SURFACE WATER DELINEATION REPORT

FOR THE:
DIXON RUN SOLAR PROJECT

SUNENERGY1
192 RACEWAY DRIVE
MOORESVILLE, NC 28117

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TABLE OF CONTENTS

PAGE

LIST OF FIGURES

LIST OF APPENDICES

List of Attachments

1.0 INTRODUCTION

SunEnergy1 is proposing to construct a utility-scale, 140-megawatt (MW_{AC}) solar facility (Project). The Project is located approximately 6.5 miles southeast of the city of Jackson in Jackson County, Ohio (Figure 1). Hull & Associates, LLC (Hull) was contracted by Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) to conduct a surface water delineation of wetlands and waterbodies within a 1,474-acre survey boundary (Ecological Study Area; Figure 2). The purpose of this surface water delineation was to determine the extent and quality of surface waters within the Ecological Study Area that may be subject to regulation under the federal Rivers and Harbors Act of 1899, Section 10; the Clean Water Act (CWA), Sections 401 and 404; the Code of Federal Regulations (CFR), Title 33 Parts 328 and 329; Executive Order 11990; National Environmental Policy Act (NEPA); and Ohio Revised Code (ORC), Sections 6111.03, 6111.021, and 6111.022. This report summarizes the methodologies and results of the surface water delineation for the Project.

2.0 SURFACE WATER DELINEATION CRITERIA

A surface water delineation involves the identification of wetlands, streams, and other relatively permanent surface water features that may be subject to federal and/or state jurisdiction.

2.1 Wetland Criteria

Federal regulations define wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory, 1987).

Ohio regulations define wetlands as:

> *"…those areas that are inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. "Wetlands" includes swamps, marshes, bogs, and similar areas that are delineated in accordance with the 1987 United States army corps of engineers wetland delineation manual and any other procedures and requirements adopted by the United States army corps of engineers for delineating wetlands (3745-1-02 OAC)."*

According to current regulatory wetland criteria, a wetland must have hydric soils, evidence of inundated or saturated conditions, and a predominance of hydrophytic vegetation. When all three of these criteria are met, a wetland is present and is subject to federal and/or state regulations and permitting.

Hydric soils are those that have formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil column (Environmental Laboratory, 1987). The presence or absence of hydric soils is determined in the field by digging a soil pit or bore sample, characterizing the soil profile, and applying the criteria for hydric soils contained in Field Indicators of Hydric Soils in the United States, Version 8.2 (USDA/NRCS 2018).

Wetland hydrology refers to a landscape which is periodically inundated or has soils that are saturated to the surface during the growing season with a duration that influences the vegetative community because of the development of anaerobic soil conditions (Environmental Laboratory, 1987). The presence of wetland hydrology is determined using field indicators including directly observable evidence such as inundation and soil saturation, and evidence of recent inundation such as water marks on trees and sediment or drift deposits.

Additional evidence of current or recent soil saturation may also be present, such as the presence of reduced iron or crayfish burrows.

Hydrophytic vegetation is described by the USACE as the community of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrences (Environmental Laboratory, 1987). Plants are placed into indicator status categories depending on their probability of occurring in a wetland. These categories were originally developed and defined by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) and subsequently have been modified by the National Plant List Panel. There are five indicator status categories for plants:

1. Obligate wetland plants (OBL) almost always occur in wetlands;
2. Facultative wetland plants (FACW) usually occur in wetlands but may occur in non-wetlands;
3. Facultative plants (FAC) occur in both wetlands and non-wetlands;
4. Facultative upland plants (FACU) usually occur in non-wetlands, but may occur in wetlands; and
5. Upland plants (UPL) almost never occur in wetlands.

2.2 Stream Criteria

The location and length of each stream channel is determined from existing mapping information and/or via surveying streams in the field. Note that some streams that are too small to be included on U.S. Geological Survey (USGS) topographic maps may nevertheless be under federal or state jurisdiction. Jurisdictional streams generally have a defined channel, an Ordinary High-Water Mark (OHWM), and discernible bed and bank features. Streams may have other morphological features including riffles and pools, meanders, and a floodplain.

2.3 Jurisdictional Determination

The U.S. Army Corps of Engineers (USACE) has sole authority to determine whether wetlands or other water bodies are non-isolated (under federal jurisdiction) or isolated (under Ohio EPA jurisdiction). Determinations made by Hull must be verified by the USACE after review of a delineation report and a field visit by USACE staff. Approved Jurisdictional Determinations (AJDs) are typically valid for a period of five years from the date of the USACE delineation verification letter. This report contains a description of an investigation conducted to delineate and to assess the ecological value of surface waters found within the Ecological Study Area. The report includes descriptions of the field methods used during the surface water delineation, a summary of surface water resources delineated within the Ecological Study Area, and a description of the limitations of this investigation.

3.0 INVESTIGATION METHODS

3.1 General

Prior to visiting the Ecological Study Area, Hull reviewed the following existing information:

- **Natural Resources Conservation Service (NRCS) Soil Survey of Jackson County, Ohio**

  The soil survey identifies soil mapping units and their associated hydric soil rating, based on percent hydric components (Figure 3). Mapped non-hydric soils may contain inclusions of hydric components in terraces, in depressions, on floodplains, and in drainage ways.

- **United States Department of Interior National Wetlands Inventory (NWI) Maps**

  These data provide an indication of the presence or absence of wetland and open-water areas within the Ecological Study Area, as defined by the USFWS classification system (Cowardin et al., 1979). The notation of a wetland on an NWI Map indicates that wetlands might occur or have occurred in the area. Often, those wetlands depicted on NWI maps are the wettest spots in an area. NWI map information is used to supplement knowledge about a site and cannot take the place of field observations due to minimal ground truthing, age of the mapping data, mapping scale, and wetlands criteria that differ from USACE wetland delineation criteria (Figure 4).

Hull used this preliminary information to screen the Ecological Study Area and target the investigation to areas that would likely contain surface water features, although all areas were evaluated.

3.2 Wetland Delineation Methods

Wetland edges were located in the field using procedures outlined in the *1987 Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the 2012 *Regional Supplement to the Delineation Manual for the Eastern Mountains and Piedmont Region* Version 2.0, subsequent USACE memoranda and regulatory guidance, and basic principles of plant community ecology.

The plant communities identified within the Ecological Study Area were investigated in detail using the three-criterion wetland delineation approach. The wetland indicator status of plant species was determined using the *National Wetland Plant List* (Lichvar et al., 2018). After characterizing the vegetation, hydrology, and soils of a plant community type and becoming familiar with the soil, vegetation, and/or hydrologic cues that indicated the upland-wetland boundary, Hull recorded the wetland boundaries using Global Positioning System (GPS) technology and periodically collected additional soil, vegetation, or hydrologic data to refine the upland-wetland boundary. A minimum of one data point was collected in each wetland or wetland mosaic and there was a corresponding upland data point taken outside of the wetland boundary, which was used to describe the upland community surrounding the wetland.

3.3 Wetland Evaluation Methods

Hull performed an evaluation of wetlands mapped within the Ecological Study Area using the Ohio Rapid Assessment Method for Wetlands (Mack, 2001), Final Version 5.0 (ORAM). The ORAM quality assessment is based on review of resource materials, data obtained in the field, and the acreage as determined by delineation and mapping. The wetland quality information is provided to the Ohio EPA during permitting coordination for the purpose of placing wetlands into the appropriate wetland Antidegradation Category described in Ohio's Wetland Water Quality Standards (Sections 3745-1-05 and Sections 3745-1-50 through 3745-1-54).

There are three possible Ohio Wetland Antidegradation Categories to which wetlands may be assigned:

- Category 1 – **Lowest value category.** Generally limited to small, low-diversity wetlands and wetlands with a predominance of non-native invasive plant species.
- Category 2 – **Middle value category.** Wetlands in this category are of moderate diversity but do not contain rare, threatened, or endangered species. They are generally degraded but are capable of attaining higher value. Most wetlands in Ohio are expected to fall into this category.
- Category 3 – **Highest value category.** Wetlands in this category may be large; diverse; represent rare plant community types; contain rare, threatened or endangered species; or any combination of these and several other factors.

3.4 Stream Channel Delineation Methods

Stream channels identified on USGS topographic maps and in the National Hydrography Dataset are generally found to be under the CWA jurisdiction of the USACE (Figures 1 and 4). Additional streams may be identified in the field by the presence of an OHWM, defined bed and bank, and other stream morphological features. The USACE Regulatory Guidance Letter No. 05-05 provides guidance for identifying the OHWM. Where possible, stream channels are investigated upstream to identify the source of water and downstream to determine if the channel ends in a wetland, a confluence with another stream, a culvert inlet, or another resource.

Hull considers the greater landscape habitat and land use when evaluating the jurisdictional nature of agricultural and other ditch networks. Wetlands that are located solely within an agricultural or roadside ditch are typically considered non-jurisdictional under the current state and federal guidelines (33 CFR Part 328 and 3745-1-02 OAC). Ditches containing wetlands within the ditch boundaries, wetlands adjacent to the ditch boundaries, captured streams, or that bisect larger wetlands or streams, may be considered jurisdictional connections between surface water features subject to federal or state regulation.

3.5 Stream Evaluation Methods

Hull utilizes the Ohio Qualitative Habitat Evaluation Index (QHEI) scoring method to evaluate streams with a drainage area greater than one square mile and/or pools greater than 40 centimeters deep. On streams with a drainage area less than one square mile and with pools less than or equal to 40 centimeters deep, Hull uses the Ohio Headwater Habitat Evaluation Index (HHEI) and other physical observations. These methods yield a numerical score for the stream reach evaluated, which in combination with other physical observation data, is used to estimate the aquatic habitat quality of each stream.

The boundaries of the Ecological Study Area are evaluated utilizing the Ohio EPA Stream Eligibility Web Map (OEPA, 2017) to determine if the stream is Eligible for coverage under the 401 Water Quality Certification (WQC) for the Nationwide Permit (NWP) or if an individual 401 WQC or Ohio EPA Director's Authorization is required. At stream locations in Possibly Eligible areas where water is present in the stream channel, pH values are taken utilizing an Oakton pH2+ pen meter. Hull utilizes the flow charts provided by Ohio EPA to clarify when streams that score high on the HHEI or QHEI, and are mapped in Possibly Eligible areas, may be subject to individual 401 WQC or Director's Authorization procedures.

3.6 Surveying and Mapping Methods

Once delineated using the three-criterion approach, the wetland/non-wetland boundaries and the sample locations are surveyed, and a map is produced. The boundaries of all wetland areas, sample points, and streams are located in the field using Trimble R1 mapping-level portable GPS receivers. Differentially corrected GPS data are typically accurate within 0.5 foot to 1.0 foot. All wetland areas, sample points, and stream locations are placed in a Geographical Information System (GIS) database and assembled with other available geographically referenced information using ArcMap v.10.8.1 GIS software. The length of each stream and acreage of each wetland is calculated using GIS.

4.0 RESULTS

The USGS Wellston, Mulga, Oak Hill, and Rio Grande Quadrangle maps indicate the Ecological Study Area consists of historic subsurface mining, strip-mining, and steep foothills (Figure 1). The Ecological Study Area contains open pastureland, new field/scrub shrub habitat, and forested hills. The terrain within and surrounding the Ecological Study Area consists of steep, irregular topography.

The Ecological Study Area has been shaped by a history of subsurface mining and surface strip-mining. Evidence of acid-mine drainage, likely caused by former mining activities, was common throughout the Ecological Study Area. Current pastureland was dominated by *Festuca rubra* and *Trifolium pratense*, new field/scrub shrub by *Solidago canadensis* and *Elaeagnus angustifolia*, and forested hills by *Quercus rubra* and *Acer rubrum*. Soils throughout the site were predominantly non-hydric except for in low-lying depressions and swales (Figure 3).

To refine the information gathered during the desktop review, Hull collected hydrology, soil, and vegetation data at 67 locations within the Ecological Study Area (see Table 1 in Appendix A, and data sheets in Appendix B). These data were used to develop a surface water delineation map (Figure 5). For regulatory purposes, final verification of any wetland and waterbody boundaries and their jurisdiction can be formally established through a Jurisdictional Determination (JD) review by the USACE. The Ecological Study Area is located within the Raccoon-Symmes Creek Watershed (05090101) and the Dickason Run and Headwaters to Symmes Creek sub-watersheds. The 100-year floodplain of Dickason Run is located approximately 0.13 miles north of the Ecological Study Area (Figure 7). The Ecological Study Area is located within an area where streams are eligible for permitting through the Ohio 401 WQC for the USACE Nationwide Permits (Figure 8).

4.1 Wetlands in the Project Area

A total of 33 wetlands were delineated at the site, comprising a total of 21.31 acres within the Project Area (Table 2 in Appendix A). Ten of these wetlands were determined to be either abutting or adjacent to relatively permanent surface waters, likely making them jurisdictional under current federal guidelines (33 CFR Part 328). Twenty-three wetlands were determined to be non-abutting and not adjacent to relatively permanent waters, likely making them non-jurisdictional under current federal guidelines (33 CFR Part 328). Because isolated wetlands are regulated in Ohio, these wetlands would likely fall under the jurisdiction of the state of Ohio (3745-1-02 OAC and 3745-1-50 OAC). Of all the wetlands, 23 were determined to be Category 1 and 10 were evaluated as Category 2 (Appendix C). Evidence of acid-mine drainage was observed within several of the delineated wetlands, likely effecting the habitat quality of each.

4.2 Waterbodies in the Project Area

A total of 9 streams were delineated, comprising 3,411.54 linear feet within the Project Area (Table 3 in Appendix A). Eight of these streams were determined to be relatively permanent waters and contain intermittent or perennial flow regime, making them likely jurisdictional under current federal guidelines (33 CFR Part 328). One of these streams was determined to be a non-relatively permanent water with ephemeral flow regime, likely making it non-jurisdictional under current federal guidelines (33 CFR Part 328). Because non-relatively permanent, ephemeral streams are regulated in Ohio, this stream would likely fall under the jurisdiction of the state of Ohio (3745-1-02 OAC). All streams were evaluated using the HHEI assessment method (Appendix D). Evidence of acid-mine drainage was observed within several of the delineated streams, likely effecting the habitat quality of each.

5.0 REPORT LIMITATIONS

The conclusions presented herein are based on the level of effort and investigative techniques defined under the Scope of Work between Hull & Associates, LLC (Hull) and the Client. Hull has conducted this investigation in a manner consistent with published guidance, sound ecological practices, and best professional judgment. No other warranty or guarantee, expressed or implied, is made. This report does not attempt to evaluate past or present compliance with Federal, State and Local environmental or land use laws and regulations. Furthermore, Hull makes no guarantees regarding the completeness or accuracy of any information obtained in review of public or private files or previous investigations at the Ecological Study Area not conducted by Hull. The results of the surface water delineation and the surface water evaluation are subject to verification by the USACE and Ohio EPA, respectively.

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FIGURES