will receive between \$409 and \$90,826 annually as detailed in Table 5. These amounts could be higher if the final PILOT amount is greater than \$7,000 MWac.

**Table 5. — Illustration of Government Revenue by the Hardin Solar II Energy Project**

<b>Taxing District</b>	<b>Estimated Annual Government Revenue</b>
Upper Scioto Valley Local School District	\$706,171
Mental Retardation and Development Disabilities (MRDD)	\$90,826
County General Fund	\$63,578
Ohio Hi-Point JVSD	\$45,413
Upper Scioto Ambulance District	\$40,872
Mental Health and Retardation	\$36,330
Council on Aging	\$34,060
Joint Mental Health District	\$34,060
Marion Township General Fund	\$26,794
Sheriff Operating Fund	\$22,706
Roundhead Township General Fund	\$18,801
9-1-1 Emergency	\$17,030
Marion Township Fire and EMS	\$13,397
Roundhead Township Fire	\$10,445
McDonald Township General Fund	\$10,422
OSU Extension Office	\$7,947
Roundhead Township Fire and EMS	\$5,222
McDonald Township Cemetery Fund	\$3,065
McDonald Township Fire and EMS	\$2,452
McDonald Township Road and Bridge	\$409
<b>TOTAL</b>	<b>\$1,190,000</b>



## VI. References

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## VII. Curriculum Vita - David Loomis

### Education

Doctor of Philosophy, Economics, Temple University, Philadelphia, Pennsylvania, May 1995.

Bachelor of Arts, Mathematics and Honors Economics, Temple University, Magna Cum Laude, May 1985.

### Experience

1996-present Illinois State University, Normal, IL

Full Professor – Department of Economics (2010-present)

Associate Professor - Department of Economics (2002-2009)

Assistant Professor - Department of Economics (1996-2002)

- Taught Regulatory Economics, Telecommunications Economics and Public Policy, Industrial Organization and Pricing, Individual and Social Choice, Economics of Energy and Public Policy and a Graduate Seminar Course in Electricity, Natural Gas and Telecommunications Issues.
- Supervised as many as 5 graduate students in research projects each semester.
- Served on numerous departmental committees.

1997-present Institute for Regulatory Policy Studies, Normal, IL

Executive Director (2005-present)

Co-Director (1997-2005)

- Grew contributing membership from 5 companies to 16 organizations.
- Doubled the number of workshop/training events annually.
- Supervised 2 Directors, Administrative Staff and internship program.
- Developed and implemented state-level workshops concerning regulatory issues related to the electric, natural gas, and telecommunications industries.

## Experience (cont'd)

2006-2018 Illinois Wind Working Group, Normal, IL

Director

- Founded the organization and grew the organizing committee to over 200 key wind stakeholders
- Organized annual wind energy conference with over 400 attendees
- Organized strategic conferences to address critical wind energy issues
- Initiated monthly conference calls to stakeholders
- Devised organizational structure and bylaws

2007-2018 Center for Renewable Energy, Normal, IL

Director

- Created founding document approved by the Illinois State University Board of Trustees and Illinois Board of Higher Education.
- Secured over \$150,000 in funding from private companies.
- Hired and supervised 4 professional staff members and supervised 3 faculty members as Associate Directors.
- Reviewed renewable energy manufacturing grant applications for Illinois Department of Commerce and Economic Opportunity for a \$30 million program.
- Created technical "Due Diligence" documents for the Illinois Finance Authority loan program for wind farm projects in Illinois.

2011-present Strategic Economic Research, LLC

President

- Performed economic impact analyses on policy initiatives and energy projects such as wind energy, solar energy, natural gas plants and transmission lines at the county and state level.
- Provided expert testimony before state legislative bodies, state public utility commissions, and county boards.
- Wrote telecommunications policy impact report comparing Illinois to other Midwestern states.

1997-2002 International Communications Forecasting Conference Chair

- Expanded Planning Committee with representatives from over 18 different international companies and delivered high quality conference attracting over 500 people over 4 years.



## Experience (cont'd)

1985-1996 Bell Atlantic, Philadelphia, Pa.

Economist - Business Research

- Wrote and taught Applied Business Forecasting multimedia course.
- Developed and documented 25 econometric demand models that were used in regulatory filings.
- Provided statistical and analytic support to regulatory costing studies.
- Served as subject matter expert in switched and special access.
- Administered \$4 million budget including \$1.8 million consulting budget.

## Professional Awards and Memberships

2016 Outstanding Cross-Disciplinary Team Research Award with Jin Jo and Matt Aldeman – recognizes exemplary collaborative research conducted by multiple investigators from different disciplines.

2011 Midwestern Regional Wind Advocacy Award from the U. S. Department of Energy's Wind Powering America presented at WindPower 2011

2009 Economics Department Scott M. Elliott Faculty Excellence Award – awarded to faculty who demonstrate excellence in teaching, research and service.

2009 Illinois State University Million Dollar Club – awarded to faculty who have over \$1 million in grants through the university.

2008 Outstanding State Wind Working Group Award from the U. S. Department of Energy's Wind Power America presented at WindPower 2008.

1999 Illinois State University Teaching Initiative Award

Member of the American Economic Association, National Association of Business Economists, International Association for Energy Economics, Institute for Business Forecasters; Institute for International Forecasters, International Telecommunications Society.

## Professional Publications

34. Aldeman, M.R., Jo, J.H., and Loomis, D.G. (2018). Quantification of Uncertainty Associated with Wind Assessments of Various Intervals, Transactions of the Canadian Society for Mechanical Engineering, forthcoming.

33. Jin, J.H., Cross, J., Rose, Z., Daebel, E., Verderber, A., and Loomis, D. G. (2016). Financing options and economic impact: distributed generation using solar photovoltaic systems in Normal, Illinois, AIMS Energy, 4(3): 504-516.

### Professional Publications (cont'd)

32. Loomis, D.G., Hayden, J., Noll, S. and Payne, J.E. (2016). Economic Impact of Wind Energy Development in Illinois, *The Journal of Business Valuation and Economic Loss Analysis*, 11(1), 3-23.
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29. Tegen, S., Keyser, D., Flores-Espino, F., Miles, J., Zammit, D. and Loomis, D. (2015). Offshore Wind Jobs and Economic Development Impacts in the United States: Four Regional Scenarios, *National Renewable Energy Laboratory Technical Report, NREL/TP-5000-61315*, February.
28. Loomis, D. G. and Bowden, N. S. (2013). Nationwide Database of Electric Rates to Become Available, *Natural Gas & Electricity*, 30 (5), 20-25.
27. Jin, J. H., Loomis, D. G., and Aldeman, M. R. (2013). Optimum penetration of utility-scale grid-connected solar photovoltaic systems in Illinois, *Renewable Energy*, 60, 20-26.
26. Malm, E., Loomis, D. G., DeFranco, J. (2012). A Campus Technology Choice Model with Incorporated Network Effects: Choosing Between General Use and Campus Systems, *International Journal of Computer Trends and Technology*, 3(4), 622-629.
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24. Hickey, E., Loomis, D. G., & Mohammadi, H. (2012). Forecasting hourly electricity prices using ARMAX-GARCH models: An application to MISO hubs, *Energy Economics*, 34, 307-315.
23. Theron, S., Winter, J.R, Loomis, D. G., & Spaulding, A. D. (2011). Attitudes Concerning Wind Energy in Central Illinois. *Journal of the America Society of Farm Managers and Rural Appraisers*, 74, 120-128.
22. Payne, J. E., Loomis, D. G. & Wilson, R. (2011). Residential Natural Gas Demand in Illinois: Evidence from the ARDL Bounds Testing Approach. *Journal of Regional Analysis and Policy*, 41(2), 138.

### Professional Publications (cont'd)

21. Loomis, D. G. & Ohler, A. O. (2010). Are Renewable Portfolio Standards A Policy Cure-all? A Case Study of Illinois's Experience. *Environmental Law and Policy Review*, 35, 135-182.
20. Gil-Alana, L. A., Loomis, D. G., & Payne, J. E. (2010). Does energy consumption by the U.S. electric power sector exhibit long memory behavior ? *Energy Policy*, 38, 7512-7518.
19. Carlson, J. L., Payne, J. E., & Loomis, D. G. (2010). An assessment of the Economic Impact of the Wind Turbine Supply Chain in Illinois. *Electricity Journal*, 13, 75-93.
18. Apergis, N., Payne, J. E., & Loomis, D. G. (2010). Are shocks to natural gas consumption transitory or permanent? *Energy Policy*, 38, 4734-4736.
17. Apergis, N., Payne, J. E., & Loomis, D. G. (2010). Are fluctuations in coal consumption transitory or permanent? Evidence from a panel of U.S. states. *Applied Energy*, 87, 2424-2426.
16. Hickey, E. A., Carlson, J. L., & Loomis, D. G. (2010). Issues in the determination of the optimal portfolio of electricity supply options. *Energy Policy*, 38, 2198-2207.
15. Carlson, J. L., & Loomis, D. G. (2008). An assessment of the impact of deregulation on the relative price of electricity in Illinois. *Electricity Journal*, 21, 60-70.
14. Loomis, D. G., (2008). The telecommunications industry. In H. Bidgoli (Ed.), *The handbook of computer networks* (pp. 3-19). Hoboken, NJ: John Wiley & Sons.
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12. Cox, J. E., Jr., & Loomis, D. G. (2006). Improving forecasting through textbooks – a 25 year review. *International Journal of Forecasting*, 22, 617-624.
11. Swann, C. M., & Loomis, D. G. (2005). Competition in local telecommunications – there's more than you think. *Business Economics*, 40, 18-28.
10. Swann, C. M., & Loomis, D. G. (2005). Intermodal competition in local telecommunications markets. *Information Economics and Policy*, 17, 97-113.



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9. Swann, C. M., & Loomis, D. G. (2004) Telecommunications demand forecasting with intermodal competition – a multi-equation modeling approach. *Elektronikk*, 100, 180-184.
8. Cox, J. E., Jr., & Loomis, D. G. (2003). Principles for teaching economic forecasting. *International Review of Economics Education*, 1, 69-79.
7. Taylor, L. D. & Loomis, D. G. (2002). Forecasting the internet: understanding the explosive growth of data communications. Boston: Kluwer Academic Publishers.
6. Wiedman, J. & Loomis, D. G. (2002). U.S. broadband pricing and alternatives for internet service providers. In D. G. Loomis & L. D. Taylor (Eds.) Boston: Kluwer Academic Publishers.
5. Cox, J. E., Jr. & Loomis, D. G. (2001). Diffusion of forecasting principles: an assessment of books relevant to forecasting. In J. S. Armstrong (Ed.), *Principles of Forecasting: A Handbook for Researchers and Practitioners* (pp. 633-650). Norwell, MA: Kluwer Academic Publishers.
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3. Malm, E. & Loomis, D. G. (1999). Active market share: measuring competitiveness in retail energy markets. *Utilities Policy*, 8, 213-221.
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- Loomis, D. G. (1997). Strategic substitutes and strategic complements with interdependent demands. *The Review of Industrial Organization*, 12, 781-791.

### Expert Testimony

23. McLean County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Invenergy, LLC, Direct Oral Testimony, January 4, 2018.
22. New Mexico Public Regulation Commission, Case No. 17-00275-UT, Application of Sagamore Wind Energy LLC, on behalf of Invenergy, LLC, Direct Written Testimony filed November 6, 2017.

### Expert Testimony (cont'd)

21. Ohio Power Siting Board, Case No. 17-773-EL-BGN, In the Matter of Hardin Solar Energy LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Hardin County, Ohio, on behalf of Invenergy, LLC, Exhibit with Report filed July 5, 2017.
20. Macon County (Illinois) Environmental, Education, Health and Welfare Committee, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of E.ON Energy, Direct Oral Testimony, August 20, 2015.
19. Illinois Commerce Commission, Case No. 15-0277, Oral Cross-examination Testimony on behalf of Grain Belt Express Clean Line LLC appeared before the Commission on August 19, 2015.
18. Macon County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of E.ON Energy, Direct Oral Testimony, August 11, 2015.
17. Illinois Commerce Commission, Case No. 15-0277, Written Rebuttal Testimony on behalf of Grain Belt Express Clean Line LLC filed August 7, 2015.
16. Kankakee County (Illinois) Planning, Zoning, and Agriculture Committee, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of EDF Renewables, Direct Oral Testimony, July 22, 2015.
15. Kankakee County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of EDF Renewables, Direct Oral Testimony, July 13, 2015.
14. Bureau County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Berkshire Hathaway Energy/Geronimo Energy, Direct Oral Testimony, June 16, 2015.
13. Illinois Commerce Commission, Case No. 15-0277, Written Direct Testimony on behalf of Grain Belt Express Clean Line LLC filed April 10, 2015.
12. Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Invenergy, Oral Cross-Examination, December 8-9, 2014.

### Expert Testimony (cont'd)

11. Missouri Public Service Commission, Case No. EA-2014-0207, Oral Cross-examination Testimony on behalf of Grain Belt Express Clean Line LLC appeared before the Commission on November 21, 2014.
10. Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Invenergy, Direct Oral Testimony, November 17-19, 2014.
9. Missouri Public Service Commission, Case No. EA-2014-0207, Written Surrebuttal Testimony on behalf of Grain Belt Express Clean Line LLC, filed October 14, 2014.
8. Missouri Public Service Commission, Case No. EA-2014-0207, Written Direct Testimony on behalf of Grain Belt Express Clean Line LLC, filed March 26, 2014.
7. Illinois Commerce Commission, Case No. 12-0560, Oral Cross-examination Testimony on behalf of Rock Island Clean Line LLC appeared before the Commission on December 11, 2013.
6. Illinois Commerce Commission, Case No. 12-0560, Written Rebuttal Testimony on behalf of Rock Island Clean Line LLC filed August 20, 2013.
5. Boone County (Illinois) Board, Examination of Wind Energy Conversion System Ordinance, Direct Testimony and Cross-Examination, April 23, 2013.
4. Illinois Commerce Commission, Case No. 12-0560, Written Direct Testimony on behalf of Rock Island Clean Line LLC filed October 10, 2012.
3. Whiteside County (Illinois) Board and Whiteside County Planning and Zoning Committee, Examination of Wind Energy Conversion System Ordinance, Direct Testimony and Cross-Examination, on behalf of the Center for Renewable Energy, April 12, 2012.
2. State of Illinois Senate Energy and Environment Committee, Direct Testimony and Cross-Examination, on behalf of the Center for Renewable Energy, October 28, 2010.
1. Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of the Center for Renewable Energy, Direct Testimony and Cross-Examination, July 28, 2010.



## Selected Presentations

“Smart Cities and Micro Grids: Cost Recovery Issues,” presented September 12, 2017 at the National Association of Regulatory Utility Commissioners Staff Subcommittee on Accounting and Finance Meeting, Springfield, IL.

“Cloud Computing: Regulatory Principles and ICC NOI,” presented September 11, 2017 at the National Association of Regulatory Utility Commissioners Staff Subcommittee on Accounting and Finance Meeting, Springfield, IL.

“Illinois Wind, Illinois Solar and the Illinois Future Energy Jobs Act,” presented July 25, 2017 at the Illinois County Assessors Meeting, Normal, IL.

“Illinois Wind, Illinois Solar and the Illinois Future Energy Jobs Act,” presented April 21, 2017 at the Illinois Association of County Zoning Officers Meeting, Bloomington, IL.

“Energy Storage Economics and RTOs,” presented October 30, 2016 at the Energy Storage Conference at Argonne National Laboratory.

“Wind Energy in Illinois,” on October 6, 2016 at the B/N Daybreak Rotary Club, Bloomington, IL.

“Smart Grid for Schools,” presented August 17, 2016 to the Ameren External Affairs Meeting, Decatur, IL.

“Solar Energy in Illinois,” presented July 28, 2016 at the 3rd Annual K-12 Teachers Clean Energy Workshop, Richland Community College, Decatur, IL

“Wind Energy in Illinois,” presented July 28, 2016 at the 3rd Annual K-12 Teachers Clean Energy Workshop, Richland Community College, Decatur, IL

“Smart Grid for Schools,” presented June 21, 2016 at the ISEIF Grantee and Ameren Meeting, Decatur, IL.

“Costs and Benefits of Renewable Energy,” presented November 4, 2015 at the Osher Lifelong Learning Institute at Bradley, University, Peoria, IL.

“Energy Sector Workforce Issues,” presented September 17, 2015 at the Illinois Workforce Investment Board, Springfield, IL.

“The Past, Present and Future of Wind Energy in Illinois,” presented March 13, 2015 at the Peoria Rotary Club, Peoria, IL.

“Where Are All the Green Jobs?” presented January 28, 2015 at the 2015 Illinois Green Economy Network Sustainability Conference, Normal, IL.

### **Presentations (cont'd)**

“Teaching Next Generation Energy Concepts with Next Generation Science Standards: Addressing the Critical Need for a More Energy-Literate Workforce,” presented September 30, 2014 at the Mathematics and Science Partnerships Program 2014 Conference in Washington, DC.

“National Utility Rate Database,” presented October 23, 2013 at Solar Power International, Chicago, IL.

“Potential Economic Impact of Offshore Wind Energy in the Great Lakes,” presented May 6, 2013 at WindPower 2013, Chicago, IL.

“Why Illinois? Windy City, Prairie Power,” presented May 5, 2013 at WindPower 2013, Chicago, IL.

“National Utility Rate Database,” presented January 29, 2013 at the EUEC Conference, Phoenix, AZ.

“Energy Learning Exchange and Green Jobs,” presented December 13, 2012 at the TRICON Meeting of Peoria and Tazewell County Counselors, Peoria, IL.

“Potential Economic Impact of Offshore Wind Energy in the Great Lakes,” presented November 12, 2012 at the Offshore Wind Jobs and Economic Development Impacts Webinar.

“Energy Learning Exchange,” presented October 31, 2012 at the Utility Workforce Development Meeting, Chicago, IL.

“Wind Energy in McLean County,” presented June 26, 2012 at BN By the Numbers, Normal, IL.

“Wind Energy,” presented June 14, 2012 at the Wind for Schools Statewide Teacher Workshop, Normal, IL.

“Economic Impact of Wind Energy in Illinois,” presented June 6, 2012 at AWEA's WINDPOWER 2012, Atlanta, GA.

“Trends in Illinois Wind Energy,” presented March 6, 2012 at the AWEA Regional Wind Energy Summit – Midwest in Chicago, IL.

“Challenges and New Growth Strategies in the Wind Energy Business,” invited plenary session speaker at the Green Revolution Leaders Forum, November 18, 2011 in Seoul, South Korea.

“Overview of the Center for Renewable Energy,” presented July 20, 2011 at the University-Industry Consortium Meeting at Illinois Institute of Technology, Chicago, IL.

## **Presentations (cont'd)**

“Building the Wind Turbine Supply Chain,” presented May 11, 2011 at the Supply Chain Growth Conference, Chicago, IL

“Building a Regional Energy Policy for Economic Development,” presented April 4, 2011 at the Midwestern Legislative Conference’s Economic Development Committee Webinar.

“Wind Energy 101,” presented February 7, 2011 at the Wind Power in Central Illinois - A Public Forum, CCNET Renewable Energy Group, Champaign, IL.

“Alternative Energy Strategies,” presented with Matt Aldeman November 19, 2010 at the Innovation Talent STEM Education Forum, Chicago, IL.

“Siting and Zoning in Illinois,” presented November 17, 2010 at the Wind Powering America Webinar.

“What Governor Quinn Should Do about Energy?” presented November 15, 2010 at the Illinois Chamber of Commerce Energy Forum Conference, Chicago, IL.

“Is Wind Energy Development Right for Illinois,” presented with Matt Aldeman October 28, 2010 at the Illinois Association of Illinois County Zoning Officials Annual Seminar in Utica, IL.

“Economic Impact of Wind Energy in Illinois,” presented July 22, 2010 at the AgriEnergy Conference in Champaign, IL.

“Renewable Energy Major at ISU,” presented July 21, 2010 at Green Universities and Colleges Subcommittee Webinar.

“Economics of Wind Energy,” presented May 19, 2010 at the U.S. Green Building Council meeting in Chicago, IL.

“Forecasting: A Primer for the Small Business Entrepreneur,” presented with James E. Cox, Jr. April 14, 2010 at the Allied Academies’ Spring International Conference in New Orleans, LA.

“Are Renewable Portfolio Standards a Policy Cure-All? A Case Study of Illinois’ Experience,” presented January 30, 2010 at the 2010 William and Mary Environmental Law and Policy Review Symposium in Williamsburg, VA.

“Creating Partnerships between Universities and Industry,” presented November 19, 2009, at New Ideas in Educating a Workforce in Renewable Energy and Energy Efficiency in Albany, NY.

“Educating Illinois in Renewable Energy,” presented November 14, 2009 at the Illinois Science Teachers Association in Peoria, IL.



### **Presentations (cont'd)**

“Green Collar Jobs,” invited presentation October 14, 2009 at the 2009 Workforce Forum in Peoria, IL.

“The Role of Wind Power in Illinois,” presented March 4, 2009 at the Association of Illinois Electric Cooperatives Engineering Seminar in Springfield, IL.

“The Economic Benefits of Wind Farms,” presented January 30, 2009 at the East Central Illinois Economic Development District Meeting in Champaign, IL.

“Green Collar Jobs in Illinois,” presented January 6, 2009 at the Illinois Workforce Investment Board Meeting in Macomb, Illinois.

“Green Collar Jobs: What Lies Ahead for Illinois?” presented August 1, 2008 at the Illinois Employment and Training Association Conference.

“Mapping Broadband Access in Illinois,” presented October 16, 2007 at the Rural Telecon '07 conference.

“A Managerial Approach to Using Error Measures to Evaluate Forecasting Methods,” presented October 15, 2007 at the International Academy of Business and Economics.

“Dollars and Sense: The Pros and Cons of Renewable Fuel,” presented October 18, 2006 at Illinois State University Faculty Lecture Series.

“Broadband Access in Illinois,” presented July 28, 2006 at the Illinois Association of Regional Councils Annual Meeting.

“Broadband Access in Illinois,” presented November 17, 2005 at the University of Illinois’ Connecting the e to Rural Illinois.

“Improving Forecasting Through Textbooks – A 25 Year Review,” with James E. Cox, Jr., presented June 14, 2005 at the 25th International Symposium on Forecasting.

“Telecommunications Demand Forecasting with Intermodal Competition,” with Christopher Swann, presented April 2, 2004 at the Telecommunications Systems Management Conference 2004.

“Intermodal Competition,” with Christopher Swann, presented April 3, 2003 at the Telecommunications Systems Management Conference 2003.

## **Presentations (cont'd)**

“Intermodal Competition in Local Exchange Markets,” with Christopher Swann, presented June 26, 2002 at the 20th Annual International Communications Forecasting Conference.

“Assessing Retail Competition,” presented May 23, 2002 at the Institute for Regulatory Policy Studies’ Illinois Energy Policy for the 21st Century workshop.

“The Devil in the Details: An Analysis of Default Service and Switching,” with Eric Malm presented May 24, 2001 at the 20th Annual Advanced Workshop on Regulation and Competition.

“Forecasting Challenges for U.S. Telecommunications with Local Competition,” presented June 28, 1999 at the 19th International Symposium on Forecasting.

“Acceptance of Forecasting Principles in Forecasting Textbooks,” presented June 28, 1999 at the 19th International Symposium on Forecasting.

“Forecasting Challenges for Telecommunications With Local Competition,” presented June 17, 1999 at the 17th Annual International Communications Forecasting Conference.

“Measures of Market Competitiveness in Deregulating Industries,” with Eric Malm, presented May 28, 1999 at the 18th Annual Advanced Workshop on Regulation and Competition.

“Trends in Telecommunications Forecasting and the Impact of Deregulation,” Proceedings of EPRI’s 11th Forecasting Symposium, 1998.

“Forecasting in a Competitive Age: Utilizing Macroeconomic Forecasts to Accurately Predict the Demand for Services,” invited speaker, Institute for International Research Conference, September 29, 1997.

“Regulatory Fairness and Local Competition Pricing,” presented May 30, 1996 at the 15th Annual Advanced Workshop in Regulation and Public Utility Economics.

“Optimal Pricing For a Regulated Monopolist Facing New Competition: The Case of Bell Atlantic Special Access Demand,” presented May 28, 1992 at the Rutgers Advanced Workshop in Regulation and Public Utility Economics.

## Grants

“SmartGrid for Schools 2018 and Energy Challenge,” with William Hunter, Illinois Science and Energy Innovation Foundation, RSP Award # A15-0092-002 - extended, January 2017, \$300,000.

“Energy Learning Exchange - Implementing Nationally Recognized Energy Curriculum and Credentials in Illinois,” Northern Illinois University, RSP Award # A17-0098, February, 2017, \$13,000.

“SmartGrid for Schools 2017 and Energy Challenge,” with William Hunter, Illinois Science and Energy Innovation Foundation, RSP Award # A15-0092-002 - extended, January 2017, \$350,000.

“Illinois Jobs Project,” University of California Berkeley, RSP Award # A16-0148, August, 2016, \$10,000.

“Energy Workforce Ready Through Building Performance Analysis,” Illinois Department of Commerce and Economic Opportunity through the Department of Labor, RSP # A16-0139, June, 2016, \$328,000 (grant was de-obligated before completion).

“SmartGrid for Schools 2016 and Smart Appliance Challenge,” with William Hunter, Brad Christenson and Jeritt Williams, Illinois Science and Energy Innovation Foundation, RSP Award # A15-0092-002, January 2016, \$450,000.

“SmartGrid for Schools 2015,” with William Hunter and Matt Aldeman, Illinois Science and Energy Innovation Foundation, RSP Award # A15-0092-001, February 2015, \$400,000.

“Economic Impact of Nuclear Plant Closings: A Response to HR 1146,” Illinois Department of Economic Opportunity, RSP Award # 14-025001 amended, January, 2015, \$22,000.

“Partnership with Midwest Renewable Energy Association for Solar Market Pathways” with Missy Nergard and Jin Jo, U.S. Department of Energy Award Number DE-EE0006910, October, 2014, \$109,469 (ISU Award amount).

“Renewable Energy for Schools,” with Matt Aldeman and Jin Jo, Illinois Department of Commerce and Economic Opportunity, Award Number 14-025001, June, 2014, \$130,001.

“SmartGrid for Schools 2014,” with William Hunter and Matt Aldeman, Illinois Science and Energy Innovation Foundation, RSP # 14B116, March 2014, \$451,701.

“WINDPOWER 2014 Conference Exhibit,” Illinois Department of Commerce and Economic Opportunity, RSP #14C167, March, 2014, \$95,000.



## Grants (cont'd)

“Lake Michigan Offshore Wind Energy Buoy,” with Matt Aldeman, Illinois Clean Energy Community Foundation, Request ID 6435, November, 2013, \$90,000.

“Teaching Next Generation Energy Concepts with Next Generation Science Standards,” with William Hunter, Matt Aldeman and Amy Bloom, Illinois State Board of Education, RSP # 13B170A, October, 2013, second year, \$159,954; amended to \$223,914.

“Solar for Schools,” with Matt Aldeman, Illinois Green Economy Network, RSP # 13C280, August, 2013, \$66,072.

“Energy Learning Exchange Implementation Grant,” with William Hunter and Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 13-052003, June, 2013, \$350,000.

“Teaching Next Generation Energy Concepts with Next Generation Science Standards,” with William Hunter, Matt Aldeman and Amy Bloom, Illinois State Board of Education, RSP # 13B170, April, 2013, \$159,901.

“Illinois Sustainability Education SEP,” Illinois Department of Commerce and Economic Opportunity, Award Number 08-431006, March, 2013, \$225,000.

“Illinois Pathways Energy Learning Exchange Planning Grant,” with William Hunter and Matt Aldeman, Illinois State Board of Education (Source: U.S. Department of Education), RSP # 13A007, December, 2012, \$50,000.

“Illinois Sustainability Education SEP,” Illinois Department of Commerce and Economic Opportunity, Award Number 08-431005, June 2011, amended March, 2012, \$98,911.

“Wind for Schools Education and Outreach,” with Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 11-025001, amended February, 2012, \$111,752.

“A Proposal to Support Solar Energy Potential and Job Creation for the State of Illinois Focused on Large Scale Photovoltaic System,” with Jin Jo (lead PI), Illinois Department of Commerce and Economic Opportunity, Award Number 12-025001, January 2012, \$135,000.

“National Database of Utility Rates and Rate Structure,” U.S. Department of Energy, Award Number DE-EE0005350TDD, 2011-2014, \$850,000.

“Illinois Sustainability Education SEP,” Illinois Department of Commerce and Economic Opportunity, Award Number 08-431005, June 2011, \$75,000.

### Grants (cont'd)

“Wind for Schools Education and Outreach,” with Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 11-025001, March 2011, \$190,818.

“Using Informal Science Education to Increase Public Knowledge of Wind Energy in Illinois,” with Amy Bloom and Matt Aldeman, Scott Elliott Cross-Disciplinary Grant Program, February 2011, \$13,713.

“Wind Turbine Market Research,” with Matt Aldeman, Illinois Manufacturers Extension Center, May, 2010, \$4,000.

“Petco Resource Assessment,” with Matt Aldeman, Petco Petroleum Co., April, 2010 amended August 2010 \$34,000; original amount \$18,000.

“Wind for Schools Education and Outreach,” with Anthony Lornbach and Matt Aldeman, Scott Elliott Cross-Disciplinary Grant Program, February, 2010, \$13,635.

“IGA IFA/ISU Wind Due Diligence,” Illinois Finance Authority, November, 2009, \$8,580 amended December 2009; original amount \$2,860.

“Green Industry Business Development Program, with the Shaw Group and Illinois Manufacturers Extension Center, Illinois Department of Commerce and Economic Opportunity, Award Number 09-021007, August 2009, \$245,000.

“Wind Turbine Workshop Support,” Illinois Department of Commerce and Economic Opportunity, June 2009, \$14,900.

“Illinois Wind Workers Group,” with Randy Winter, U.S. Department of Energy, Award Number DE-EE0000507, 2009-2011, \$107,941.

“Wind Turbine Supply Chain Study,” with J. Lon Carlson and James E. Payne, Illinois Department of Commerce and Economic Opportunity, Award Number 09-021003, April 2009, \$125,000.

“Renewable Energy Team Travel to American Wind Energy Association WindPower 2009 Conference, Center for Mathematics, Science and Technology, February 2009, \$3,005.

“Renewable Energy Educational Lab Equipment,” with Randy Winter and David Kennell, Illinois Clean Energy Community Foundation (peer-reviewed), February, 2008, \$232,600.

## Grants (cont'd)

“Proposal for New Certificate Program in Electricity, Natural Gas and Telecommunications Economics,” with James E. Payne, Extended Learning Program Grant, April, 2007, \$29,600.

“Illinois Broadband Mapping Study,” with J. Lon Carlson and Rajeev Goel, Illinois Department of Commerce and Economic Opportunity, Award Number 06-205008, 2006-2007, \$75,000.

“Illinois Wind Energy Education and Outreach Project,” with David Kennell and Randy Winter, U.S. Department of Energy, Award Number DE-FG36-06GO86091, 2006-2010, \$990,000.

“Wind Turbine Installation at Illinois State University Farm,” with Doug Kingman and David Kennell, Illinois Clean Energy Community Foundation (peer-reviewed), May, 2004, \$500,000.

“Illinois State University Wind Measurement Project,” Doug Kingman and David Kennell, Illinois Clean Energy Community Foundation (peer-reviewed), with August, 2003, \$40,000.

“Illinois State University Wind Measurement Project,” with Doug Kingman and David Kennell, NEG Micon matching contribution, August, 2003, \$65,000.

“Distance Learning Technology Program,” Illinois State University Faculty Technology Support Services, Summer 2002, \$3,000.

“Providing an Understanding of Telecommunications Technology By Incorporating Multimedia into Economics 235,” Instructional Technology Development Grant (peer-reviewed), January 15, 2001, \$1,400.

“Using Real Presenter to create a virtual tour of GTE’s Central Office,” with Jack Chizmar, Instructional Technology Literacy Mentoring Project Grant (peer-reviewed), January 15, 2001, \$1,000.

“An Empirical Study of Telecommunications Industry Forecasting Practices,” with James E. Cox, College of Business University Research Grant (peer-reviewed), Summer, 1999, \$6,000.

“Ownership Form and the Efficiency of Electric Utilities: A Meta-Analytic Review” with L. Dean Hiebert, Institute for Regulatory Policy Studies research grant (peer-reviewed), August 1998, \$6,000.

**Total Grants: \$7,740,953**



## External Funding

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Aqua Illinois (\$7,500); Commonwealth Edison (\$7,500); Exelon (\$7,500); Illinois American Water (\$7,500); Midcontinent ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2017, \$67,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2017, \$18,342.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Aqua Illinois (\$7,500); Commonwealth Edison (\$7,500); Exelon (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midcontinent ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2017, \$75,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2016, \$19,667.

Corporate Funding for Energy Learning Exchange, Calendar Year 2016, \$53,000.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Aqua Illinois (\$7,500); Commonwealth Edison (\$7,500); Exelon/Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midcontinent ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Utilities, Inc. (\$7,500) Fiscal Year 2016, \$82,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2015, \$15,897.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Alliance Pipeline (\$7,500); Aqua Illinois (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Exelon/Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midcontinent ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2015, \$90,000 total.

Corporate Funding for Energy Learning Exchange, Calendar Year 2014, \$55,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2014, \$12,381.

## External Funding (cont'd)

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Alliance Pipeline (\$7,500); Aqua Illinois (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midwest Energy Efficiency Alliance (\$4,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2014, \$102,000 total.

Corporate Funding for Energy Learning Exchange, Calendar Year 2013, \$53,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2013, \$17,097.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren (\$7,500), Alliance Pipeline (\$7,500); Aqua Illinois (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2013, \$97,500 total.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2012, \$29,325.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2012, \$16,060.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline (\$7,500); Aqua Illinois (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2012, \$90,000 total.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2011, \$57,005.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2011, \$13,562.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline (\$7,500); Aqua Illinois (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); Illinois American Water (\$7,500) ITC Holdings (\$7,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2011, \$90,000 total.

### External Funding (cont'd)

Corporate Funding for Center for Renewable Energy, Calendar Year 2010, \$50,000.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2010, \$49,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2010, \$17,759.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline (\$7,500); Ameren (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); ITC Holdings (\$7,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2010, \$82,500 total.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2009, \$57,140.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2009, \$21,988.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline (\$7,500); Ameren (\$7,500); AT&T (\$7,500); Commonwealth Edison (\$7,500); Constellation NewEnergy (\$7,500); MidAmerican Energy (\$7,500); Midwest Generation (\$7,500); MidWest ISO (\$7,500); NICOR Energy (\$7,500); People Gas Light and Coke (\$7,500); PJM Interconnect (\$7,500); Fiscal Year 2009, \$82,500 total.

Corporate Funding for Center for Renewable Energy, Calendar Year 2008, \$157,500.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2008, \$38,500.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2008, \$28,489.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline (\$5,000); Ameren (\$5,000); AT&T (\$5,000); Commonwealth Edison (\$5,000); Constellation NewEnergy (\$5,000); MidAmerican Energy (\$5,000); Midwest Generation (\$5,000); MidWest ISO (\$5,000); NICOR Energy (\$5,000); Peabody Energy (\$5,000), People Gas Light and Coke (\$5,000); PJM Interconnect (\$5,000); Fiscal Year 2008, \$60,000 total.



## External Funding (cont'd)

Corporate Funding for Illinois Wind Working Group, Calendar Year 2007, \$16,250.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2007, \$19,403.

Corporate Funding for Institute for Regulatory Policy Studies, AARP (\$3,000), Alliance Pipeline (\$5,000), Ameren (\$5,000); Citizens Utility Board (\$5,000); Commonwealth Edison (\$5,000); Constellation NewEnergy (\$5,000); MidAmerican Energy (\$5,000); Midwest Generation (\$5,000); MidWest ISO (\$5,000); NICOR Energy (\$5,000); Peabody Energy (\$5,000), People Gas Light and Coke (\$5,000); PJM Interconnect (\$5,000); SBC (\$5,000); Verizon (\$5,000); Fiscal Year 2007, \$73,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2006, \$13,360.

Corporate Funding for Institute for Regulatory Policy Studies, AARP (\$1,500), Alliance Pipeline (\$2,500), Ameren (\$5,000); Citizens Utility Board (\$5,000); Commonwealth Edison (\$5,000); Constellation NewEnergy (\$5,000); DTE Energy (\$5,000); MidAmerican Energy (\$5,000); Midwest Generation (\$5,000); MidWest ISO (\$5,000); NICOR Energy (\$5,000); Peabody Energy (\$2,500), People Gas Light and Coke (\$5,000); PJM Interconnect (\$5,000); SBC (\$5,000); Verizon (\$5,000); Fiscal Year 2006, \$71,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2005, \$12,916.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); Citizens Utility Board (\$5,000); Commonwealth Edison (\$5,000); Constellation NewEnergy (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); Midwest Generation (\$5,000); MidWest ISO (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); PJM Interconnect (\$5,000); SBC (\$2,500); Verizon (\$2,500); Fiscal Year 2005, \$60,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2004, \$17,515.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); Commonwealth Edison (\$5,000); Constellation NewEnergy (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); Midwest Generation (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); PJM Interconnect (\$5,000); Fiscal Year 2004, \$45,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2003, \$8,300.

### External Funding (cont'd)

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); AT&T (\$2,500); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); Fiscal Year 2003, \$32,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2002, \$15,700.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$2,500); AT&T (\$5,000); Commonwealth Edison (\$2,500); Illinois Power (\$2,500); MidAmerican Energy (\$2,500); NICOR Energy (\$2,500); People Gas Light and Coke (\$2,500); Calendar Year 2002, \$17,500 total.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates (\$10,000); Taylor Nelson Sofres Telecoms (\$10,000); Calendar Year 2002, \$20,000 total

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); AT&T (\$5,000); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); Calendar Year 2001, \$35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2001, \$19,400.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates (\$10,000); Taylor Nelson Sofres Telecoms (\$10,000); SAS Institute (\$10,000); Calendar Year 2001, \$30,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); AT&T (\$5,000); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); Calendar Year 2000, \$35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2000, \$20,270.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates (\$10,000); Taylor Nelson Sofres Telecoms (\$10,000); Calendar Year 2000, \$20,000 total.

### **External Funding (cont'd)**

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); AT&T (\$5,000); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); NICOR Energy (\$5,000); People Gas Light and Coke (\$5,000); Calendar Year 1999, \$35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1999, \$10,520.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates (\$10,000); PNR Associates (\$10,000); Calendar Year 1999, \$20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); CILCO (\$5,000); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); People Gas Light and Coke (\$5,000); Calendar Year 1998, \$30,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1998, \$44,334.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates (\$10,000); PNR Associates (\$10,000); Calendar Year 1998, \$20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS (\$5,000); CILCO (\$5,000); Commonwealth Edison (\$5,000); Illinois Power (\$5,000); MidAmerican Energy (\$5,000); People Gas Light and Coke (\$5,000); Calendar Year 1997, \$30,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1997, \$19,717.

**Total External Funding: \$2,492,397**





# **Exhibit K**

## **Complaint Resolution Plan**

Christine M.T. Pirik (0029759)  
(Counsel of Record)  
William V. Vorys (0093479)  
Dickinson Wright PLLC  
150 East Gay Street, Suite 2400  
Columbus, Ohio 43215  
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*Attorneys for Hardin Solar Energy II LLC*

HARDIN SOLAR ENERGY II, LLC (“Hardin Solar II”)  
Case No 18-1360-EL-BGN

Hardin Solar II Complaint Resolution Plan

**PURPOSE:** To provide a transparent and effective method for residents of the community to lodge concerns, problems and complaints related to the solar facility.

**BACKGROUND:** Hardin Solar II is committed to ensuring that an accessible process is in place for community members to voice concerns and for those concerns to be addressed as quickly and effectively as possible.

Maintaining a detailed record of all complaints and the resolutions that follow is an important aspect of the complaint resolution plan.

**POLICY:** The policy of Hardin Solar II is to take reasonable necessary actions to rectify legitimate interference or disturbances that are a direct result of the solar facilities.

**PROCEDURE:**

- 1.) Hardin Solar II will establish an 800-phone number prior to the solar facility being commercially operational and will ensure that the phone number is provided to the county commissioners, township trustees, emergency responders, the schools, and public libraries within the project area. A resident who has a complaint about the solar facility may either call the 800# and leave a message 24 hours a day or go to the Operations and Maintenance Facility for the solar facility during regular business hours to register a complaint.
- 2.) Hardin Solar II will document every complaint that is received, including all pertinent information about the person making the complaint, the issues surrounding the complaint and the date that the complaint was received. The logbook will also contain the resolution that Hardin Solar II suggests, the date the complaining party agreed to the proposed resolution and the date when the proposed resolution was implemented. Hardin Solar II will investigate each complaint.
- 3.) Hardin Solar II personnel will generate a quarterly report about the nature and resolution of all complaints received in that quarter and file the report with the Ohio Power Siting Board on the following date of each year (April 15th, July 15th, October 15<sup>th</sup>, and January 15th).
- 4.) Residents who register a complaint with Hardin Solar II will be contacted by the company no later than 48 hours after registering the complaint. The intent of the initial contact is to garner more information from the individual’s complaint. Within 30 days of the complaint being received Hardin Solar II will initiate reasonable action to resolve the legitimate interference or disturbance that is a direct result of the solar facility.



- 5.) If Hardin Solar II and the complaining resident cannot agree to a resolution proposed by Hardin Solar II or one negotiated with the complaining resident, Hardin Solar II will provide a summary of the complaint and proposed resolution to the complaining resident so that the resident may bring the complaint to the Ohio Power Siting Board.

# **Exhibit L**

## **Certificate of Liability Insurance**

**CONFIDENTIAL**  
**FILED UNDER SEAL**

Hardin Solar Energy II LLC has requested confidential treatment of this document in accordance with OAC Rule 4906-2-21.

This document contains policy numbers and certificate numbers and, as such, is entitled to confidential treatment under state and/or federal statutes and regulations.

An unredacted version of the following document has been submitted to the Docketing Division of the OPSB in accordance with OAC Rule 4906-2-21(D)(2):

Christine M.T. Pirik (0029759)  
(Counsel of Record)  
William V. Vorys (0093479)  
Dickinson Wright PLLC  
150 East Gay Street, Suite 2400  
Columbus, Ohio 43215  
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[wvorys@dickinsonwright.com](mailto:wvorys@dickinsonwright.com)

*Attorneys for Hardin Solar Energy II LLC*



# CERTIFICATE OF LIABILITY INSURANCE

 DATE(MM/DD/YYYY)  
07/12/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).**

<b>PRODUCER</b> Aon Risk Services Central, Inc. Chicago IL Office 200 East Randolph Chicago IL 60601 USA	<b>CONTACT NAME:</b> PHONE (A/C. No. Ext.): (866) 283-7122 FAX (A/C. No.): (800) 363-0105 E-MAIL ADDRESS:	
	<b>INSURER(S) AFFORDING COVERAGE</b>	
<b>INSURED</b> Hardin Solar Energy LLC One South Wacker Suite 1900 Chicago IL 60606 USA	INSURER A:	Great Northern Insurance Co.
	INSURER B:	Federal Insurance Company
	INSURER C:	Arch Insurance Company
	INSURER D:	
	INSURER E:	
	INSURER F:	

Holder Identifier :

**COVERAGES** **CERTIFICATE NUMBER:** XXXXXXXXXX **REVISION NUMBER:** XXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. **Limits shown are as requested**

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
B	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input checked="" type="checkbox"/> LOC OTHER:				06/01/2018	06/01/2019	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$1,000,000 MED EXP (Any one person) \$25,000 PERSONAL & ADV INJURY \$2,000,000 GENERAL AGGREGATE \$2,000,000 PRODUCTS - COMP/OP AGG Included
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS ONLY <input type="checkbox"/> HIRED AUTOS ONLY				06/01/2018	06/01/2019	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)
B	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input type="checkbox"/> RETENTION				06/01/2018	06/01/2019	EACH OCCURRENCE \$25,000,000 AGGREGATE \$25,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A		06/01/2018	06/01/2019	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE-EA EMPLOYEE \$1,000,000 E.L. DISEASE-POLICY LIMIT \$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)  
 RE: Location: Hardin County, OH. Evidence of Insurance.

**CERTIFICATE HOLDER**
**CANCELLATION**

Hardin Solar Energy LLC One South Wacker, Suite 1900 Chicago IL 60606 USA	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE 

Certificate No : 570072290562





## **Exhibit M**

### **Determination of Average Ambient Noise Levels**

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*Attorneys for Hardin Solar Energy II LLC*



August 22, 2016

Kent N. Truckor  
Manager, Business Development  
Invenergy LLC  
One South Wacker Drive, Suite 1800  
Chicago, IL 60606

Re: Hardin Wind Farm Project: Calculation of 24-Hour Average Ambient Noise Level

Kent,

Per your request, Hankard Environmental calculated the site-wide, 24-hour average ambient noise level for the Hardin Wind Farm Project, which is located in Hardin County, Ohio. Described herein are details regarding this calculation, the resulting noise levels, and the recommended noise criterion for use in the Ohio Power and Siting Board (OPSB) impact assessment. For more detailed information regarding the ambient noise level survey conducted for this project, refer to the report entitled *Hardin Wind Farm Baseline Sound Survey Report* (Tetra Tech, December 2009). For more information regarding noise emissions from the project, refer to the *Application of Hardin Wind Energy LLC for a Third Amendment to its Certificate of Environmental Compatibility* (June 2016, OPSB Case No. 16-469-EL-BGA).

Ambient noise levels were measured at four locations in the fall of 2009 within the Hardin Project study area. Ambient noise levels at this time of year are relatively low, owing to the fact that leaves are off the trees, bird and insect noise is at a minimum, and harvest activities were concluded. Noise levels were measured continuously for a period of approximately three weeks. The A-weighted equivalent noise level ( $L_{eq}$ , dBA), was measured in 10-minute intervals, 24 hours per day. I processed the resulting noise level dataset in two ways. First, periods during which there was precipitation were removed. Second, noise level versus time plots for each location were reviewed to identify anomalies. Two were observed. Noise levels for one entire night at Location 3 were abnormally high due to the wind, as were levels for about two hours at Location 1 for unknown reasons. These data were removed for the purposes of this calculation. The 24-hour 'energy-average' noise level ( $L_{eq}$ , dBA) was calculated for each location, as well as for the site as a whole. The resulting noise levels are listed in the table below.

The site-wide, 24-hour average ambient noise level at Hardin is 46 dBA ( $L_{eq}$ , 24-hour). The criterion for Hardin, described as condition 36 in the OPSB Joint Stipulation and Recommendation (Case No. 09-0479-EL-BGN), is the ambient noise level plus 5 dBA. Based on this, the criterion for Hardin would be 51 dBA. However, I recommend a criterion of 50 dBA, as to operate the project in a manner that will minimize potential noise impacts.



24-Hour Ambient Noise Levels for the Hardin Wind Farm Project	
Location	Average 24-Hour $L_{eq}$ (dBA)
M1	44
M2	45
M3	49
M4	46
Site-Wide (energy average)	46

Thank you for commissioning Hankard Environmental to conduct this analysis for the Hardin Wind Farm Project. If you have any questions or would like additional information, please call.

Sincerely,



Michael Hankard, INCE and ASA Member  
*Principal Acoustical Consultant*

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**10/12/2018 10:51:38 AM**

**in**

**Case No(s). 18-1360-EL-BGN**

Summary: Application Part 4 of 6, Exhibits H through M electronically filed by Christine M.T. Pirik on behalf of Hardin Solar Energy II LLC