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December 30, 2021

Ms. Tanowa Troupe, Secretary
Ohio Power Siting Board
Docketing Division
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3797

Re: **Case No. 20-1605-EL-BGN -** In the Matter of the Application of Birch Solar 1, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Allen and Auglaize Counties, Ohio.

Supplemental Response to Tenth Data Request from Staff of the Ohio Power Siting Board and Response to Staff Report of Investigation Conditions 33 and 44.

Dear Ms. Troupe:

Attached please find Birch Solar 1, LLC's ("Applicant") Supplemental Response to the Tenth Data Request from the staff of the Ohio Power Siting Board ("OPSB Staff") and Response to the Staff Report of Investigation Conditions 33 and 44. The Applicant provided this response to OPSB Staff on December 30, 2021.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ Christine M.T. Pirik
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CERTIFICATE OF SERVICE

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to these cases. In addition, the undersigned certifies that a copy of the foregoing document is also being served upon the persons below this 30th day of December, 2021.

/s/ Christine M.T. Pirik
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4889-2026-7784 v1 [92234-1]

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of Birch Solar 1, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Allen and Auglaize Counties, Ohio.	)))))	Case No: 20-1605-EL-BGN

BIRCH SOLAR 1, LLC 'S SUPPLEMENTAL RESPONSE TO THE TENTH DATA REQUEST FROM THE STAFF OF THE OHIO POWER SITING BOARD AND RESPONSE TO STAFF REPORT OF INVESTIGATION CONDITIONS 33 AND 44

On February 12, 2021, as supplemented on March 25 and 31, 2021, April 5, 2021, and October 5, 2021, Birch Solar 1, LLC ("Applicant") filed an application ("Application") with the Ohio Power Siting Board ("OPSB") proposing to construct a solar-powered electric generation facility in Allen and Auglaize Counties, Ohio.

On October 1, 2021, the Staff of the OPSB ("OPSB Staff") provided the Applicant with OPSB Staff's Tenth Data Request. On October 20, 2021, the OPSB Staff issued its Staff Report of Investigation ("Staff Report"). Now comes the Applicant providing the following Supplemental Response to the Tenth Data Request from the OPSB Staff and Response to Staff Report Conditions 33 and 44.

Tenth Data Request – Oil and Gas Wells

Response: Attachment 1 to this response contains the Engineering Constructability Report, which includes the study of oil and gas wells conducted by UAV Explorations Inc.

Staff Report

1. **Condition 33: The Applicant shall not construct within the 37 percent of un-surveyed project land identified in its Programmatic Agreement with the OHPO (signed on February 22, 2021) where potential archaeological resources remain to be surveyed.**

Response: Attachment 2 to this response includes the Phase I Archeological Survey Report conducted by Weller & Associates. The report was provided to the State Historic Preservation Office on December 30, 2021.

2. **Condition 44: At least 60 days prior to the preconstruction conference, the Applicant shall provide to Staff and file on the public docket an Engineering Constructability Report, which shall include but is not limited to the following:**

   a. **Name of the engineering firm, or technical expert writing the report;**

   b. **An explanation of what oil/gas wells are and the potential adverse environmental impacts (such as: brine release affecting vegetation, odors, vapors, oil leakage) that could result from damage to an oil/gas well and why these require special construction consideration;**

   c. **A statement on the Applicant's coordination and consultation effort with Ohio Department of Natural Resources (ODNR);**

   d. **An Inventory and map of the oil/gas wells within the project area, including their status (i.e., plugged, not plugged);**

   e. **A determination of whether that oil/gas well poses a risk to public health, safety, or the environment;**

   f. **An explanation of construction techniques to be employed when working around the oil/gas well (e.g., avoidance, plugging, setbacks);**

   g. **Include a revised (Project Site Layout Map);**

   h. **The Unanticipated Discovery Plan to describe the plan if other oil/gas wells are discovered during construction;**

   i. **If the Applicant discovers the need to plug wells (prior to construction, during operation, or at the end of solar facility's life), include an analysis of the probable costs of construction or decommissioning; and**

   j. **A cost estimate to properly plug and abandon an oil/gas well.**

Response: Attachment 1 to this response contains the Engineering Constructability Report.

Respectfully submitted,

/s/ Christine M.T. Pirik
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Attorneys for Birch Solar 1, LLC

4862-9653-3768 v1 [92234-1]

Attachment 1

Engineering Constructability Report

LightSource BP

December 30, 2021

DICKINSON WRIGHT PLLC

ENGINEERING CONSTRUCTABILITY REPORT

Birch Solar 1, LLC
OPSB Case Number: 20-1605-EL-BGN

December 30, 2021

lightsource bp

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1. EXECUTIVE SUMMARY AND OVERVIEW

1.1 Introduction

In October 2020, Lightsource bp (the Applicant), initiated application efforts for the Birch Solar Project, as described in Section 1.4. On February 12, 2021, the Applicant filed the "Application for a Certificate of Environmental Compatibility and Public Need for Birch Solar 1, LLC" (Case Number: 20-1605-EL-BGN).

Over the course of the next year, the Applicant worked with the Ohio Power Siting Board (OPSB) staff to provide supplements to the Application, conduct additional surveys and studies, and to provide written responses to OPSB Data Requests.

As described in the OPSB Staff Report issued on October 20, 2021, the project is partially located within the mapped boundary of the Lima Consolidated Oil Field and Trenton Limestone Oil and Gas area, the location of numerous oil and gas wells. A review of the Ohio Department of Natural Resource's (ODNR) Oil and Gas Database indicated there were potentially 60 oil and gas wells within the project area. Therefore, the Applicant engaged in electromagnetic (EM) data collection and evaluation efforts that were still ongoing at the time of the release of the Staff Report.

The Staff Report recommended Denial of Certificate, and one of the causes for recommended denial was failure to meet the Finding for "Minimum Adverse Environmental Impact" pursuant to R.C. 4906.10(A)(3). In part, page 37 of the Staff Report notes that "the Applicant has not established sufficient and/or compelling evidence to evaluate the geologic suitability of the proposed project…" and therefore, "the Applicant is unable to determine the nature of the probable environmental impact of the proposed facility and thus is unable to conclude that the project represents the minimum adverse environmental impact."

However, the Staff Report also recommended that, "on the event the Board determines that a certificate should be granted, Staff recommends that the Applicant complete its oil and gas well assessment as soon as possible, but in any event, no later than 60 days prior to the preconstruction conference…" This opportunity was further defined by OPSB Staff Proposed Condition 44 (Condition 44), which requires that the Applicant prepare an Engineering Constructability Report (ECR) to compile and analyze the final data, subject to parameters as described in Section 1.2.

Though the Condition 44 requires that the ECR be submitted 60 days prior to the preconstruction conference, the Applicant has completed the subsequent work under a revised scope of work and submits the ECR to the OPSB staff ahead of that deadline.

1.2 Purpose of Report

The purpose of this ECR is to provide information as requested by Condition 44 of the OPSB Staff Report for the Birch Solar Project. Condition 44 is stated in its entirety below, and this ECR has been structured to reflect those requirements. For reference, the relevant components of Condition 44 are cited throughout the report via <u>underline</u>.

> *44. At least 60 days prior to the preconstruction conference, the Applicant shall provide to Staff and file on the public docket an Engineering Constructability Report, which shall include but is not limited to the following:*
>
> *a. Name of the engineering firm, or technical expert writing the report;*

b. *An explanation of what oil/gas wells are and the potential adverse environmental impacts (such as: brine release affecting vegetation, odors, vapors, oil leakage) that could result from damage to an oil/gas well and why these require special construction consideration;*

c. *A statement on the Applicant's coordination and consultation effort with Ohio Department of Natural Resources (ODNR);*

d. *An Inventory and map of the oil/gas wells within the project area, including their status (i.e. plugged, not plugged);*

e. *A determination of whether that oil/gas well poses a risk to public health, safety, or the environment;*

f. *An explanation of construction techniques to be employed when working around the oil/gas well (e.g., avoidance, plugging, setbacks);*

g. *Include a revised (Project Site Layout Map)*

h. *The Unanticipated Discovery Plan to describe the plan if other oil/gas wells are discovered during construction;*

i. *If the Applicant discovers the need to plug wells (prior to construction, during operation, or at the end of solar facility's life), include an analysis of the probable costs of construction or decommissioning; and*

j. *A cost estimate to properly plug and abandon an oil/gas well.*

1.3 Preparation of Report – Name of Firm and Technical Experts

Pursuant to Condition 44.a, this ECR has been prepared by the Applicant, in collaboration with technical experts in the oil and gas field, including:

- Stantec Consulting Services, Inc., which provides professional consulting services in planning, engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management, and project economics for infrastructure and facilities projects. The Company provides services on projects around the world through over 22,000 employees operating out of more than 350 locations in North America and across offices in 6 continents internationally.
- UAV Exploration Inc., (UAVEX) which is a geophysical services provider specializing in Unmanned Aerial Magnetic Surveying. UAVEX combines the latest in lightweight magnetic sensor technology, highly specialized aerial platforms and expert-level flight operations to produce the highest quality unmanned aeromagnetic surveys available. UAVEX has extensive experience in assisting Federal/ State/ Local agencies, including the ODNR, and Oil and Gas asset owners prepare geo-database information by providing an accurate map of detected subsurface wells.
- Kleinfelder, which is a firm of certified engineers, scientists, and construction professionals that provides engineering services for a variety of fields including transportation, water, energy, and other private infrastructure. Kleinfelder works in projects throughout the US and in Canada and Australia, and has specific and extensive experience working in the State of Ohio.

The ECR references and incorporates additional Studies and surveys prepared by technical experts, as referenced herein. Those studies are also included in the Appendices of this ECR.

1.4 Project Description and Background

The Project, located in Allen and Auglaize counties, Ohio, is a utility-scale solar-powered electric generation facility that will have a nameplate capacity of 300 megawatts (MW) alternating current (AC) 375 MW direct current (DC) (See Figure 1, Property Location Map). The Project will be constructed and operated by the Applicant, a wholly owned subsidiary of Lightsource Renewable Energy US, LLC, a Delaware limited liability company (Lightsource US), and will operate for a period of 35 years.

The purpose of the Project is to provide 300 MWac/375 MWdc (referred to herein as 300 MW) of cost effective, clean and renewable energy to the PJM Interconnection, LLC (PJM) transmission grid. The Project will add generation diversity to the electrical grid creating a more robust grid. Electricity from the Project will use virtually no fuels or water and emit zero air emissions. The Project is in line with Ohio's legislative desires for economic benefit, jobs, and the infrastructure investment that clean energy brings.

Additional Project details are included in the Application to the OPSB for a Certificate of Environmental Compatibility and Public Need for Birch Solar 1, LLC (Case Number: Case Number: 20-1605-EL-BGN).

1.5 Historical O&G Production and Well Setting

Nowhere in the world has oil and gas been commercially produced and widely distributed for as long as within the Appalachian Basin. The first oil discovery in Ohio occurred in 1860 in shallow reservoirs located in eastern Ohio. Today, highly sophisticated horizontal shale development in eastern Ohio provides significant energy resources. Over time there have been over 264,000 wells drilled in Ohio.

To provide perspective, beginning in 1884 in northwestern Ohio, a drilling boom established the largest U.S. oilfield at the time, known as the Lima Findlay Trenton Field. Over time 71,000 wells were drilled. Of those, nearly 60,000 wells were drilled between the discovery well and 1910. For two years during that period over 5,000 wells were drilled per year – using wooden rigs. Recording of oil well data by the ODNR began in 1980 and currently the ODNR Risk Based Management System ("RBMS") contains well data for over 100,000 wells permitted since 1980. Historical well card information from the Division of Geological Survey for wells permitted before 1980 has also be added to the online database, which can be found at the ODNR website: https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/safetyconservation/about-odnr/oil-gas/oil-gas-resources/featured-content-3).

The Trenton Limestone is a vugular reservoir with quality porosity and permeability, influenced by regional faulting that tended to capture hydrocarbons. The Trenton Limestone ran across Indiana east to Ohio and north to Michigan, the historic nature of this area can be seen in the Eighth Annual Report of the United States Geological Survey, 1886-1887: Part 2. (See Figure 2, Geological Map of Ohio and Indiana). The typical well was 1,200 to 1,400 feet in depth. Characteristic of the time, cable tool rigs were constructed using compression drilling to create a bore hole from the surface to total depth in order to expose the reservoir and provide a pathway for production. Once drilling was initiated, conductor casing made of either wood or steel was inserted to a depth of 20 feet to assist hole integrity. At a depth of approximately 600 feet, steel casing was inserted to isolate the well bore from shallow rocks yielding water. From that point a slightly smaller diameter hole was drilled deeper into the Trenton. If it was determined that commercial oil and gas existed, the well was "completed". A production casing string could have been run into the well and set on top of Trenton for better well control. But most often the well

was left uncased. Often two-inch tubing was run to proximity of the Trenton to assist production. Good wells simply flowed product to surface under natural pressure. If pressure was insufficient or depleted, the walking beam of the drilling rig or small pump jacks were used to actuate artificial lift using downhole pumps.

Initially, Trenton wells produced prolific volumes of oil and gas. However, the relatively shallow depth of the reservoir limited natural down-hole pressure. Excessive drilling activity driven by "rule of capture" competition combined with poor production practices to squander reservoir drive and eventually limited optimum recovery of reserves. By 1910 activity in the Trenton Field was in steep decline as more promising oilfields were discovered in the American mid-continent. The Trenton play was essentially dead by 1930.

At the time of peak development of the Trenton Field, there was no stable understanding of petroleum engineering, proper well construction or appropriate production methods. Public policy did not contemplate orderly development and the play was over drilled. Little consideration was given to proper abandonment or plugging procedures. That historic problem exists today in three of the four quadrants of Ohio and is the reason the Ohio General Assembly, with strong industry support, enacted the Idle and Orphan Well Plugging Program.

Lima, Ohio's infrastructure and population has continued to grow since the original oil boom of the 1800s. Residential, commercial, and industrial complexes have now grown beyond city limits, often over ODNR oil and gas data base locations. Housing subdivisions, industrial warehouses, refineries, factories and even golf courses now cover historic and abandoned oil and gas wells both inside and outside of Lima, Ohio city limits and Shawnee Township.

Ohio's Idle & Orphan Well Plugging Program was created in 1976 to plug improperly abandoned oil and gas wells where no responsible owner exists. The enacting legislation set aside a portion of the oil and gas mineral severance tax to fund the program. A key objective was to rectify the plight of landowners who had abandoned wells on their property and had no means to address the problem while also addressing imminent threats to health, safety and the environment. In 2018 the Ohio General Assembly enacted statutory reforms to the program, including a dramatic increase of sustained funding, to encourage more robust plugging activity.

The Birch Solar Project continues Allen and Auglaize County's participation in the energy sector into clean energy. In reviewing the impact of the Project in comparison to other uses of this land, it should be noted that many other uses in the area would require the same underground disturbance as a solar field, if not a greater impact. The excavation for a residential basement, digging of a residential well, or the addition of a man-made pond, pool or water feature would feature depths similar or more than solar racking pilings. The ability to build and develop over ODNR data points and well locations has been made possible, often, by a lack of any physical presence of a well feature. Wells may have been removed, possibly by the well driller themselves to reuse components, by a farmer during planting, or during wartime to re-use components.

Without the surveys represented within this document, knowledge of the locations of this underground infrastructure would be unknown and open to numerous other developments which could be contemplated for this property. Further, during the 35-year operational life of the Project, the oil and gas wells within the Project area pose less of a human health risk than other potential land uses because of the minimal excavation for construction, minimal need for onsite operations or disruptions and secure nature of the facility with the Project fencing. Solar facilities, in many ways are ideal for historic oil and gas locations which could be harmed if additional more extensive infrastructure was created or a higher population density was established.

In the initial application for the Project, the Applicant undertook an evaluation to verify the presence of potential oil and gas wells within a radius around each of the ODNR Orphaned Well Database locations. As is noted in the OPSB Staff Report, a larger study area was required due to discrepancies within the ODNR database to the finding. The Project took a broader approach to the study and was able to use drone flights throughout the entire Project Area to locate metallic anomalies associated with historical oil and gas wells. Those anomalies were then ground truthed by a hand magnetometer to increase location accuracy. All anomalies verified by ground truthing where then presumed to be wells, either oil and gas or in two instances, water wells. In both circumstances, the Project will establish a setback from the locations.

1.6 Coordination and Consultation Efforts with Ohio Department of Natural Resources

Pursuant to Condition 44.c, throughout the preparation of this ECR and the overall Project development process, the Applicant and technical team have had extensive and regular coordination with both ODNR and the OPSB, as detailed below.

Date	Summary of Communications
October 6, 2021	The Applicant and consulting team met with ODNR staff to review questions from OPSB staff regarding the status of oil and gas wells as well as study parameters. Applicant and ODNR discussed the lack of any current regulatory structure for solar and other development around well locations as well as the accuracy of the ODNR data set.
October 27, 2021	The Applicant and ODNR staff reviewed the Birch Solar Project OPSB Staff Report and discussed the Staff Report Conditions. ODNR reviewed the current scope of the oil and gas studies and provided suggestions
November 10, 2021	The Applicant and ODNR staff reviewed the preliminary results of the drone flight from UAVEX to date and additional requests from ODNR regarding the need to possibly access wells in the future. Applicant and ODNR discussed the Engineering Constructability Report and expected contents.
December 28, 2021	The Applicant and ODNR staff reviewed final study results from UAV and the proposed Engineering Constructability Report. The Applicant presented a plan to focus on mitigation through a 50-foot setback from the wells and a commitment to provide access to wells if needed. ODNR Staff indicated that the approach taken was consistent with their preference.

2. INVENTORY OF OIL AND GAS WELLS

Pursuant to Condition 44.b, the Applicant engaged in a variety of efforts to ensure an accurate understanding of the location and nature of the historical oil and gas wells within the Project, as described in this section.

2.1. Review of Historical Data

Pursuant to Condition 44.d, a review of historical data was conducted as detailed in Section 1.5, which resulted in an Inventory and map of the potential oil and gas wells within the Project area, including their status. This Map was included in the Applicant's Response to the Tenth Data Request from OPSB Staff, which can be found in its entirety in the OPSB Docket and is also attached to this ECR as Figure 3, Historical Oil & Gas Map – ODNR Data.

The data updated through the additional magnetic survey work was conducted by UAVEX. The scope of which is described later in this ECR and can be found in the UAV Exploration Birch Solar Magnetic Well Survey – Final Report (Appendix B).

2.2. Desktop Hydrogeological Assessment

A desktop Hydrogeological Assessment was undertaken by Kleinfelder to characterize the geological and hydrogeological conditions of the Project Area. This assessment included a review of "Local Water Supply Well Construction Logs" (Appendix A) and a search and review of publicly available information and databases. Results of this search are presented below. This information also considers relevant information previously presented by the Applicant in the OPSB Docket; including Kleinfelder's Geotechnical Investigation Report, dated December 21, 2020 (Exhibit K) and Kleinfelder's Hydrology and Flood Inundations Study, dated December 18, 2020 (Exhibit O).

2.2.1 Desktop Hydrogeological Assessment - Physical Setting

Based on the "Physiographic Regions of Ohio" map published by ODNR, the Project area is mapped within the Central Ohio Clayey Till Plain Section of the Central Lowland Physiographic Province. The geology of this region generally consists of clayey, high-lime Wisconsinan-age till originating from the Erie glacial lobe, and lacustrine materials overlying Lower Paleozoic-aged carbonate rocks. This region is also comprised of well-defined moraines with intervening flat-lying ground moraines and intermorainal lake basins. The ground surface ranges in elevation from 700 to 1,150 feet above mean sea level with moderate relief.

Surficial Geology. Based on review of the Quaternary Geologic Map published by the ODNR Division of Geological Survey, the surficial geology consists of several surficial geologic units across the project site. These geologic units originate from the Late Wisconsinan-aged Late Woodfordian ice deposits which are composed predominately of Clayey Till (Hiram Till). This till consists of a mixture of calcareous clay, silty clay, silty clay loam, or clay loam, and is consistent with observations made during field investigation activities reported in the Geotechnical Investigation Report. These surficial Quaternary deposits generally range in thickness from 6 to 100 feet across the project area but may be up to 200 feet in thickness in isolated areas.

Bedrock Geology. Based on the Bedrock Geology map published by the ODNR Division of Geological Survey, the surficial deposits within the project are underlain by Silurian-aged Tymochtee Dolomite and Greenfield Dolomite. The Tymochtee Dolomite unit consists predominantly of thin to massively-bedded dolomite with shale laminations and is estimated to be up to 140 feet in thickness. The Greenfield Dolomite unit underlies the eastern portion of the project area and is comprised of thin to massively-bedded argillaceous dolomite, with an

estimated thickness of 80 feet. Below the Dolomite bedrock are layers of Ordovician and Cambrian bedrock, consisting of sedimentary shale and limestone. The Ordovician layer is estimated to be approximately 500 feet thick, and the Cambrian layer to be approximately 1,000 feet thick.

Groundwater. Based on data from the ODNR Division of Geological Survey Ohio Water Wells database and the U.S. Geologic Survey (USGS) Ground Water Atlas of the United States, ground water in the project area is from the surficial aquifer. The ODNR water well database indicates that groundwater wells in the project area are placed at depths between 30 and 200 feet below ground surface (bgs). Shallow wells (between 30 and 75 feet bgs) were found in gravel and shale layers, with deeper wells (between 60 and 200 feet) placed within limestone layers. A query of the ODNR water well database for all water wells in the project area is provided as Appendix A to this report. Well depths are consistent with the surficial aquifer system depths identified within the Quaternary (surficial) deposits presented in ODNR's Division of Geological Survey Bedrock Geologic Map of Ohio. Additional aquifers found in deeper bedrock layers are suggested by the USGS Ground Water Atlas of the United States, however, the shallow nature of the water wells identified in ODNR's water well database suggests that these aquifers are not utilized locally.

Oil and Gas Geology. Based on oil and gas well permitting information provided by the Allen County Engineering Office from 2001-2005 and ODNR's Division of Geological Survey collection of Subsurface Information catalogs from 1954-1972, there appear to be two geological formations from which oil and gas were extracted in the project area. Oil well depths generally range between 300-700 feet and 1,200-3,300 feet, which coincide with the Silurian and Ordovician bedrock formations, respectively, as noted by the bedrock geology information reviewed.

2.2.2 Desktop Hydrogeological Assessment - Findings

Public water wells logs for the adjoining Project Area located in the Local Water Supply Well Construction Logs (Appendix A), indicate the average water well to be 83.2 feet in depth and have a range of 33 to 278 feet. Solar modules are installed on steel posts having a cross sectional area of approximately 6 inches by 7 inches. Posts are typically 10 to 15 feet long and are driven 7 to 11 feet below grade. Preliminary geotechnical work at the site recommended that the posts be driven to a minimum of 7.5 feet. Subsurface land disturbance is unlikely to impact local groundwater conditions at this depth.

2.3. Oil and Gas Survey of the Project

2.3.1. Oil and Gas Survey Methods and Limitations

During the consultation process described in Section 1, the Applicant learned that ODNR engages with UAVEX for a variety of services throughout Ohio. Therefore, Applicant and Kleinfelder, subcontracted with UAVEX to conduct aerial and ground-based magnetometer surveys to locate and record the position of historical plugged, abandoned, and unknown steel-cased wells within the Project area. In consultation with ODNR staff regarding past assessments of well exploration, a scope of work was developed which included:

- Provide aerial data collection, data processing, data results package and final reporting based on data collected from aerial magnetic surveys and ground survey/field reconnaissance efforts.
- Provide data collection using a certified unmanned aerial platform outfitted with a proprietary EX-Mag™ magnetometer payload and operated by a Federal Aviation

Administration (FAA)-certified pilot holding a valid commercial unmanned aerial systems (UAS) pilot certificate and visual observer flight crew.

- Collect Aerial data at a nominal altitude of approximately 30 meters above ground level (AGL) along line spacings of approximately 30 meters. Divide survey area data into subsections consisting of areas of manageable size and scope as to allow the UAS crew to perform the survey while complying with line of sight (LOS) requirements and other safety related standard operating procedures. Define each subsection boundary by UAVEX according to best practices. Altitude will not exceed 400 ft AGL.
- Upon completion of aerial data collection, verify and process magnetic data with the following corrections applied: diurnal variation, instrument lag, magnetic heading, attitude perturbations, 1D filtering, combined datasets, trend removal, analytic signal grid filter, and 2D smoothing filtering. Analyze processed data and select and geo-locate all anomalies of interest.
- Upon completion of data processing, ground-truth all well-like anomalies of interest during a ground-based reconnaissance survey. Well-like anomalies with a distinct magnetic peak will be flagged, labeled, photographed (if visible) and their respective geo-locations recorded with survey grade Global Navigation Satellite System (GNSS).

2.3.2. Oil and Gas Survey Results

UAVEX commenced the activities as noted above and complied the information into a report of the "UAV Exploration Birch Solar Magnetic Well Survey – Final Report" (Appendix B). This report describes a Legacy Well Survey carried out by UAVEX thru November – December 2021, as well as the results, and is described in this section.

Project Overview. The project goal was to identify and locate legacy, plugged and abandoned (P&A) and potential unknown steel-cased gas and oil wells in an area under consideration for development of the Birch Solar Project in Allen County and Auglaize County, OH. The survey called for a multi-phase approach to collect, process, interpret, and confirm magnetic data to locate wells in the project area of operations (AOI). These primary phases were Flight Operations, Data Processing and Interpretation, and Ground Truthing. The principal geophysical sensors used included an Ex-Mag™ atomic magnetometer system mounted on an Unmanned Aerial Vehicle (UAV)platform, a Gem Systems GSM-19 Overhauser Proton Procession magnetometer base station and multiple Schondstedt handheld magnetic locators.

Flight Operations. The daily survey procedure consisted of an early morning safety and survey plan meeting. The GSM-19W Overhauser Base Station was set up and initiated at the start of each survey day. UAV-based magnetic data collection was conducted at a nominal altitude of28meters above ground level which was the calculated maximum tree height plus a safety margin in each survey grid. Flight-line spacing was 28 meters.

The position and altitude of the aircraft and magnetometer payload was achieved using a combination of Barometric Pressure Measurement, GPS, Compass, Inertial Measurement Unit (IMU) and RADAR altimeter. AGL altitude was maintained using a combination of RADAR altitude measurement and barometric pressure readings. The magnetometer was suspended from the UAV in a fixed orientation by a vibration isolated mounting system at a sensor distance of approximately 1.3 meters to reduce UAV noise and magnetic interference. Nominal survey speed was maintained at 7-9 meters per second ground speed. Scan rates for

data acquisition was 1000 hertz (Hz) for the magnetometer and 1 Hz for GPS positioning which translates to an effective downline sampling of <1cm.

Navigation of the UAV was maintained by the onboard GPS-Compass system. Pre-programmed flight plans were uploaded to the UAV prior to takeoff, and the aircraft flew the flight lines autonomously, returning to its takeoff location, or a pre-programed landing location once the lines were completed. Landing and takeoff were conducted manually by the UAV pilot and ground crew. Raw survey data was downloaded at the completion of each flight and quality checked. The total combined survey distance for the site was ~300-line km.

Data Processing and Interpretation. For each mission, raw data files were initially batch processed into a single comma-delimited file using custom software. The concatenated files from each mission were imported into Oasis Montaj for all remaining processing. The following corrections were applied:

- Instrument Lag
- Magnetic Heading
- Major attitude noise due to wind
- Diurnal variation
- 1D filtering
- Combining sorties into one dataset
- Trend removal filter
- Analytic signal grid filter
- Other 2D smoothing filters

At the completion of each survey grid sub-section data was analyzed and anomalies determined to be possible sub-surface steel-cased wells were identified along with their respective latitude/long positions.

Ground Truthing. The field crew traversed on foot to each anomaly location individually for ground identification and magnetic verification. The process was as follows:

1. The peak aerial detection location was first flagged using the GNSS system.
2. Using the magnetic locator, aserpentine path was walked within an approximate 15 meter diameter radius, starting at the center.
3. Once a potential target was detected, a circular survey was conducted around the target to determine if the magnetic field is monopolar (well-like) or dipolar (not well-like).
4. If determined to be monopolar, the exact position was located where the magnetic gradient was the highest and flagged and its respective location collected with survey grade precision using an RTK GNSS system.
5. A wider 30+ meter circle was surveyed to rule out any additional weaker anomalous signatures in proximity to the well.

Upon completion of ground truthing, all anomalies of interest were classified into 4 categories:

- **Category 1 - Ground Confirmed Well**: As part of a Quality Control (QC) regimen the field team selected several anomalies which had clear aerial and ground-based detections which displayed the potential to have shallow (<18 inches) well casings and excavated these wells using hand tools to confirm the presence and condition of the casing. This

category encompasses these uncovered wells plus wells that were already visible above the surface.

- **Category 2 - Ground Detected Well-Like Anomaly**: This category covers all detections that indicate a clear monopolar well-like detection from both the aerial data and ground surveys which indicate the presence of a well-like object likely less than 20 feet below the surface.
- **Category 3 - Weak or Ambiguous Ground Detection**: This category covers detections that appear well-like in the aerial data but displayed some ambiguity during the ground survey. The ambiguity in the ground detection primarily refers to the uncertainty in the true position of the well. This can be caused by two primary factors. Either the well casing lies at significant depth near or beyond the detection limits of the ground magnetic locators or other sub-surface ferrous infrastructure or debris causes multiple detections. These factors make it difficult to pin-point the true center position (X,Y) of the anomaly peak. The aerial data strongly suggests the presence of a well in most cases regardless of the ground ambiguity.
- **Category 4 - Well-like Aerial Detection. No Ground Detection**: The survey area contained several aerial well-like detections that had very weak or no ground-based detection. This is generally caused by the well casing lying at a depth greater than 20 feet. This is beyond the detection limits of ground magnetic locators

The data is reflected in the Project Magnetic Maps, included as a part of Appendix B.

Summary of Findings. The survey confirmed the presence of many sub-surface legacy gas/oil wells which had poor to no positional records. The confirmed located wells and likely well detections cover a wide spectrum of possible characteristics, which spread from strong detections with casing visible at the surface to very deep detections of wells with casings likely below feasible excavation depth. Regarding depth calculations there is not a well-defined limit to the depth of exploration of wells and well-like structures due to the varied nature of the sources.

This survey identified 85 confirmed or possible well-like targets within or proximal to the Project area which are identified in the Anomaly Reference Sheet as part of the project deliverables. Forty six wells are within the Facility Area, or fence line of the Project. Of those, one above ground surface water well was confirmed and at least one well-like detection is a suspected water-well of a former residence. The findings are summarized below and described in Appendix B.

According to the ODNR's Risk Evaluation Matrix (Appendix C), all 85 identified targets, including the 14 Ground Confirmed Wells, can be classified as Class 4 (Low Risk).

Anomaly Type	Total
1. Ground Confirmed Well. Hand excavated or exposed at the surface.	14
2. Ground Detected Well-like Anomaly. Detection > 10 mG, likely < 20 ft deep	39
3. Weak or Ambiguous Ground Detection. Detection < 10 mG OR multiple detections.	17
4. No Ground Detection. Well-like aerial detection.	15
Total (Note: Of the 85 anomalies, 46 are within Project Facility area)	**85**

3. ENGINEERING CONSTRUCTABILITY ASSESSMENT

Pursuant to Condition 44.b, the Applicant has evaluated the potential impact that historical O&G wells may have on the Project, (such as: brine release affecting vegetation, odors, vapors, oil leakage) that could result from damage to an oil/gas well and why these require special construction consideration. The process and findings are described in this section.

3.1. Determination of O&G Well Risk - Process

3.1.1 Historical O&G well information

As described in Section 2.1, the survey confirmed the presence of many sub-surface legacy gas and oil wells which had poor to no positional records. The confirmed located wells and likely well detections cover a wide spectrum of possible characteristics. This spectrum spreads from strong detections with casing visible at the surface to very deep detections of wells with casings likely below feasible excavation depth. Regarding depth calculations there is not a well-defined limit to the depth of exploration of wells and well-like structures due to the varied nature of the sources. This survey identified 85 confirmed or possible well-like targets within or proximal to the Project Area. 46 wells are within the Facility Area, or fence line of the Project. Of those, one above ground surface water well was confirmed and at least one well-like detection is suspected water-well of a former residence. A description and location data can be found for each target in Appendix B.

3.1.2 ODNR Risk Evaluation Matrix

The ODNR has developed a Risk Evaluation Matrix (Appendix C) that categorizes orphan wells into the following classes:

- Class 1 – Emergency (as declared by ODNR)
- Class 2 – High Risk (Non-Emergency)
- Class 3 – Medium Risk
- Class 4 – Low Risk

The ODNR assigns risk to each discovered orphan well based on the condition of the well (e.g. what and how much is being release from the well) and the potential to come in contact with what is being released.

3.2. Determination of O&G Well Risk – Findings

The ODNR dataset for orphaned wells classified all wells in the Project Area as Class 4 – Low Risk.

Additionally, the “UAV Exploration Birch Solar Magnetic Well Survey – Final Report” (Appendix B), also classified all wells found through the survey as Class 4 – Low Risk.

4. O&G WELL AVOIDANCE AND MITIGATION METHODS

Pursuant to Condition 44.f, the Application has developed construction and engineering techniques to be employed when working around the oil/gas well and has updated the project layout in accordance with the updated data and findings. These methods and results are described in this section.

4.1 Project Layout Update

Pursuant to Condition 44.g, the Applicant has prepared a Revised Project Site Layout Map (Appendix D). The Project Layout has been updated based on the findings of this Report, including updated spatial information about the location and status of oil and gas wells. Based on consultation with ODNR staff, the Applicant included updated design features which include avoidance of and setback from well-like features identified by the survey and placement of internal access roads to facilitate access to well locations.

4.1.1 Avoidance and Setback

The Project has implemented changes to the facility footprint to minimize, avoid and mitigate impact to areas surrounding found anomalies which are presumed to be well locations.

Upon validation of well locations and anomalies, a minimum of 50-foot radius setback was implemented around the data point. It is noted that the Project implemented this setback for all wells under each Category identified by UAVEX (Category 1 – Ground Confirmed, Category 2 – Ground Detected Well-Like Anomaly, Category 3 – Week or Ambiguous Ground Detection and Category 4 – Well-like Aerial Detection. No Ground Detection). The 50-foot radius allows for the wells to remain undisturbed during construction and operations of the Project, regardless of the well's depth.

The Project notes that this is a change from OPSB precedent set in the Wheatsbourough Solar Project which received its permit in Case No. 20-1529-EL-BGN. In that case OPSB staff recommended a 25-foot setback to ensure "the abandoned well will not be disturbed" and "serve to allow access for well service equipment in the event the well would ever require reentry to properly plug and abandon". There is no statutory or regulatory requirement for development around history wells in the State of Ohio, however, after further consultation with ODNR, the Project has moved forward with the larger setback of 50-feet.

It is also noted that two water wells were also identified within the Facility Area. The Project will be treating those in the same nature as oil and gas wells and maintaining the 50-foot setback.

4.1.2 Access

The Project also recognizes that through the State of Ohio's Orphaned Well Program, access to the well locations may be desired by the State of Ohio, at some point during the operational life of the project. The Project can address access to wells through a re-engineering of the Project and the modular nature of the Project. Access was created by reengineering access roads throughout the Project to OPSB's desired width of 14-feet. It is noted that while the Revised Project Site Layout Map (Appendix D) shows access roads to all well locations. The Project is also committed to facilitating access by the removal of panel segments. Solar technology is modular. Although overall production may be harmed in removal of panel segments, the Project is committed to the modular removal of panels to provide additional access to the State of Ohio to facilitate the State's Orphaned Well Program if it were needed due to a heighted risk of a well or required mitigation of a well.

The mitigation and avoidance measures can be seen in the Revised Project Site Layout Map (Appendix D). Within that map well locations, panel setbacks and new 14-foot access roads can be identified.

4.2 Unanticipated Discovery Plan

Pursuant to Condition 44.h, the Applicant has included the Draft Unanticipated Discovery Plan (UDP) as reflected in Appendix E. The proposed approach addresses any unknown possible contaminant including oil and gas wells that may be discovered during construction. The UDP also requires the appropriate federal, state, or municipal level government involvement, depending on the discovery.

In regards an unknown oil and gas well found during construction, the UDP would require the contractor to, amongst other actions 1) stop work 2) secure the site 3) notify the appropriate local, state, or federal agency (in the case of a well the Orphan Well Program), 4) notify the landowner and 5) realign the Project's layout if necessary.

Monitoring of the site was discussed using methane or other detection during construction. However, due to nature of the historic wells (Allen and Auglaize counties had an oil, not gas focus), location of the resource in comparison to the grading and piling for the Project (wells > 1000 feet in depth in comparison to 7 to 11 feet below grade pilings for the proposed Project) and the historic exhaustion of the area's resource, it was deemed as an unnecessary construction procedure. Upon selectin of the Engineering, Procurement and Construction (EPC) contractor for the Project, this topic may be revisited if deemed necessary.

The UDP will also include a Soil Management Plan. The purpose of a SMP is to provide protocols for the proper management of unknown impacts to soil or subsurface features potentially encountered during Project grading and construction activities. The SMP will be developed to facilitate the redevelopment of the Project by outlining those specific procedures that will be used for identifying, testing, handling, and disposing of (if warranted) soil containing regulated constituents that may be encountered during the redevelopment activities. Implementing the procedures in this SMP will help to ensure that soil is managed in a manner that is protective of human health and the potential environmental liability of the Birch Solar Project, and compliant with applicable federal, state, and local regulations.

The UDP is in draft form. The UDP will be finalized before construction, in conjunction with the Construction Contractor (EPC) selected for the Project. At this time the Project has not yet selected an EPC.

4.2.1 Plugging of Wells

Pursuant to Condition 44.i, the Applicant notes that all wells found on site through the ODNR database and the on site magnetic survey were identified as Class 4 – Low Risk. However, the Applicant recognizes that the State of Ohio Orphan Well Program may require additional plugging or mitigation for the wells within the Project Area. The Applicant would work through the State of Ohio's Orphan Well Program to complete any required actions. Through the setbacks and ability to access the wells as described above, the Project is facilitating any action which may be required in the future by the Orphan Well Program.

4.2.2 Cost Estimate for Well Abandonment

Pursuant to Condition 44.j, the applicant anticipates that the cost to plug and abandon a well is $40,000 to $75,000 on average, dependent on the condition and nature of the well.

5. CONCLUSION

The ECR has demonstrated that the Project is compatible with potential subsurface oil and gas well and water well features within the Facility Area by providing 1) the detailed review of existing historical oil and gas well information; 2) a complete oil and gas survey report; 3) assessment of potential environmental and safety concerns associated with potential oil and gas wells; and 4) a UDP that will be used to address the event of encountering a previously unknown oil and gas well during construction and 5) an updated Project layout reflecting the updated oil and gas data including setbacks and access. The ECR was created including feedback and consultation with the ODNR, namely, staff within the Orphan Well Program.

While it is the State's responsibility to locate and address historic wells, the records from that period are often ambiguous. Therefore, the Birch Solar Project has made extensive efforts to survey and identify the location of historic wells within the Project area and has accurately plotted the locations. That alone is a significant benefit to the State of Ohio.

The ECR avoids risk by bringing a rationale development process to an area impaired by historic irrational development. Modern oil and gas regulatory policy requires that the siting of an oil and gas well maintain setbacks from 1) occupied dwellings, other wells, roads and water bodies for health and safety purposes and 2) from drilling unit boundary lines to protect correlative rights. There are no modern oil and gas regulations in regard to development and historic well locations. The ECR plan adopts health and safety policy the regulatory agency applies when permitting and siting a new oil and gas wells. Additionally, the plan employees the setback policies in reverse when a Birch facility is offset by a depleted and essentially dead historic well. The mitigation plan is to avoid historic wells using a setback policy appropriate to the risk associated with historic wells. The plan is consistent with 1) the health and safety concerns when siting modern oil and gas facilities, and 2) the profiles the state uses to rank risk of harm from wells. Driving a pylon seven to eleven feet in the ground from a distance of at least 50 feet away will not alter the conditions of a hole that is >1,000 feet deep.

Development of the Findlay-Lima Trenton Field is a story of extreme over-drilling and primitive completion and production practices that resulted in fatal reservoir damage. Any rational evaluation of the field will conclude that the Trenton Limestone is fully depleted and of no practical productive value. Serious but failed modern attempts to revive production using modern secondary recovery techniques verifies this view. It is reasonably unlikely that any surface construction proximate to existing wellbores will result in the release of meaningful quantities of oil and gas and therefore presents negligible risk.

It is also noted that the additional study of potential oil and gas infrastructure within the Project area initiated by the Birch Solar Project has resulted in an enhanced understanding of the prior historical data. The Birch Solar Project development preserves the land and ensures limited additional development of the site for the next 35 years or more, which can reduce potential impacts that might be associated with other types of development that include more intense excavations, grading of the site and possible disruption of the historic oil and gas features.

Figure 1

Regional Vicinity Map

LightSource BP

December 28, 2021

Birch Solar - Regional Vicinity Map

Lightsource BP, advancing solar

Birch Solar
Allen & Auglaize Counties, Ohio
Date: December 28, 2021

★ Birch Solar - Project Location

NORTH

0 5 10
Miles

Figure 2

Geological Map of Ohio and Indiana

Figure 2 - Geological Map of Ohio and Indiana

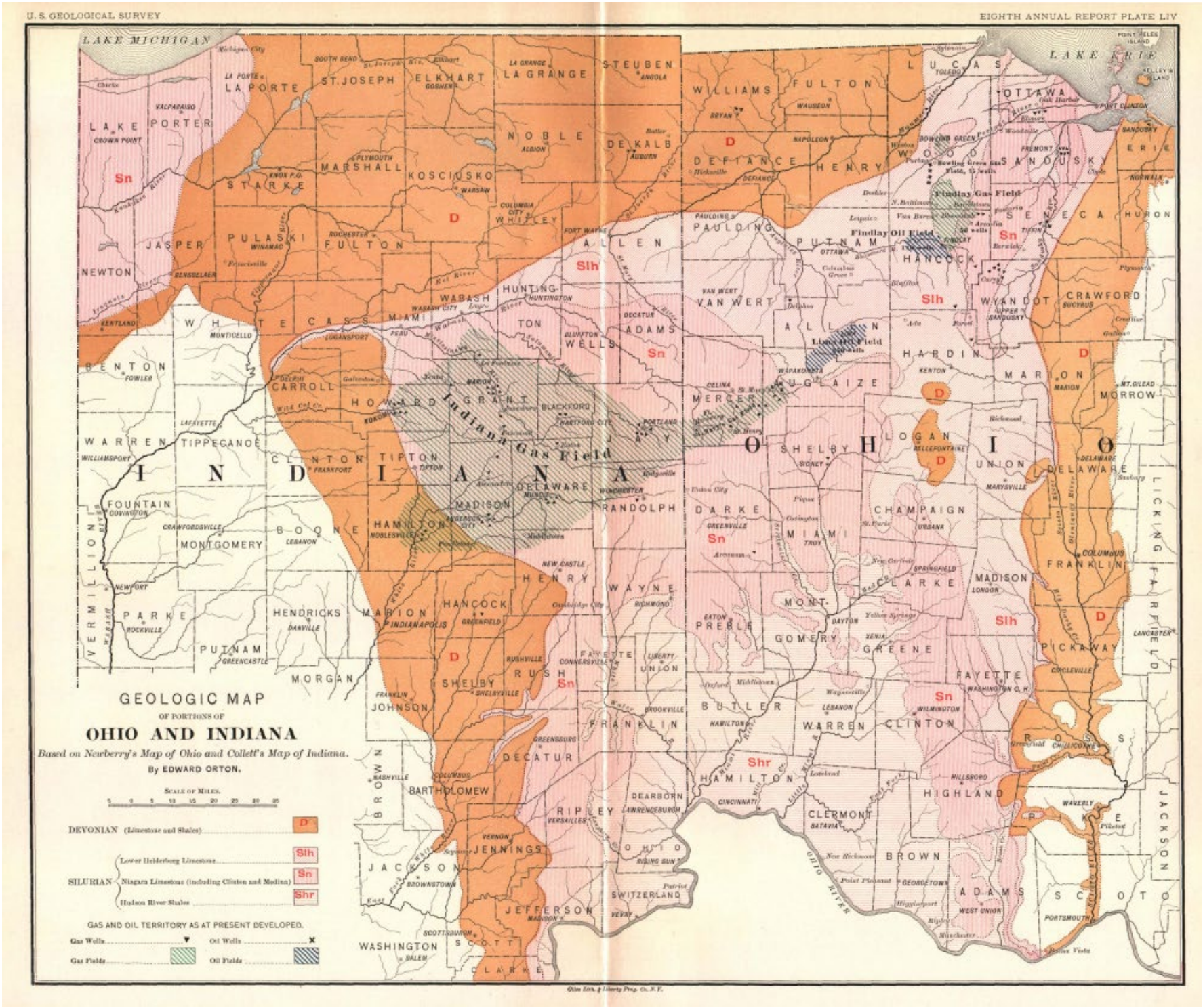


Figure 3

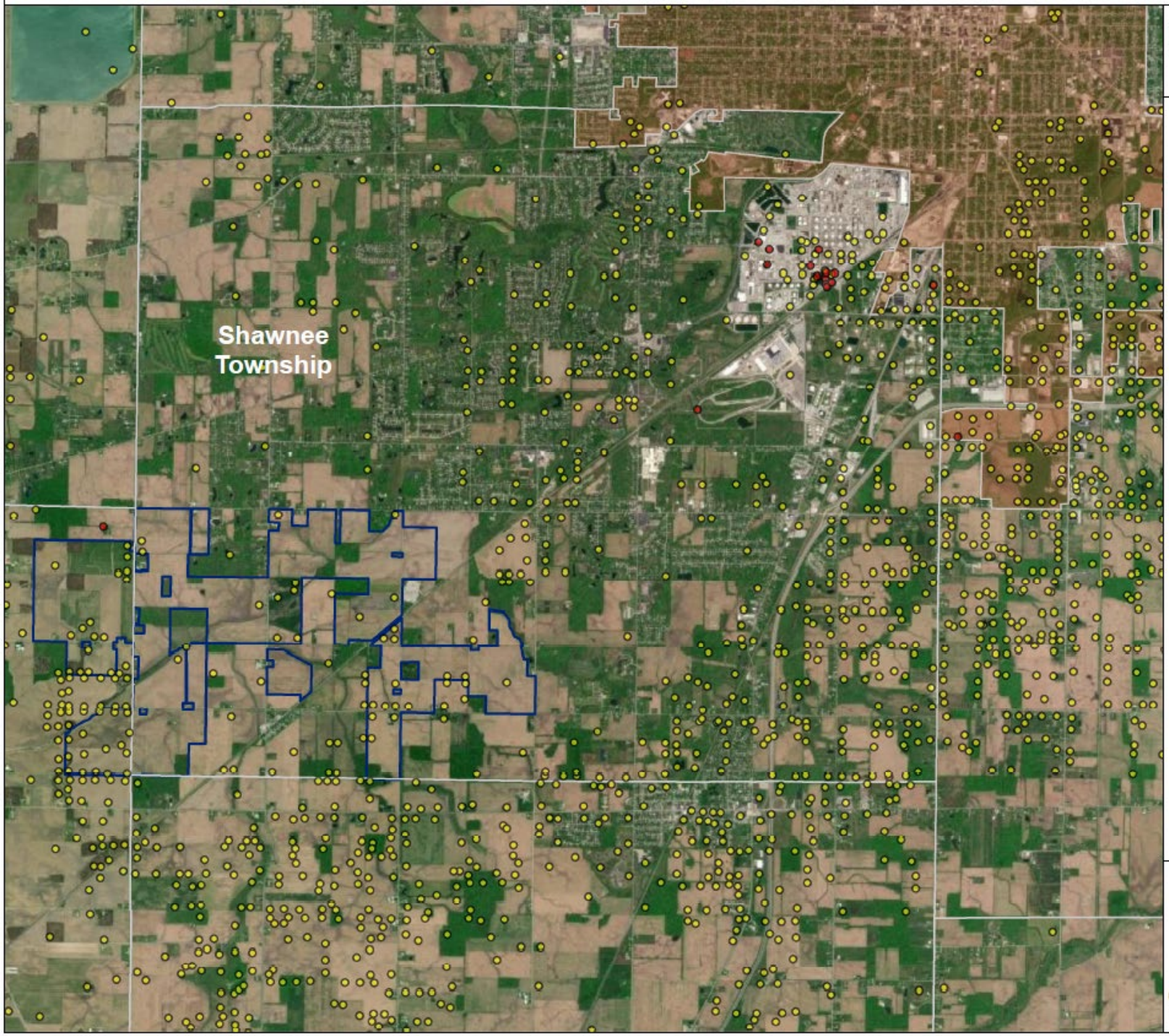
ODNR- Oil/Gas Wells Data

LightSource BP

October 11, 2021

ODNR - Oil/Gas Wells Data

Lightsource BP, advancing solar



Lima, Ohio
Date: October 11, 2021

- ODNR - Active Wells
- ODNR - Inactive Wells
- City of Lima
- Township Boundaries

NORTH

0 4,100 8,200
Feet

Appendix A

Water Supply Well Construction Logs

Water Well Log Number	House No	Street Name	Owner	County	Township	Latitude	Longitude	Elevation	Total Depth (ft)	Casing Length (ft)	Static Water Level (ft)	Test Rate (gpm)	Aquifer Type	Completion Date	Well Use	Bedrock Depth
819986	5545	WAPAK RD	MAYER, KEVIN	ALLEN	SHAWNEE	40.66806	-84.2034	839	39	39	18	15	GRAVEL	09/25/1995	DOMESTIC	
700561	3520	BREESE RD	HEFFNER, TERRY D.	ALLEN	SHAWNEE	40.68641	-84.17116	840	35	35	10	20	GRAVEL	09/27/1989	DOMESTIC	
673396	2972	BREESE RD	HEATH, PHILLIP	ALLEN	SHAWNEE	40.6865	-84.16106	856	278	268	22	15	LIMESTONE	04/07/1988	DOMESTIC	265
997887	5616	HUME RD	HIXENBAUGH, JOHN	ALLEN	SHAWNEE	40.664444	-84.209722	845	102	52	12	20		07/13/2006	DOMESTIC	101
963219	5582	BREESE RD	FRANCIS, SHANE	ALLEN	SHAWNEE	40.68619	-84.20948	851	55	55	27	20	GRAVEL	10/21/2003	DOMESTIC	
35437		UNKNOWN	GERSHMUR, CLAYTON	ALLEN	SHAWNEE	40.670206	-84.165502	851	53	52	25		GRAVEL	05/03/1953	DOMESTIC	
2080149	3375	BOWSHER RD	WARD, RALPH	ALLEN	SHAWNEE	40.67085	-84.166833	770	95	88	20	15	LIMESTONE	06/23/2020	DOMESTIC	
2077845	4520	BREESE RD	CARDER, KYLE	ALLEN	SHAWNEE	40.686833	-84.189	748	75	63	17	12	LIMESTONE	01/20/2020	DOMESTIC	
1016357	5212	NORFOLK ST	WALLACE, ROBERT	ALLEN	SHAWNEE	40.663056	-84.201667	845	35	33	22	20	SHALE	10/15/2012	DOMESTIC	33
66474		GRIMM ADDITION	GARY, G	ALLEN	SHAWNEE	40.686826	-84.174214	845	99				LIMESTONE	08/15/1955	DOMESTIC	79
2024376	4160	BOWSHER RD	SPRING, JOHN / PAULA	ALLEN	SHAWNEE	40.67185	-84.18172	851	182	68	16	48	LIMESTONE	10/08/2009	DOMESTIC	30
914484	4354	BREESE RD	ALLENBACH, BRIAN	ALLEN	SHAWNEE	40.68631	-84.18665	846	63	55	19	15	LIMESTONE	05/25/2000	DOMESTIC	55
23413			THOMPSON, A	ALLEN	SHAWNEE	40.665165	-84.201051	843	22	22	9		GRAVEL	10/07/1947		
967462	5350	BREESE RD	CAPRILLA, FRANK	ALLEN	SHAWNEE	40.68621	-84.20526	863	68	66	35	20	SHALE & LIMESTONE	12/12/2003	DOMESTIC	66
997868		BEELER RD	KARAPINDA, DAVID	ALLEN	SHAWNEE	40.67583	-84.16056	859	105	102	25	20	SAND	02/01/2006	DOMESTIC	104
916227	5261	NORFOLK ST	YOAKAM, DONALD	ALLEN	SHAWNEE	40.662	-84.20198	846	34	32	14	15	SHALE	01/23/2001	DOMESTIC	32
955464	4534	BREESE RD	ALLENBACH, BRIAN	ALLEN	SHAWNEE	40.6863	-84.18989	846	179	62	15	12	LIMESTONE	12/06/2002	DOMESTIC	52
657156	5350	BREESE RD	SHELLHAMMER, RICK	ALLEN	SHAWNEE	40.68621	-84.20526	863	73	73	40	6	GRAVEL	06/22/1987	DOMESTIC	
2057710	5050	BREESE RD	HEMENWAY, JOSH	ALLEN	SHAWNEE	40.686372	-84.199041		129	86	40	25	LIMESTONE	06/30/2016	DOMESTIC	68
319436		SELLERS RD	PRANGE, CHARLES	ALLEN	SHAWNEE	40.680436	-84.18349	844	52	53	17	12	GRAVEL	05/13/1965	DOMESTIC	
2083809	22705	KEMP RD	BOTT, JESSE	AUGLAIZE	LOGAN	40.68153	-84.22304		147	72	42	15	LIMESTONE	12/21/2020	DOMESTIC	
665253	2540	HALL DR	BABER, JOE	ALLEN	SHAWNEE	40.68506	-84.16406	848	152	137	12	12	LIMESTONE	07/30/1987	DOMESTIC	134
839986	5135	NORFOLK ST	YOAKAM, SARA	ALLEN	SHAWNEE	40.66371	-84.19937	848	50	50	8	15	GRAVEL	02/05/1997	DOMESTIC	
665417	4675	BEELER RD	AUTHUR, GARY	ALLEN	SHAWNEE	40.67117	-84.16508	852	64	64	21	9	GRAVEL	05/11/1987	DOMESTIC	
705130	3980	BREESE RD	FLANIGAN, KEN	ALLEN	SHAWNEE	40.68635	-84.17983	844	190	70	14	20	LIMESTONE	10/20/1989	DOMESTIC	67
121413		SR 501	LAMAN, ARTIE	ALLEN	SHAWNEE	40.683651	-84.203346	854	104	104	44		GRAVEL	02/05/1954	DOMESTIC	

Water Well Log Number	House No	Street Name	Owner	County	Township	Latitude	Longitude	Elevation	Total Depth (ft)	Casing Length (ft)	Static Water Level (ft)	Test Rate (gpm)	Aquifer Type	Completion Date	Well Use	Bedrock Depth
622658	4134	WAPAK RD	YUHASY, ROBERT	ALLEN	SHAWNEE	40.68683	-84.20399	865	110	47	20	20	LIMESTONE	08/30/1983	DOMESTIC	44
1018031	5257	NORFOLK ST	LYON, LINDA	ALLEN	SHAWNEE	40.66166	-84.20166		43	42	15	10	SHALE	05/09/2014	DOMESTIC	42
819989	5420	BREESE RD	BLISS, MICHAEL	ALLEN	SHAWNEE	40.68621	-84.20653	859	97	75	55	3	LIMESTONE	10/17/1995	DOMESTIC	72
728566	4380	BREESE RD	BABCOCK, DANA	ALLEN	SHAWNEE	40.68631	-84.18712	845	53	53	25	20	GRAVEL	09/11/1991	DOMESTIC	
306218		SR 501	BOWSHER, W.E.	ALLEN	SHAWNEE	40.674941	-84.203329	839	88	52	15	20	LIMESTONE	05/25/1964	DOMESTIC	52
677653	4415	BREESE RD	BOWSHER, EDWARD	ALLEN	SHAWNEE	40.68604	-84.18775	845	36	36	20	20	GRAVEL	05/25/1988	DOMESTIC	
526377	4580	BOWSHER RD	NEWLAND, OTTIS	ALLEN	SHAWNEE	40.67169	-84.19088	851	40	40	18	15	GRAVEL	08/29/1983	DOMESTIC	
651911	4500	BREESE RD	MONROE, HERB	ALLEN	SHAWNEE	40.68631	-84.18927	845	160	75	28	30	LIMESTONE	08/06/1981	DOMESTIC	72
859476	3676	HUME RD	PUGIN BUILDERS,	ALLEN	SHAWNEE	40.66453	-84.16469	866	45	45	15	15	GRAVEL	01/05/1998	DOMESTIC	
651471	3882	BREESE RD	MAYDAY, CAROL	ALLEN	SHAWNEE	40.68637	-84.17781	843	120	79	13	15	LIMESTONE	11/13/1984	DOMESTIC	71
997876	3072	HOME RD	HUBER, MATTHEW	ALLEN	SHAWNEE	40.66833	-84.16139	863	44	42	30	20	SHALE	04/07/2006	DOMESTIC	43
141807		GRIMM ADDITION	RAY, VICTOR	ALLEN	SHAWNEE	40.687169	-84.169534	843	91	81	22	9	LIMESTONE	12/08/1954	DOMESTIC	81
72867		HUME RD	JONES, R	ALLEN	SHAWNEE	40.674691	-84.160206	864	54	53			GRAVEL	10/21/1953	DOMESTIC	
69627			LEFFLER, BILLEY	ALLEN	SHAWNEE	40.671051	-84.206776	836	52	52	20	20	GRAVEL	02/27/1950		
918062	5274	BEELER RD	LAVY , RICHARD	ALLEN	SHAWNEE	40.66496	-84.16531	865	182	140	29	20	LIMESTONE	08/05/2000	DOMESTIC	126
978595	5195	NORBULK ST	METHODIST CHURCH, HUME UNITED	ALLEN	SHAWNEE	40.6625	-84.20083	847	33	32	15	20	SHALE	05/19/2004	PUBLIC/SEMI-PUB	32
515476	5485	BREESE RD	ZEFFLER, BILL	ALLEN	SHAWNEE	40.68593	-84.20771	854	47	50	17	10	SAND	03/11/1982	DOMESTIC	
515484	4165	ODEMA DR	CROWE, JIM	ALLEN	SHAWNEE	40.68728	-84.18146	845	68	42	28	20	LIMESTONE	05/18/1982	DOMESTIC	40
967452	3955	BEELER RD	DUBOIS, MIKE	ALLEN	SHAWNEE	40.67909	-84.16518	852	96	93	45	15	SHALE	09/26/2003	DOMESTIC	93
2040030	4060	WAPAK RD	KEIBER, KEN	ALLEN	SHAWNEE	40.675167	-84.202333	837	63	43	15	30	GRAVEL & LIMESTONE	10/05/2012	DOMESTIC	47
677651	4737	BEELER RD	VIOLET, BOB	ALLEN	SHAWNEE	40.67062	-84.16508	846	105	105	25	20	GRAVEL	05/18/1988	DOMESTIC	
728572	3860	BREESE RD	CREAMER, KEVIN	ALLEN	SHAWNEE	40.68637	-84.17742	843	80	66	15	10	LIMESTONE	11/01/1991	DOMESTIC	66
997867		BEELER RD	KORAPINDA, DAVID	ALLEN	SHAWNEE	40.67639	-84.16111	859	117	114	30	20	SAND	02/02/2006	DOMESTIC	115
677691	4270	BOWSHER RD	CLAY, JACK	ALLEN	SHAWNEE	40.67173	-84.18365	846	36	36	8	20	GRAVEL	05/30/1989	DOMESTIC	
884314	4620	BEELER RD	MAYER, HELEN	ALLEN	SHAWNEE	40.67195	-84.16545	853	123	98	28	15	LIMESTONE	06/22/1999	DOMESTIC	98
947310	5525	BREESE RD	LUGABILL, LYNN	ALLEN	SHAWNEE	40.68593	-84.20844	845	55	53	45	15	SHALE	05/01/2003	DOMESTIC	53

Water Well Log Number	House No	Street Name	Owner	County	Township	Latitude	Longitude	Elevation	Total Depth (ft)	Casing Length (ft)	Static Water Level (ft)	Test Rate (gpm)	Aquifer Type	Completion Date	Well Use	Bedrock Depth
649697	2593	HALL DR	DOYLE, STEVE	ALLEN	SHAWNEE	40.68337	-84.16488	850	86	86	35	20	GRAVEL	09/16/1985	DOMESTIC	
978609	1	BREESE RD	HOMES INC, MILLER FAMILY	ALLEN	SHAWNEE	40.684666	-84.185	843	70	62	12	6		10/27/2004	DOMESTIC	62
997891	3610	BOWSHER RD	REBER, JIM	ALLEN	SHAWNEE	40.672222	-84.171111	860	42	40	25	20		08/09/2006	DOMESTIC	41
690143	5236	NORFOLK ST	WALLACE, EMMET	ALLEN	SHAWNEE	40.6624	-84.20193	846	95	52	15	12	LIMESTONE	11/10/1988	DOMESTIC	49
677652	4495	BREESE RD	BECKSTEDT, DENNY	ALLEN	SHAWNEE	40.68603	-84.18918	844	40	40	20	20	GRAVEL	05/24/1988	DOMESTIC	
2019610	5580	HUME RD	HIXENBAUGH, TOYETTA	ALLEN	SHAWNEE	40.66456	-84.20901	846	102	59	11.6	25	LIMESTONE	10/27/2008	DOMESTIC	81
745262	4535	BOWSHER RD	TAYLOR, GREG	ALLEN	SHAWNEE	40.67142	-84.19009	850	60	60	8	12	GRAVEL	05/01/1992	DOMESTIC	
100307		SR 501	ZERKEL, LEROY	ALLEN	SHAWNEE	40.675315	-84.203398	841	100	52	26		LIMESTONE	09/28/1952	DOMESTIC	50
978634	4480	BRUCE RD	GILSON, TED	ALLEN	SHAWNEE	40.68667	-84.18833	845	44	41	18	15	SHALE	06/16/2005	DOMESTIC	43
839977	5880	HUME RD	WIEGING, GEORGE	ALLEN	SHAWNEE	40.6643	-84.21473	843	35	35	8	15	GRAVEL	12/18/1996	DOMESTIC	
258475		NORFOLK ST	RHODES, HAROLD	ALLEN	SHAWNEE	40.674136	-84.200806	842	50	50	15	12	SAND & GRAVEL	12/13/1961	DOMESTIC	

Appendix B

Magnetic Well Survey Final Report

UAV Exploration

December 2021

Birch Solar
Magnetic Well Survey
Final Report

December 2021

TABLE OF CONTENTS

INTRODUCTION

This report describes a Legacy Well Survey carried out by UAV Exploration (UAVEX) thru November - December 2021. The project goal was to identify and locate legacy, plugged and abandoned (P&A) and potential unknown steel-cased gas and oil wells in an area under consideration for development of the Birch Solar Project in Allen County, OH.

The survey called for a multi-phase approach to collect, process, interpret, and confirm magnetic data to locate wells in the project area of operations (AOI). These primary phases were Flight Operations, Data Processing and Interpretation, and Ground Truthing.

The principal geophysical sensors used included an Ex-Mag atomic magnetometer system mounted on an Unmanned Aerial Vehicle (UAV) platform, a Gem Systems GSM-19 Overhauser Proton Procession magnetometer base station and multiple Schondstedt handheld magnetic locators.

FLIGHT OPERATIONS

The daily survey procedure consisted of an early morning safety and survey plan meeting. The GSM-19W Overhauser Base Station was set up and initiated at the start of each survey day.

UAV-based magnetic data collection was conducted at a nominal altitude of 28 meters above ground level which was the calculated maximum tree height plus a safety margin in each survey grid. Flight-line spacing was 28 meters.

The position and altitude of the aircraft and magnetometer payload was achieved using a combination of Barometric Pressure Measurement, GPS, Compass, Inertial Measurement Unit (IMU) and RADAR altimeter. AGL altitude was maintained using a combination of RADAR altitude measurement and barometric pressure readings.

The magnetometer was suspended from the UAV in a fixed orientation by a vibration isolated mounting system at a sensor distance of approximately 1.3 meters to reduce UAV noise and magnetic interference. Nominal survey speed was maintained at 7-9 meters per second ground speed. Scan rates for data acquisition was 1000 hertz (Hz) for the magnetometer and 1 Hz for GPS positioning which translates to an effective downline sampling of <1cm.

Navigation of the UAV was maintained by the onboard GPS-Compass system. Pre-programmed flight plans were uploaded to the UAV prior to takeoff, and the aircraft flew the flight lines autonomously, returning to its takeoff location, or a pre-programed landing location once the lines were completed. Landing and takeoff were conducted manually by the UAV pilot and ground crew. Raw survey data was downloaded at the completion of each flight and quality checked. The total combined survey distance for the site was ~300-line km.

DATA PROCESSING AND INTERPRETATION

For each mission, raw data files were initially batch processed into a single comma-delimited file using custom software. The concatenated files from each mission were imported into Oasis Montaj for all remaining processing. The following corrections were applied:

- Instrument Lag
- Magnetic Heading
- Major attitude noise due to wind
- Diurnal variation
- 1D filtering
- Combining sorties into one dataset
- Trend removal filter
- Analytic signal grid filter
- Other 2D smoothing filters

At the completion of each survey grid sub-section data was analyzed and anomalies determined to be possible sub-surface steel-cased wells were identified along with their respective lat/long positions.

GROUND TRUTHING

The field crew traversed on foot to each anomaly location individually for ground identification and magnetic verification. The process was as follows:

(1) The peak aerial detection location was first flagged using the GNSS system.

(2) Using the magnetic locator, a serpentine path was walked within an approximate 15 meter diameter radius, starting at the center.

(3) Once a potential target was detected, a circular survey was conducted around the target to determine if the magnetic field is monopolar (well-like) or dipolar (not well-like).

(4) If determined to be monopolar, the exact position was located where the magnetic gradient was the highest and flagged and its respective location collected with survey grade precision using an RTK GNSS system.

(5) A wider 30+ meter circle was surveyed to rule out any additional weaker anomalous signatures in proximity to the well.

Upon completion of ground truthing all anomalies of interest were classified into 4 categories:

Category 1 - Ground Confirmed Well:

As part of a Quality Control (QC) regimen the field team selected several anomalies which had clear aerial and ground-based detections which displayed the potential to have shallow (<18”) well casings and excavated these wells using hand tools to confirm the presence and condition of the casing. This category encompasses these uncovered wells plus wells that were already visible above the surface.

Category 2 - Ground Detected Well-Like Anomaly:

This category covers all detections that indicate a clear monopolar well-like detection from both the aerial data and ground surveys which indicate the presence of a well-like object likely less than 20’ below the surface.

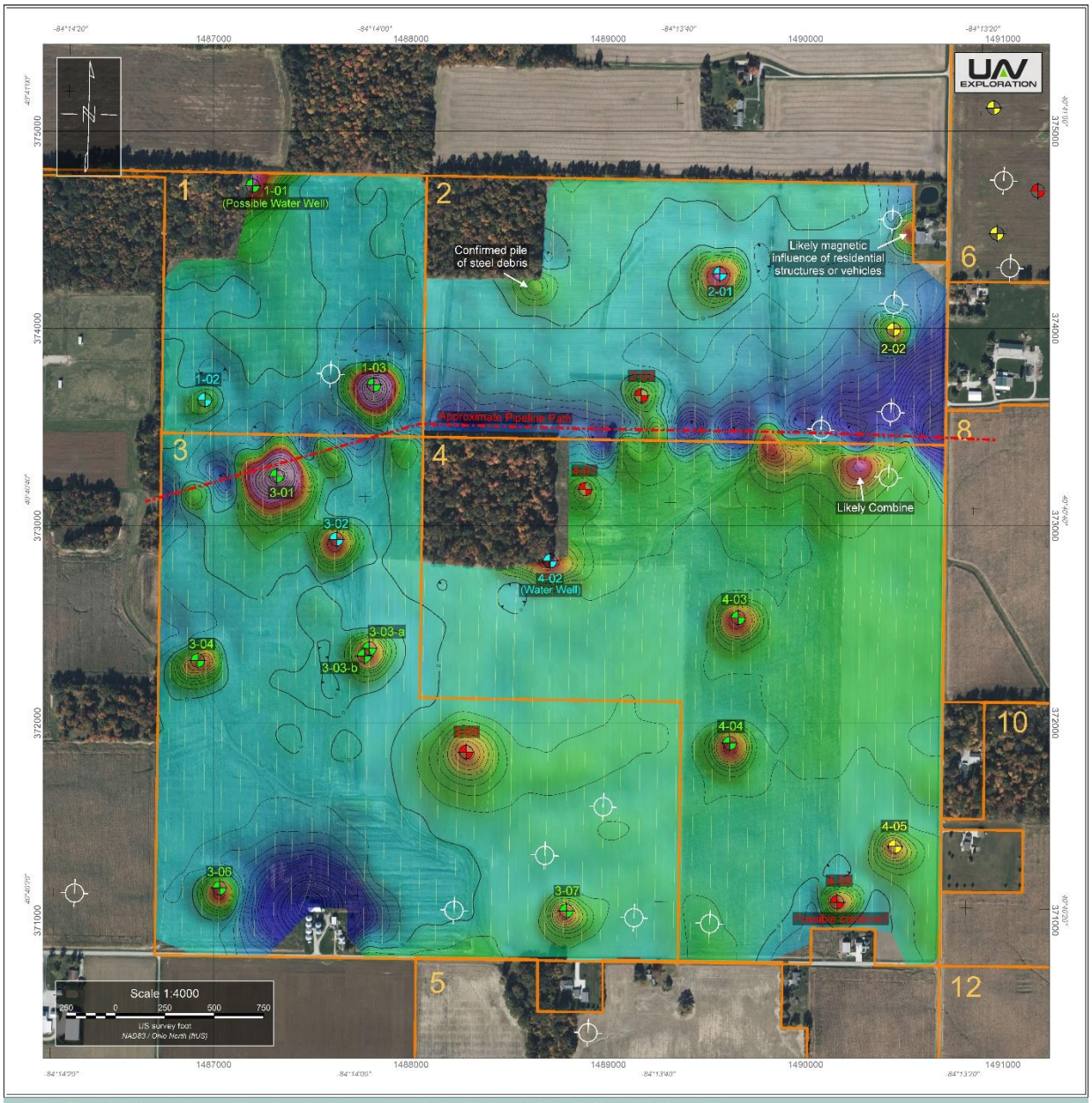
Category 3 - Weak or Ambiguous Ground Detection:

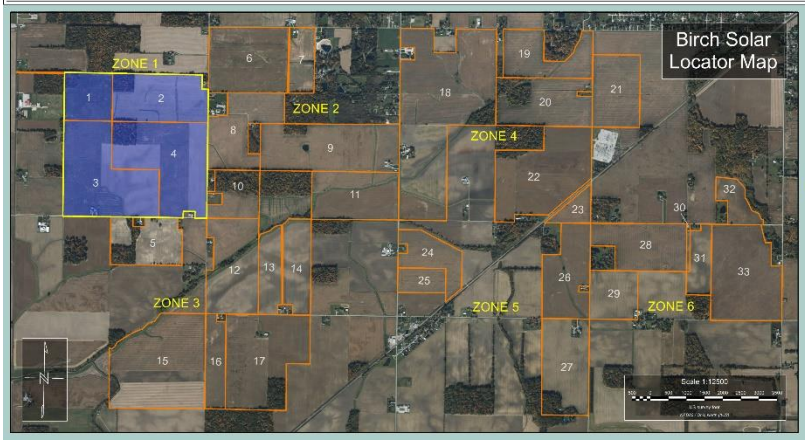
This category covers detections that appear well-like in the aerial data but displayed some ambiguity during the ground survey. The ambiguity in the ground detection primarily refers to the uncertainty in the true position of the well. This can be caused by two primary factors. Either the well casing lies at significant depth near or beyond the detection limits of the ground magnetic locators or other sub-surface ferrous infrastructure or debris causes multiple detections. These factors make it difficult to pin-point the true center position (X,Y) of the anomaly peak. The aerial data strongly suggests the presence of a well in most cases regardless of the ground ambiguity.

Category 4 - Well-like Aerial Detection. No Ground Detection:

The survey area contained several aerial well-like detections that had very weak or no ground-based detection. This is generally caused by the well casing lying at a depth greater than 20’. This is beyond the detection limits of ground magnetic locators.

PROJECT MAGNETIC MAPS Zone 1





Kleinfelder

Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 1, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 28 m

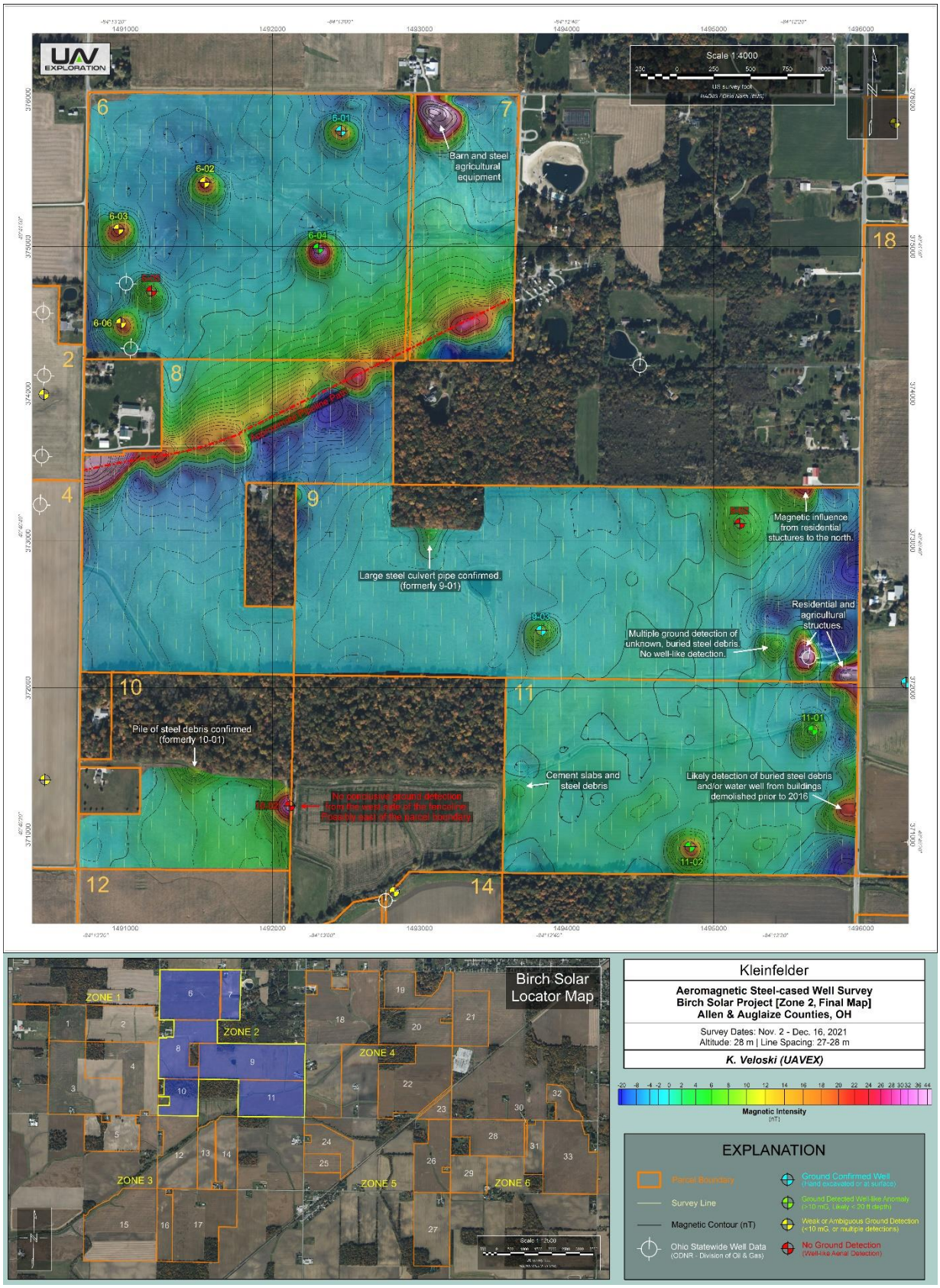
K. Veloski (UAVEX)

Magnetic Intensity (nT)

EXPLANATION

- Parcel Boundary
- Survey Line
- Magnetic Contour (nT)
- Ohio Statewide Well Data (ODNR - Division of Oil & Gas)
- Ground Confirmed Well (Hand excavated or at surface)
- Ground Detected Well like Anomaly (>10 mG Likely < 20 ft depth)
- Weak or Ambiguous Ground Detection (<10 mG, or multiple detections)
- No Ground Detection (Well-like Aerial Detection)

Zone 2



Kleinfelder

Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 2, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 27-28 m

K. Veloski (UAVEX)

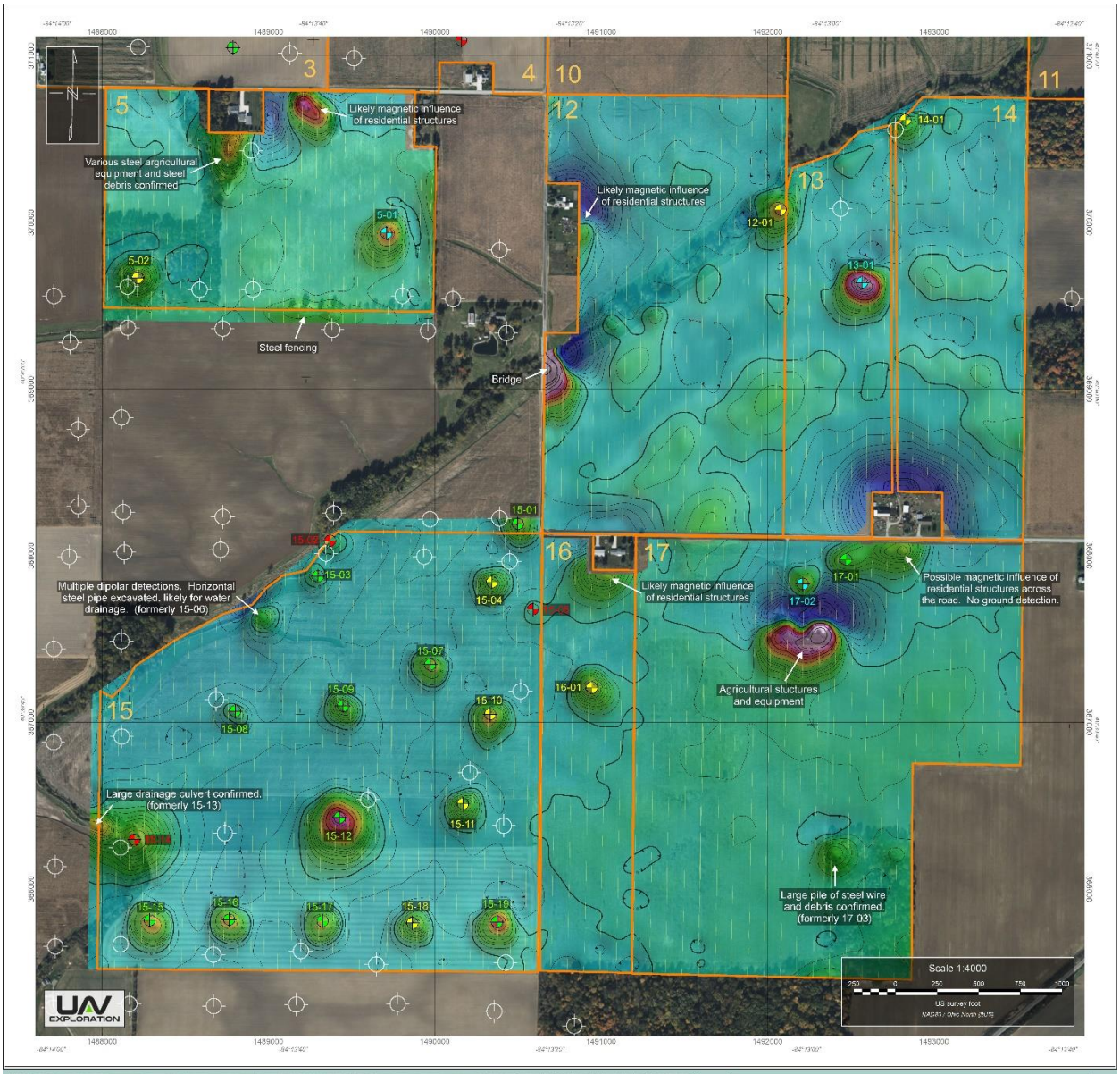
-20 -8 -4 -2 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 36 44

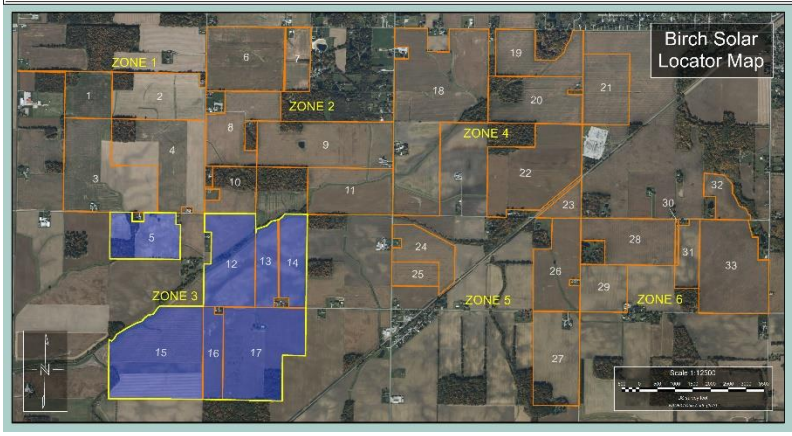
Magnetic Intensity
(nT)

EXPLANATION

- Parcel Boundary
- Survey Line
- Magnetic Contour (nT)
- Ohio Statewide Well Data (ODNR - Division of Oil & Gas)
- Ground Confirmed Well (Found excavated or at surface)
- Ground Detected Well-like Anomaly (>10 mG, Likely < 20 ft depth)
- Weak or Ambiguous Ground Detection (<10 mG, or multiple detections)
- No Ground Detection (Well-like Aerial Detection)

Zone 3





Kleinfelder

Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 3, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 25-28 m

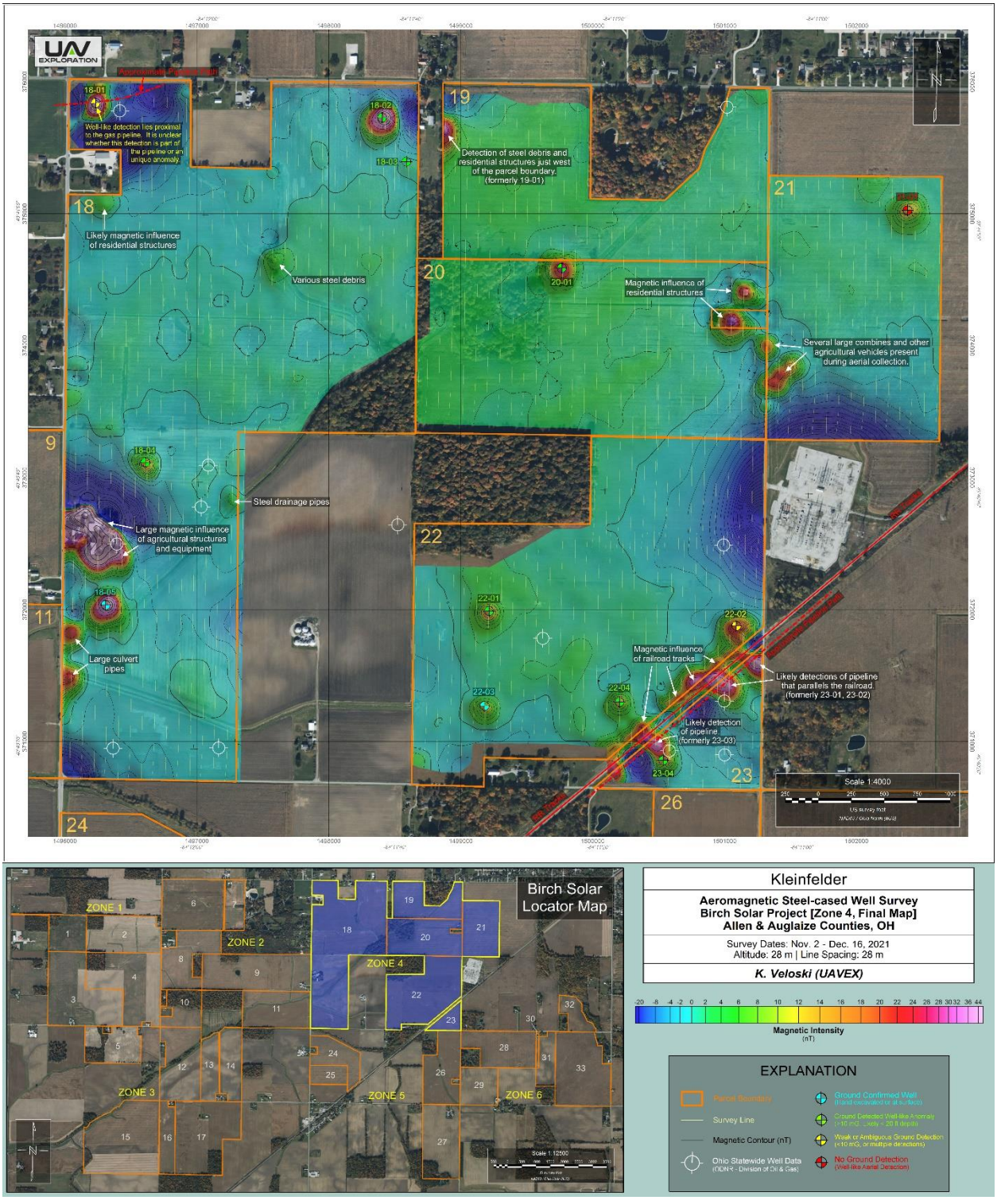
K. Veloski (UAVEX)

Magnetic Intensity (nT)

EXPLANATION

- Parcel Boundary
- Survey Line
- Magnetic Contour (nT)
- Ohio Statewide Well Data (ODNR - Division of Oil & Gas)
- Ground Confirmed Well (Hand excavation of at surface)
- Ground Detected Well-like Anomaly (>10 mG, Likely < 20 ft depth)
- Weak or Ambiguous Ground Detection (<10 mG, or multiple detections)
- No Ground Detection (Well-like Aerial Detection)

Zone 4



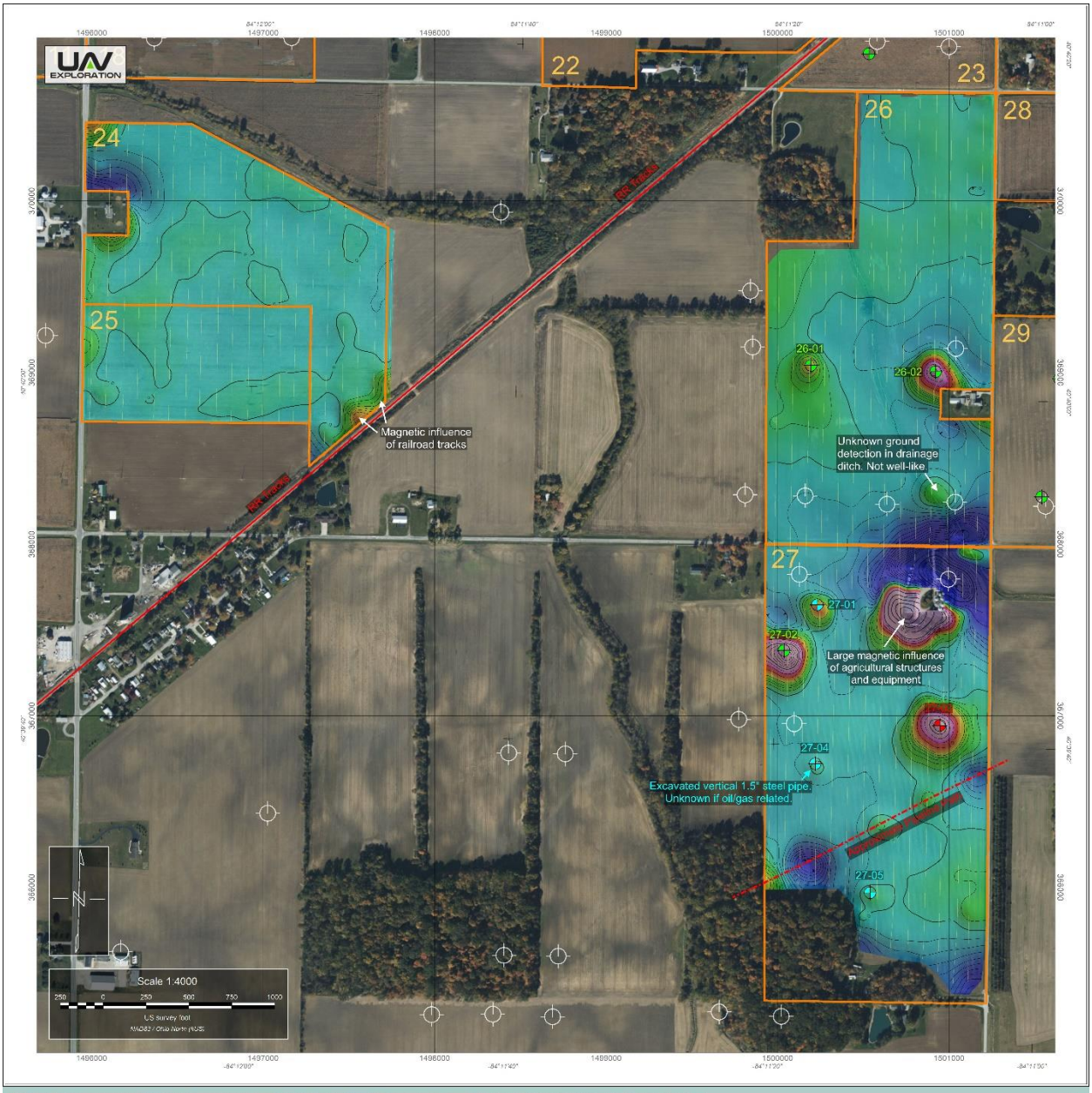
Kleinfelder

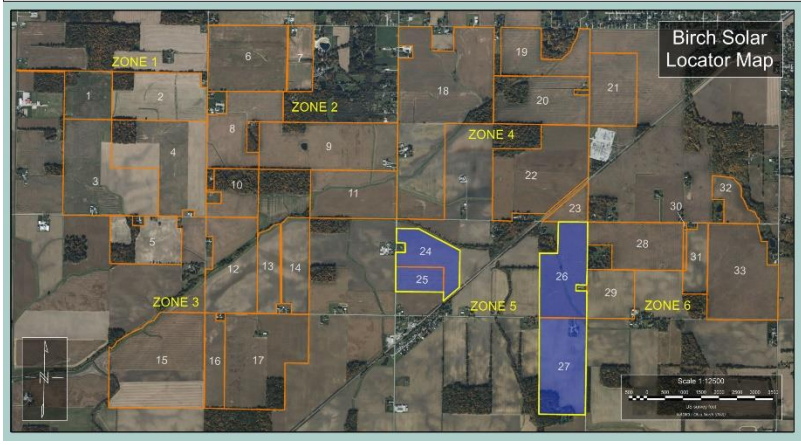
Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 4, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 28 m

K. Veloski (UAVEX)

Zone 5



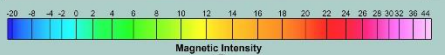


Kleinfelder

Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 5, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 28 m

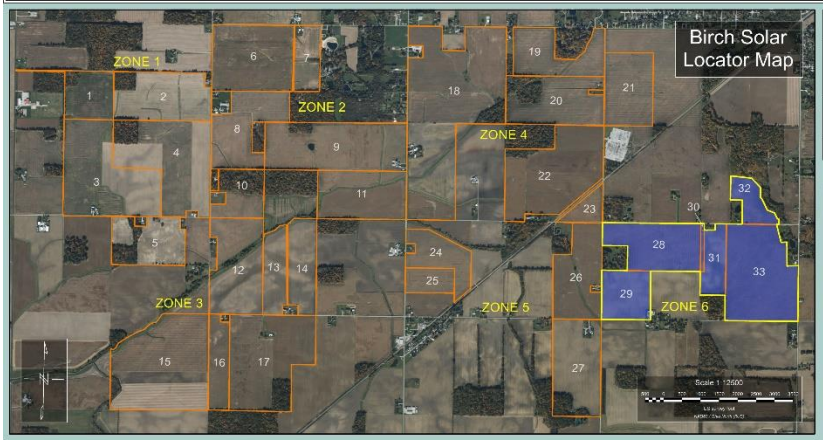
K. Veloski (UAVEX)



EXPLANATION

- Parcel Boundary
- Survey Line
- Magnetic Contour (nT)
- Ohio Statewide Well Data (ODNR - Division of Oil & Gas)
- Ground Confirmed Well (Hand excavated or at surface)
- Ground Detected Well-like Anomaly (>10 mG, Likely < 20 ft depth)
- Weak or Ambiguous Ground Detection (<10 mG, or multiple detections)
- No Ground Detection (Well-like Aerial Detection)

Zone 6



Kleinfelder

Aeromagnetic Steel-cased Well Survey
Birch Solar Project [Zone 6, Final Map]
Allen & Auglaize Counties, OH

Survey Dates: Nov. 2 - Dec. 16, 2021
Altitude: 28 m | Line Spacing: 28 m

K. Veloski (UAVEX)

Magnetic Intensity (nT)

EXPLANATION

- Parcel Boundary
- Survey Line
- Magnetic Contour (nT)
- Ohio Statewide Well Data (ODNR - Division of Oil & Gas)
- Ground Confirmed Well (Partial exposure at or at surface)
- Ground Detected Well-like Anomaly (>10 mG, Likely < 20 ft depth)
- Weak or Ambiguous Ground Detection (<10 mG, or multiple detections)
- No Ground Detection (Well - see Aerial Detection)

PROJECT DELIVERABLES

The project deliverables can be found at the following link:

https://www.dropbox.com/sh/5sqzgctnf5r5op2/AAAtG50oi2MQQaJTcOuxd4qfa?dl=0

This folder contains the following:

- **Maps of project area**
  - .JPG (Visual version of the maps, best used for project overview)
- **Photos of Ground Confirmed Wells**
  - .JPG format
- **Georeferenced Magnetic Grid in electronic format** (Electronic version of the magnetic data that can be imported into GIS/CAD software)
  - .KMZ format
  - .TIF format with corresponding .TFW files
- **Anomaly Location Files**
  - .XLS (Anomaly reference sheet with locations and notes)
  - .CSV (Importable spreadsheet listing all aerial and ground anomalies)
  - .SHP (Anomalies represented as points on a map in .SHP extension)
  - .KMZ (Anomalies represented as points on a map in .KMZ extension)

SUMMARY

UAVEX is very pleased with the quality of data collected throughout this survey and the results of the ground truthing effort. The survey confirmed the presence of many sub-surface legacy gas/oil wells which had poor to no positional records.

Quality unmanned aeromagnetic survey data and results are highly dependent on the quality of flight operations. The flight crews at UAVEX go to great lengths to ensure only the best data is produced by operating custom tailored UAV platforms, conducting flight operations only when weather conditions are ideal and flying at the lowest feasible altitudes. Ideal results are further ensured by in-field data processing and methodical ground truthing procedures.

For this project the confirmed located wells and likely well detections cover a wide spectrum of possible characteristics. This spectrum spreads from strong detections with casing visible at the surface to very deep detections of wells with casings likely below feasible excavation depth.

Regarding depth calculations there is not a well-defined limit to the depth of exploration of wells and well-like structures due to the varied nature of the sources. However, based on experience, assuming sufficient production or surface casing remains then most steel-cased wells are detectable at survey altitudes up to 50+ meters above the source. Factors that affect the strength and width of well-like anomalies include the length and diameter of casing, the magnetic susceptibility of the steel, permanent magnetization of the steel, and the influence of other proximal magnetic sources.

This survey identified 85 confirmed or possible well-like targets within or proximal to the project area which are identified in the Anomaly Reference Sheet as part of the project deliverables. A description and location data can be found for each target.

Regarding the 14 surface and excavated wells, according to the ODNR well classification levels, none appeared to be Class I (Emergency) or Class II (Distressed-High Priority).

END OF REPORT

Please contact us with questions:

UAV Exploration Inc.

Renfrew, PA

724-432-2999

www.uavex.com

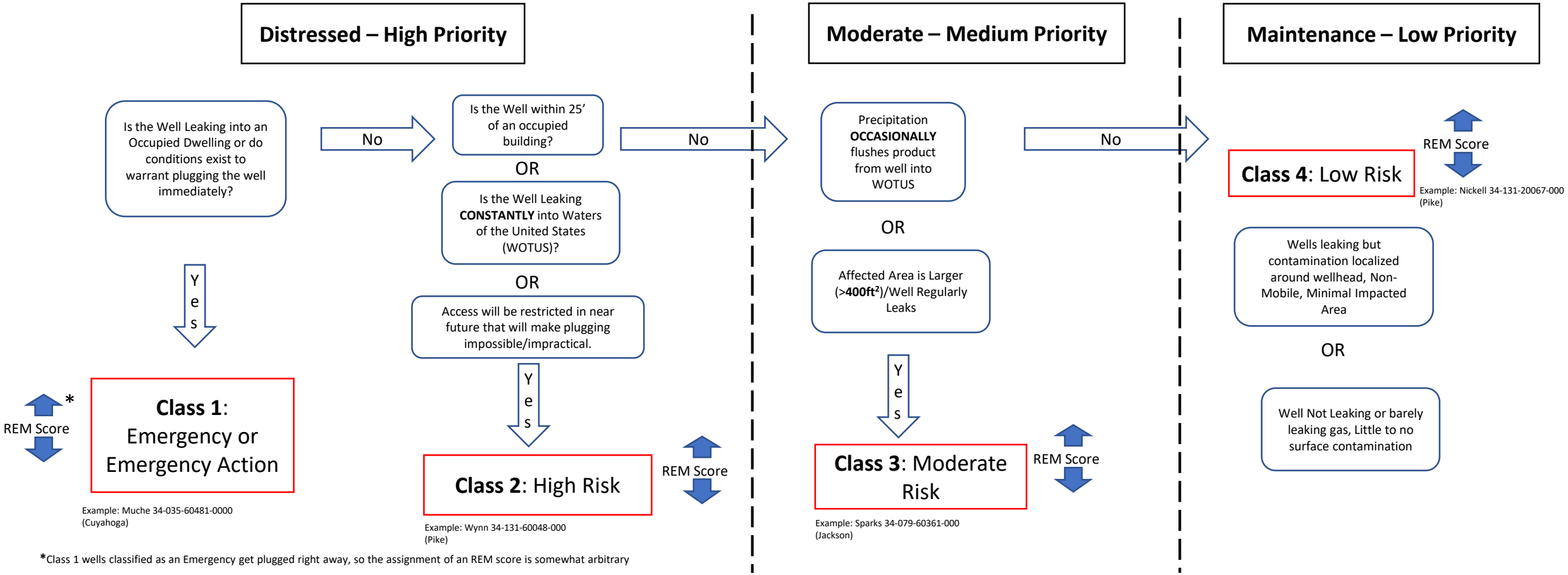
DISCLAIMER

The geophysical service provider individually, the client and/or the client's contractor collectively, will not be liable for any damages that occur from excavations based on the results of this survey. Although sound technical procedures and prudent application of oversight are exercised by the geophysical service provider, to the extent possible, due caution should be used when performing any subsurface excavation based on results of this survey. The users of this data agree to release liabilities, perceived or otherwise, toward the geophysical service provider and its client, caused by actions or recommendations or lack thereof related to the discovery, deliberate or accidental of any hazardous objects within the surveyed area.

Appendix C

Process for Assigning Risk to Orphan Wells in Ohio

Process for Assigning Risk to Orphan Wells in Ohio



*Class 1 wells classified as an Emergency get plugged right away, so the assignment of an REM score is somewhat arbitrary

Step #1 – Categorize wells and place them into appropriate Risk Class
Step #2 – Once in a class, the wells are prioritized **WITHIN** that class by a Risk Evaluation Matrix (REM) score

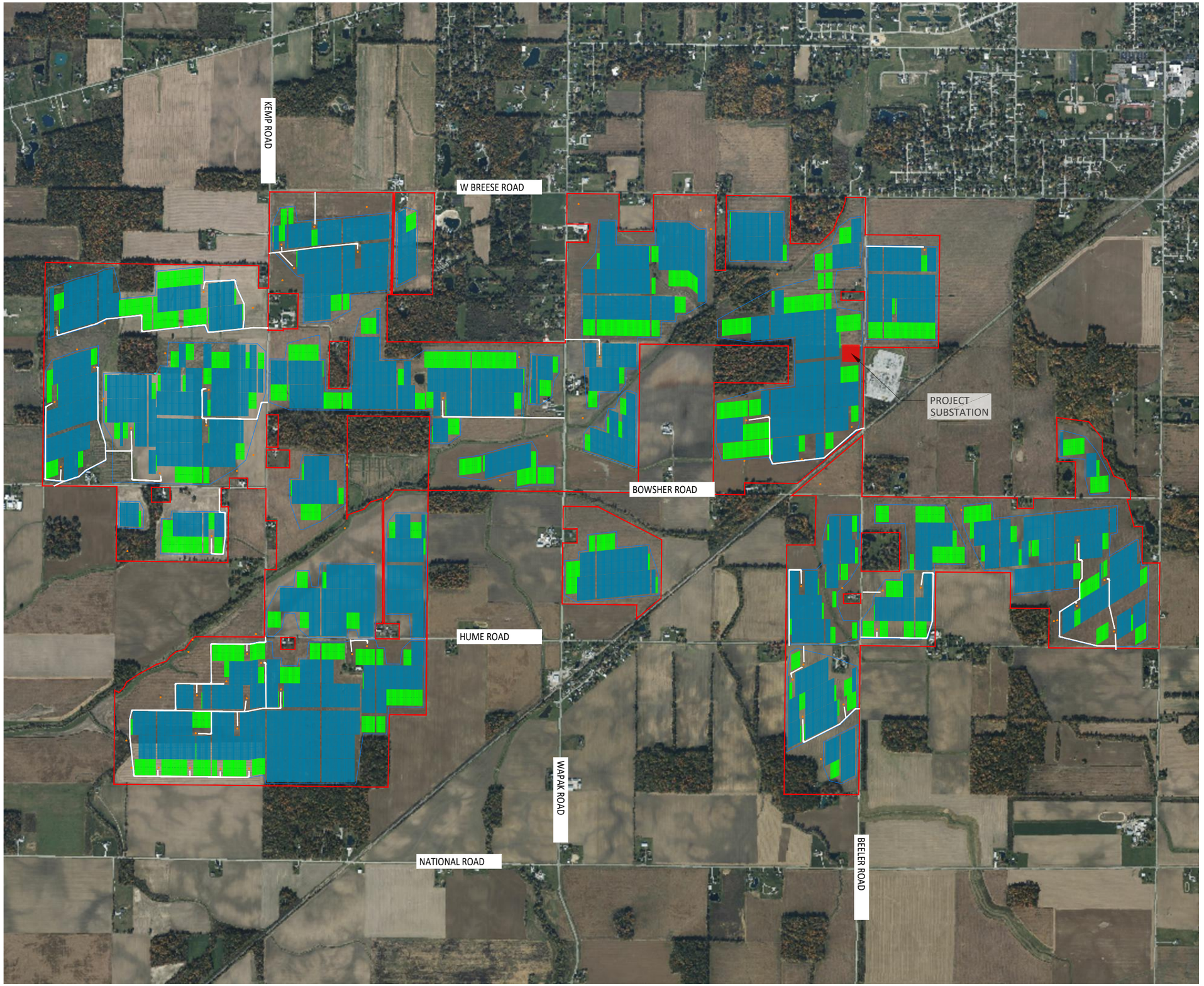
Notes:

- Sorting into risk classes first and **THEN** prioritizing within class allows for a more "apples to apples" comparison. (i.e. wells leaking into a creek are only compared to other wells leaking in a creek).
- Workload – Wells will be plugged by class first within an inspectors area. If there are no Class 1 (Emergency) wells, then focus on Class 2 (High Risk) wells. If there are no Class 2 wells, then focus on Class 3 (Moderate Risk) wells and so on.
- Grouping/Packaging - The inspector's workload could include some from each category. If we move into an area to plug a Class 2 (High Risk) well, then it makes sense to include any orphan wells on the same property or from the surrounding area in the package even if their class is lower.
- Senate Bill 225 comes into effect 9/28/2018. With it, wells will now be included into three groups: Distressed – High Priority (Class 1 and 2); Moderate – Medium Priority (Class 3); and Maintenance – Low Priority (Class 4).

Appendix D

Revised Project Site Layout Map

US_Birch Solar-Allen County-OH_LP1-CE-IMP_14



- Site Access
- Site Boundary
- Security Fence
- Single Axis Tracker (full row)
- Single Axis Tracker (partial row)
- Inverter
- Access Road
- Access Gates
- Overhead Line
- Area for Substation
- Found Anomalies - Assumed OG Well
- Found Anomalies - Assumed Water Well
- Access Roads (at least 14 ft in width) for Well Access

PV SYSTEM SPECIFICATIONS

- 375.00 MWp
- 300.00 MW AC

--			30.12.21
DRAWN	CHECKED	APPROVED	DATE

PROJECT NAME & ADDRESS:
Location:
Allen County, OH

NOTES:

Paper Size:	Scale:	Sheet:
ARCH B	1/1600" = 1'-0"	1

CAPACITY:
375.00 MWp

DRAWING TITLE:
US_Birch Solar-Allen County-OH_LP1-CE-IMP_14

DRAWING NUMBER:	STATUS:
BIRCH_01	Preliminary

lightsource bp
Lightsource Renewable Energy North America
400 Montgomery Street, 8th Floor, San Francisco, CA 94104
General: +1 (714) 333-0032
Web: www.lightsourcebp.com/us
info@lightsourcebp.com

ARCH full bleed B (18.00 x 12.00 Inches)

Appendix E

Draft Unanticipated Contamination Discovery Plan

EPC Company

UNANTICIPATED CONTAMINATION DISCOVERY PLAN
(DRAFT – TO BE COMPLETED WITH EPC AS PRE-CONSTRUCTION ITEM)

Birch Solar Project

DATE - TBD

EPC Company

OVERVIEW

The following plan is a draft Unanticipated Contamination Discovery Plan (Plan) that covers the processes that would be followed by the Project entity in the event undocumented or unanticipated contaminated material were encountered during construction. The final Plan will address the specific mitigation measures committed to by the Project entity in the event contamination were discovered during construction. **The contact information, details, site design specifics and other project specific information would be updated prior to construction when contractors and Project entity staff have been identified. Final Plan will be submitted as a Pre-construction item to the Ohio Power Siting Board (OPSB).**

TABLE OF CONTENTS

1.0 INTRODUCTION

This Draft Unanticipated Contamination Discovery Plan (Plan) is intended to provide guidance to ensure worker and public safety as well as prevent the spread of further contamination in the event that waste and/or contaminated soils (as defined in applicable federal, state, and local regulations and guidelines) are encountered during construction of the Project. Whereas preconstruction planning has avoided known hazardous and non-hazardous material sites, other undocumented sources of contamination could be encountered during construction.

1.1 PURPOSE AND SCOPE

1.2 OBJECTIVES

The objective of this Plan is to prescribe measures for safely addressing unanticipated, potentially hazardous[1] wastes found during construction of the Project. If such materials are encountered during construction, the actions contained in this Plan provide measures that the Project entity and its contractors would undertake.

1.2.1 Project Responsibilities

The Project entity would be responsible for identifying and delineating known documented hazardous waste and/or contaminated sites ahead of construction and taking appropriate action to avoid these sites or mitigate them. In the event of an unanticipated discovery, the Project entity would be responsible for:

- Notifying the appropriate agencies/authorities.
- Providing guidance to the Construction Contractor (Contractor).
- Ensuring that the site is secure.
- Engaging specialized waste contractor(s) to characterize discovered wastes and to implement subsequent response actions as negotiated with the landowner and the Ohio Environmental Protection Agency (OEPA) and/or the U.S. Environmental ProtectionAgency (EPA).
- Adjust Project design if necessary.

1.2.2 Contractor Responsibilities

The Contractor shall be responsible for implementation of the initial response procedures contained in Section 2.1 of this Plan.

1.3 SCOPE

This Plan shall be effective during all construction phases of the Project and at all Project construction locations.

2.0 DISCOVERY

Identifying and recognizing existing hazardous materials or contaminants is the first step to initiate the proper response action. During excavation, indicators of possible contamination include, but are not limited to:

- Rusted barrels and containers.
- Stained or discolored earth, as contrasted to adjoining soil.
- Fill material containing debris unearthed during trenching or grading.
- Household trash covered by earth or other material that appears to be interspersed withindustrial debris.
- Gasoline smells or other hydrocarbon odors that emanate when the earth is disturbed.
- Oily residue intermixed with earth.
- Sheen on groundwater.
- Hydrocarbon sheen on surface water.
- Cinders and other combustion products like ash.

Structures such as abandoned oil and gas lines, asbestos pipe, old transformers, andunderground storage tanks also require special handling if disturbed.

2.1 INITIAL RESPONSE PROCEDURES

Immediately following discovery of potential hazardous waste or contaminants, the Contractorwould:

- Cease work in the vicinity of suspected contamination.
- Cordon off or otherwise restrict access to the suspected area to protect workers and thepublic.
- Notify the Project entity's Lead Environmental Inspector and Resident ConstructionSupervisor.
- Notify the landowner of the affected parcel, if applicable.
- Notify the appropriate state or federal agency, if applicable.
- Await further instructions.

2.2 SITE CHARACTERIZATION AND HAZARD ASSESSMENT

The following procedures would be used to determine the extent, nature, and disposition of suspected contamination encountered by construction. These actions would be undertaken by a waste consultant (retained by the Project entity) using trained Occupational Safety and Health Administration (OSHA), Hazardous Waste Operations and Emergency Response (HAZWOPER) technicians that implement specialized personal protective equipment (PPE), sampling, and decontamination protocols approved by the Project entity.

The actions following discovery and site security would include:

- Notifying the proper authorities, as required.
- Identifying the extent of unanticipated site contamination, as required.
- Determining the worker safety and public exposure concerns.
- Characterizing the contaminant(s).
- Developing and implementing hazardous materials/waste management measures.
- Documenting the event from discovery and through the final disposition documentation.

2.2.1 State Agency Notifications

All agency notifications would be made by the appropriate Project entity to the appropriate State Agency. In the case of potentially found underground oil and gas like features, Ohio Department of Natural Resource (ODNR) would also be consulted through their Orphaned Well Program. Phone numbers forregional OEPA offices are shown in the following Table.

Area Response Team Office	Phone	Fax
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Outside normal business hours	(xxx) xxx-xxxx	

2.2.1.1 State Lands

If contamination is found on state lands, notify the [State Land Management Agency]:

Regional Office	Phone	Fax

State Pipeline Coordinator[1]	(xxx) xxx-xxxx	(xxx) xxx-xxxx
STATE AGENCY 24-Hour Spill Report	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Notes: [1] Contact State Pipeline Coordinator for contamination discovered on State Park Lands. Review associated state land use permit notification requirements for additional contacts.		

2.2.1.2 Borough/County Lands

If contamination is found on borough/county (select one or both) or city lands, notify the appropriate office listed below:

Borough/County/City	Phone	Fax
Borough/County/City	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Borough/County/City – Land Management	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Borough/County/City – Planning Director	(xxx) xxx-xxxx	(xxx) xxx-xxxx
City of XXX	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Borough/County/City – Land Management	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Borough/County/City – Planning	(xxx) xxx-xxxx	(xxx) xxx-xxxx

2.2.1.3 Native Corporation Lands

If contamination is found on native or tribal lands, notify the appropriate office listed below:

Native or Tribal Lands	Phone	Fax
Native or Tribal 1	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Native or Tribal 2	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Native or Tribal 3	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Native or Tribal 4	(xxx) xxx-xxxx	(xxx) xxx-xxxx

2.2.2 Federal Agency Notifications

All federal agency notifications would be made by the appropriate Project entity. Phone numbers for the EPA and Bureau of Land Management (BLM) offices are shown in the following tables.

2.2.2.1 U.S. Environmental Protection Agency – Region XX

EPA Region 10	Phone	Fax
National Response Center	(xxx) xxx-xxxx	(xxx) xxx-xxxx
STATE Operations Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx
Region XX Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx

Indian Lands Coordinator – XXX Regional Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx

2.2.2.2 Bureau of Land Management

If contamination is found on BLM-administered lands notify the appropriate office listed below.

BLM Land Manager	Phone	Fax
XX Field Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx
XX Field Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx
XX Field Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx
XX Field Office	(xxx) xxx-xxxx	(xxx) xxx-xxxx

2.2.3 Hazard Assessment

The Project entity would engage a specialized waste consultant to identify and characterize the contamination through sampling and analytical testing. The objectives of the consultant's investigation, in consultation with the landowner, would include:

- Devising a plan for additional site-specific investigations, as necessary.
- Determining the characteristics of the soil, groundwater, and vapor (e.g., groundwaterrecovery rates; vertical and horizontal extent of contamination; chemicals of concern; etc.).
- Determining the handling and/or disposal requirements for any contaminated mediaunearthed as part of the construction process or if the site should be avoided with a reroute.
- Recommending a preventive action plan to ensure the problem is not aggravated and tominimize liability.
- Determining the requirements necessary for the construction contractor to resume work in thearea.

A waste consultant may also be employed to develop special construction specifications to complete portions of the Project within or around contaminated areas. The data obtained from the investigation would also enable the consultant to develop in consultation with the landowner special site closure specifications related to groundwater treatment or filtration systems; ventilation systems; ongoing site monitoring; contaminated material disposal or reuse options;and permitting.

2.2.4 Mitigation Measures

The final disposition of contaminated soils and/or water (groundwater, surface water) would be determined through discussions with the jurisdictional agencies and affected landowners. Depending on the extent and characteristics of contamination identified, the Project entity would first seek a realignment to avoid encountering further contamination. If such a move is infeasible, plans for excavation or reducing the contamination and disposing at an approved waste disposal site would be developed with the landowner and ODNR/OEPA, or with input from EPA if the site were characterized as hazardous.

3.0 RECORDKEEPING AND REPORTING

Documentation of the unanticipated contamination discovery would start with the details associated with initial discovery and end with the final disposition of the waste materials following the appropriate agency approvals. Records would also be kept in accordance with the Project Waste Management Plan.

3.1 PROJECT ENTITY RESPONSIBILITIES

The Project entity would document steps involved from initial discovery through final disposition, and written approval by agencies, including:

- Detailed description of initial discovery.
- Initial response actions.
- Establishment of site security.
- Agency contacts.
- Waste management consultant engagement.
- Site investigation by waste management consultant.
- Sampling, chain of custody, and laboratory results.
- Agreed-upon activities to resume Project construction or to avoid the site.
- Site assessment and/or removal of contaminated materials in the construction area by thewaste management contractor (e.g., burial or exhumation and offsite disposal).
- Secure copies of any transport manifests and delivery receipts.
- Site closure verification and concurrence (by regulatory agencies).

The level of associated documentation from initial discovery through final resolution would depend on the extent of discovered contamination, the potential toxicity of contaminants, and degree of further disturbance of the contaminated site by construction activities.

At a minimum, the Project entity would record the following information when unanticipatedcontamination is discovered:

- The time and place of discovery.
- Actions taken to secure the site from further disturbance or human exposure.
- The extent of disturbance of the site by construction.

- The description of discovered substances (visual and odors).
- Additional actions taken in response to the discovery.
- Notifications made in response to the discovery.
- Sampling performed and analytical testing results.
- Site closure plans.
- Actions taken to secure contamination in place or at the treatment, storage, or disposalfacility.
- Actions taken to redirect or complete construction.

3.2 CONTRACTOR RESPONSIBILITIES

The Contractor would cooperate with the Project entity by providing all pertinent and detailed information regarding the initial discovery.

If directed by the Project entity, the Contractor may be required to develop a Decontamination Plan that includes guidance on the procedures for decontaminating materials and equipment that directly come in contact with the contaminated materials.

4.0 ACRONYMS AND TERMS

Term	Definition
BLM	Bureau of Land Management
Contractor	Construction Contractor
EPA	United States Environmental Protection Agency
HAZWOPER	Hazardous Waste Operations and Emergency Response
OSHA	Occupational Safety and Health Administration
Plan	Unanticipated Contamination Discovery Plan
PPE	Personal protective equipment
Project	Birch Solar 1, LLC
RCRA	Resource Conservation and Recovery Act

Attachment 2

Phase 1 Archaeological Survey Report

Weller & Associates, Inc.

December 28, 2021

Phase I Archaeological Investigations for the 570.8 ha (1,410.5 ac) Birch Solar Project in Shawnee Township, Allen County and Logan Township, Auglaize County, Ohio

Ryan J. Weller

December 28, 2021

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Phase I Archaeological Investigations for the 570.8 ha (1,410.5 ac) Birch Solar Project in Shawnee Township, Allen County and Logan Township, Auglaize County, Ohio

By

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Lead Agency:

Ohio Power Siting Board (OPSB)

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December 28, 2021

W-2835

Abstract

In December of 2021, Weller & Associates, Inc. completed Phase I Archaeological Investigations for the 570.8 ha (1,410.5 ac) Birch Solar Project in Shawnee Township, Allen County and Logan Township, Auglaize County, Ohio. This work was conducted under contract with Stantec Consulting Group, Inc. for submission to the Ohio Power Siting Board (OPSB). The survey is to identify any sites or properties and to evaluate them in for the National Register of Historic Places (NRHP) in a manner that is reflective of Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). The report format and design are similar to that established in Archaeology Guidelines (Ohio Historic Preservation Office [OHPO] 1994). The work includes a literature review and background documentation and archaeological field investigations. These investigations resulted in the identification of 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261.

The project plans are for the installation and use of the surveyed area for the purposes of a solar panel farm and its amenities. These archaeological investigations accounted for a series of parcels in the vicinity of Cridersville and in both Auglaize and Allen Counties, Ohio. Most of the project is within Allen County. The surveyed areas are not all contiguous but spread out through what is largely rural agricultural land.

The literature review that was conducted for this project did not identify many previously recorded resources within or near the project. The eastern part of the surveyed area and within Allen County is located within a former Native American (Shawnee) reservation, the Hog Creek Reservation. There are relative resources recorded and indicated to the east of the project area that are related to the former reservation occupation; however, nothing in this regard is indicated in the project area. The project area does not appear to have been the subject of any previous surveys. There are no recorded significant cultural resources in the project or its study area.

These investigations resulted in the identification of 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261. There were no sites that could be related to the Hog Creek Reservation era identified during these investigations. These sites are not considered to be significant resources, they are not landmarks and they are not eligible for the National Register of Historic Places. The fieldwork did not identify anything relative to the former Reservation that has a partial overlap with the project area. No further archaeological work is deemed necessary for this project.

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Introduction

In December of 2021, Weller & Associates, Inc. completed Phase I Archaeological Investigations for the 570.8 ha (1,410.5 ac) Birch Solar Project in Shawnee Township, Allen County and Logan Township, Auglaize County, Ohio. This work was conducted under contract with Stantec Consulting Group, Inc. for submission to the Ohio Power Siting Board (OPSB). The survey is to identify any sites or properties and to evaluate them in for the National Register of Historic Places (NRHP) in a manner that is reflective of Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). The report format and design are similar to that established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994). The work includes a literature review and background documentation and archaeological field investigations.

Ryan J. Weller served as the Principal Investigator/Senior Project Manager. Chad Porter and Alex Thomas completed the literature review prior to the initiation of the fieldwork and updated it on December 16, 2021. The field crew included Lincoln Caldwell, Nikki DeWitt, Daniel Dubois, Abraham Ledezma, Daniel Picka, Daniel Ross, Jesse Heinrich, DaKanya Roach, Daniel Quintela, and Mikayla Hed. The history/architecture component of this work was conducted by Amy Kramb (Kramb Consulting) and is contained in a separate, stand-alone document.

Project Description

This project is for the installation and/or use of the parcels for a solar panel farm, Birch Solar Farm. It is located in the upland till plain settings that are to the southwest of Lima and northwest of Cridersville. The project area includes a series of mostly disconnected farmland parcels in this rural landscape. These collectively account for 570.8 ha (1,410.5 ac).

Environmental Setting

Climate

Allen and Auglaize Counties, like all of Ohio, hve a continental climate with hot and humid summers and cold winters. Most of precipitation falls in June, and the smallest amount falls in February. The average annual temperature in Allen County is 11°C. Precipitation is favorably distributed for the production of crops (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1965[2021a and 2021b]).

Physiography, Relief, and Drainage

The project area is located in the Central Ohio Clayey Till Plain physiographic region. This is characterized by “Surface of clayey till; well-defined moraines with intervening flat-lying ground moraine and intermorainal lake basins; no boulder belts; about a dozen silt-, clay- and till-filled lake basins range in area from a few to 200 square

miles; few large streams; limited sand & gravel outwash; elevation 700'-1150', moderate relief" (Brockman 1998). This area is comparably more undulating to gently rolling than that of the Lake Plains to the north. The eastern part of the project area drains to the Little Ottawa River and its tributaries. The western part of the area is drained by Twomile Creek and its tributaries, this flows to the Auglaize River. These are all within the Maumee-Auglaize River watershed.

Geology

Brockman (1998) describes this area as a flattened and nearly level setting caused by ice-age lakes and glaciers. The underlying bedrock is from the Silurian era, including dolomite, anhydrite, gypsum, salt, and shale (Brockman 1998).

Soils

The project area is located in the southern part of Allen County and northern part of Auglaize County. The soils that are indicated in this area are mostly comprised of upland till plain conditions and more specifically, ground moraine conditions. Generally, the area is very gently rolling to flat and is not well drained. There are no floodplains that would have deep alluvial deposits in the area and steeply sloping conditions are limited. These soils are expected to be akin to plowzone deposits (USDA, SCS 1965 [2021a 2021b]) (Table 1). There are 27 soil series types indicated in Allen County and 18 indicated in Auglaize County.

Table 1. Soils in the Project.

Allen County Soils			
Soil Series	**Slope %**	**% in Project**	**Landform**
Alvada loam	0-1	.1	Upland till plain, flats
Blount silt loam, end moraine	0-2	1.4	Upland till plain, slight rises
Blount silt loam, end moraine	2-4	8.0	Upland till plain, slight rises
Blount silt loam, ground moraine	0-2	1.9	Upland till plain, slight rises
Blount silt loam, ground moraine	2-4	11.3	Upland till plain, slight rises
Blount-Jenera complex	0-3	.2	Upland till plain, slight rises
Cygnet loam	0-3	.2	Upland till plain, slight rises
Gallman loam	2-6	3.1	Upland till plain, slight rises
Gallman loam	6-12	.1	Upland till plain, sloping areas
Glynwood loam	2-6	.2	Upland till plain, slight rises
Glynwood silt loam	2-6	3.1	Upland till plain, slight rises
Glynwood clay loam, end moraine	2-6	1.3	Upland till plain, slight rises
Glynwood silt loam, ground moraine	2-6	.6	Upland till plain, slight rises
Glynwood clay loam, ground moraine	2-6	.7	Upland till plain, slight rises
Houktown loam	2-6	1.8	Upland till plain, slight rises
Houktown silt loam	0-2	.1	Upland till plain, slight rises
Houktown silt loam	2-4	.1	Upland till plain, slight rises
Houktown-Glynwood complex	6-12	.1	Upland till plain, sloping areas
Medway silt loam	0-2	.1	Upland flat areas near streams
Pewamo silty clay loam	0-1	16.9	Upland flat to depressed areas
Rensselaer loam	0-1	1.9	Flats near drainages
Saranac silty clay loam	0-2	1.0	Upland till plains, slight rises
Shawtown loam	2-6	.6	Upland till plain, slight rises
Thackery sandy loam	1-3	3.2	Beach deposit treads

Thackery loam	0-2	4.2	Beach deposit sl. elevations
Westland clay loam	0-1	9.0	Flats near drainages
Westland-Rensselaer complex	0-1	2.1	Flats near drainages
Auglaize County Soils			
Blount silt loam, end moraine	0-2	.1	Upland till plain, slight rises
Blount silt loam, end moraine	2.4	11.1	Upland till plain, slight rises
Blount silt loam, ground moraine	0-2	.1	Upland till plain, slight rises
Blount silt loam, ground moraine	2.4	2.7	Upland till plain, slight rises
Digby loam	0-2	.1	Upland till plain, slight rises
Digby loam	2-6	.5	Upland till plain, slight rises
Gallman loam	2-6	.3	Upland till plain, slight rises
Glynwood clay loam	6-12	.3	Upland till plain, sloped areas
Glynwood silt loam, end moraine	2-6	2.4	Upland till plain, slight rises
Glynwood silt loam, ground moraine	2-6	.4	Upland till plain, slight rises
Haskins loam	0-3	.3	Beach deposits
Haskins loam	2-6	.6	Beach deposits
Millgrove clay loam	0	2.0	Flat areas near drainages
Pewamo silty clay loam	0-1	4.9	Upland flat to depressed areas
Sloan silty clay loam	0-1	.1	Floodplain flats
Thackery sandy loam	1.3	.1	Upland till plain, slight rises
Thackery loam	0-2	.3	Upland till plain, slight rises
Westland clay loam	0-1	.1	Flat areas near drainages

Flora

There was and continues to be great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, including the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999). The following is to provide comparison of the different floral regions of Ohio relative to this project.

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments such as those in Wyandot and Marion County areas would contain islands of forests but were mostly expansive open terrain dominated by grasses.

The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, dissected areas along drainages and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains (Black Swamp region) except for the occasional

patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests. Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio from about Cincinnati to Bellefontaine east to the Scioto River historically contained a very diverse floral landscape. This is an area where moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forest types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands are in glacial areas but are still patchy. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999).

Southern Allen County and northern Auglaize County, including the project area, are generally within what is considered to be a beech forest area (Gordon 1966).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e. wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone offered significant species as well. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fishes and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, whereas, the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or open-air scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Fitting 1963). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much

like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the creation of greater social and material culture complexity. The environment at this time is warmer and drier. Most elevated landforms in northeastern Ohio have yielded Archaic artifacts (Prufer and Long 1986: 7), and the same can be stated for the remainder of Ohio.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). Along the Ohio River, intensive occupations have been placed within the Riverton phase. Pottery makes its first appearance during the Terminal Late Archaic.

The Early Woodland period (ca 3000-2100 B.P.) in Ohio is often associated with the Adena culture and the early mound builders (Dragoo 1976). Early and comparably simple geometric earthworks first appear with mounds more spread across the landscape. Pottery at this time is thick and tempered with grit, grog, or limestone; however, it becomes noticeably thinner towards the end of the period. There is increased emphasis on gathered plant resources, including maygrass, chenopodium, sunflower, and squash. Habitation sites have been documented that include structural evidence. Houses that were constructed during this period were circular, having a diameter of up to 18.3 m (Webb and Baby 1963) and often with paired posts (Cramer 1989). Artifacts dating from this period include leaf-shaped blades with parallel to lobate hafting elements, drilled slate pieces, ground stone, thick pottery, and increased use of copper. Early Woodland artifacts can be recovered from every region of Ohio.

In northwest and north-central Ohio, there are not very many mounds or village sites that indicate an Early Woodland occupation. Artifacts from these areas often are reflective of seasonal hunting excursions. Adena-like bifaces and tools are commonly found in river and stream valleys that drain into Lake Erie as well as in the uplands. It is assumed that Early Woodland inhabitants used these areas for little more than a transient hunting-collecting subsistence. One of the best-known Early Woodland sites is the

Leimbach site. This site is located where the Huron River empties into Lake Erie (Shane 1975). Early Woodland ceramics and lugged vessels have been recovered from this site. Evidence of Early Woodland activity, such as ceramics, has been encountered infrequently at locations across north-central and northwestern Ohio.

The Middle Woodland period (ca 2200-1600 B.P.) is often considered to be equivalent with the Hopewell culture. The largest earthworks in Ohio date from this period. There is dramatic increase in the appearance of exotic materials that appear most often in association with earthworks and burials. Artifacts representative of this period include thinner, grit-tempered pottery, dart-sized projectile points (Lowe Flared, Steuben, Snyders, and Chesser) [Justice 1987], exotic materials (mica, obsidian, and marine shell, etc.). The points are often thin, bifacially beveled, and have flat cross sections. There seems to have been a marked increase in the population as well as increased levels of social organization. Middle Woodland sites seem to reflect a seasonal exploitation of the environment. There is a notable increase in the amount of Eastern Agricultural Complex plant cultigens, including chenopodium, knotweed, sumpweed, and little barley. This seasonal exploitation may have followed a scheduled resource extraction year in which the populations moved camp several times per year, stopping at known resource extraction loci. Middle Woodland land use appears to center on the regions surrounding earthworks (Dancey 1992; Pacheco 1996); however, there is evidence of repeated occupation away from earthworks (Weller 2005). Household structures at this time vary with many of them being squares with rounded corners (Weller 2005). Exotic goods are often attributed to funerary activities associated with mounds and earthworks. Utilitarian items are more frequently encountered outside of funerary/ritual contexts. The artifact most diagnostic of this period is the bladelet, a prismatic and thin razor-like tool, and bladelet cores. Middle Woodland remains are more commonly recovered from central Ohio south and lacking from most areas in the northern and southeastern part of the state.

Little information is known about the Middle Woodland period of western and northwestern Ohio. This may be due to a poor representation of artifacts from this period or because the area is not directly associated with the Hopewell culture. The loosely associated patterns of earthworks to habitation sites that have been identified in central and southern Ohio areas are not present in this region. Sites associated with this period have been identified along the south and western shores of Lake Erie, but they are not common (Stothers et al. 1979; Stothers 1986).

The Late Woodland period (ca A.D. 400-900) is distinct from the previous period in several ways. There appears to be a population increase and a more noticeable aggregation of groups into formative villages. The villages are often positioned along large streams, on terraces, and were likely seasonally occupied (Cowan 1987). This increased sedentism was due in part to a greater reliance on horticultural garden plots, much more so than in the preceding Middle Woodland period. The early Late Woodland groups were growing a wide variety of crop plants that are collectively referred to as the Eastern Agricultural Complex. These crops included maygrass, sunflower, and domesticated forms of goosefoot and sumpweed. This starch and protein diet was supplemented with wild plants and animals. Circa A.D. 800 to 1000, populations adopted

maize agriculture, and around this same time, shell-tempered ceramics appear. Other technological innovations and changes during this time period included the bow and arrow and changes in ceramic vessel forms.

Evidence suggests that the Late Woodland occupations in northern Ohio developed from the Western Basin Middle Woodland tradition. The Late Woodland period in northern Ohio is best defined by ceramic traditions. Western Basin Late Woodland sites have been identified in most of the river valleys in northwestern Ohio such as the Maumee, Auglaize, and the Sandusky Rivers. Radiocarbon dating establishes this Late Woodland occupation at the first century B.C. to A.D. 500 (Pratt and Bush 1981: 88). The Western Basin tradition consists of three primary phases, which include the Riviere au Vase, the Younge (Fitting 1965), and the Springwells phase. Influence from the Cole complex may extend into the area from the south, but this remains theoretical and not well researched.

The Late Prehistoric period in northwest and northern Ohio is often associated with an intensification of the use of plant resources, the presence of large villages, and a steady population increase. Permanent villages were associated with a heavy dependence on farming. These villages were often located on the meander belt zones of river valleys (Stothers et al. 1984: 6). Subsistence of these farming communities relied upon maize, beans, and squash as the major cultigens. Villages were often strategically located on bluff tops. There is a change in social structure to a chiefdom-based society. The Late Prehistoric period in northwest Ohio has been segregated into the Sandusky tradition and smaller phases based largely on age and ceramic assemblage traits.

The Sandusky tradition has been broken up into four phases. These phases are identified (in chronological order) as Eiden, Wolf, Fort Meigs, and Indian Hills. These are often associated with a style of ceramic referred to as Mixter Tool Impressed, Mixter Dentate, Mixter Cordmarked, and Parker Festooned. The Eiden and Wolf phases show a dependence upon fishing, and villages are usually associated with large cemeteries (Schneider 2000; Shane 1967).

The Fort Meigs and Indian Hills phases occur late in the Late Prehistoric period. The Fort Meigs phase may be related to the Wolf phase in that the pottery is similar. Fort Meigs phase occupations are identified by specific rim and neck motifs that are applied to their pottery. The Indian Hills phase is associated with shell-tempered pottery. Some villages show evidence of defensive features such as stockade lines, ditches, or earthen walls (Pratt and Bush 1981: 155). There is little evidence to support inter-village relationships, such as trade; this lack may have been due to competition for localized resources.

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the

early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and. the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as 'Lower Shawnee 2' existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River, yet Americans were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between

tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region. The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio. These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Allen County History

The history of white occupation in Allen County begins with the War of 1812. In that year, a detachment of General Harrison's troops under the leadership of Col. Thomas Poague built a military base in what would one day become Allen County along the west bank of the Auglaize River. Poague named this fort for his wife, Fort Amanda. Here his men kept a garrison and built boats for river transport from the vast woodland. There was also a hospital and cemetery opened there for the military personnel. After the close of the war in 1815, the fort was abandoned, fell into disrepair, and was destroyed by vandals and probably its timber used by others as expedient material. One-hundred years later, in 1915, the state set a marble memorial at the site of the fort to commemorate its importance in the war effort (Howe 1888; Knapp 1872; Leeson 1885; Miller 1906; Rusler 1921; Winter 1917).

After the war, in 1817, Andrew Russell became the first permanent settler in Allen County. Soon after, perhaps in the same year, Peter Diltz and William Van Ansdall joined him. Logically, their settlements were very near the previously established, yet abandoned fort. At that time, the nearest neighbors were the Indians in Shawneetown. This was after the peace treaty, but before the Federal purchase of the final Indian Territories and the subsequent removal of the Indians to Kansas. Therefore, it will be noted that portions of modern Allen County were part of the Indian Lands. The Indians left the county in 1831. In the same year, Allen County was separated out as its own county (Howe 1888; Knapp 1872; Leeson 1885; Slocum 1905; Winter 1917).

The county had already been organized in 1820 but had been attached to Mercer County because of the complexities surrounding the Indian Lands and legal settlement.

In 1824, Christopher Wood came to the county and served in many local government roles including a commissioner in charge of locating a county seat. He also organized the first Sunday School and worked as the county's first tanner. He and the other commissioners settled on the site of Lima for the county seat in 1831, facilitating the separation of Allen as its own county. W. L. Henderson laid it out. The US land office moved there in 1834 from Wapakoneta. It became an organized town in 1842 and a city near the turn of the century. At the formation of Auglaize County in 1848, the final boundaries of Allen County were set (Harrison 1880; Howe 1888; Knapp 1872; Leeson 1885; Miller 1906; Slocum 1905; Winter 1917).

German Catholics, Mennonites, and Welsh were among the early settlers of the area. The early structures reflect this as do the systems they put in place and the general attitudes within the region. John Cunningham operated the first school from 1834 to 1838. Robert Finley led the Methodists into the first organized church in 1829; but religious sentiment had come with the first settlers and all the major denominations were soon to follow with church organizations and buildings of their own (Howe 1888; Knapp 1872; Leeson 1885; Winter 1917).

The Crawford Mill and Samuel Burch's Sugar Creek Gristmill were both open to serve the county in 1830. This was the first real industry of the county, agriculture having been the foremost occupation of the settlers. With the opening of the Miami & Erie Canal in 1843 and 1845, growth came to the county in the form of new towns, new industry, and new opportunities. Delphos and Spencerville were both built in 1845 and owe their existence to the canal. Both became small manufacturing and shipping towns. They were overtrumped when the railroad came in the 1850s and bolstered the importance of Lima. Unquestionably, the oil business has been the largest industry in this county. The Lima oil field from the 1880s to the early 1900s was the largest discovered oil field in the world. Drilling and refining became big businesses for Allen County and though the field has mostly dried up, refining still plays a part of the local economy. Since those days, agriculture has re-emerged as the staple occupation of the Allen County resident outside the cities of Lima and Delphos, and the villages of Beaverdam, Bluffton, Cairo, Elida, Fort Shawnee, Harrod, Lafayette, and Spencerville (Howe 1888; Knapp 1872; Leeson 1885; Miller 1906; Rusler 1921; Winter 1917).

Shawnee Township History

The origins of Shawnee Township began with its formal organization in 1834. Located in the south-central portion of Allen County, the neighboring townships include American to the north, Bath and Perry to the east, Auglaize County to the south, and Amanda to the west. The topography in Shawnee Township is primarily level with little to no rolling or hilly areas. The native Shawnee, for whom the township was named, had only recently completely left the area the when the township formed. The Shawnee and several other tribes were moved to northwest Ohio as part of the 1795 Treaty of Greenville, that came about after Wayne's Indian Campaign of 1794 and the betrayal of the British towards the army of Blue Jacket (Ohio History Central 2017). Shawnee Township was formerly the Hog Creek Reservation, which was "granted to the Shawnees

by treaty" in 1817 (Leeson 1885). Prior to 1832, the Shawnee, organized under the prominent Chief Pht (Pe-Ditch-Ta) and Onowaskemo, owned a large portion of the township, as well as cabins, large farms and orchards within Shawnee Township (Howe 1854; Holdgreve 1999). The Shawnees were made to give up their lands to the United States in 1831 as part of the Treaty of Wapakoneta and were moved to a Kansas Reservation as part of the Trail of Tears (Holdgreve 1999). After their removal to Kansas, some Shawnee later returned to their home to visit graves or hunt until about 1843.

Before the arrival of European influence, Shawnee Township was populated with dense forests. Thousands of acres were removed in order to clear land for agriculture and construction purposes. The timber was used for building homes, barns, schools, shops and other various crafting. The early settlers traveled to Piqua and Cherokee on forest paths for their grinding. Griffith Breese and his family became the first European settlers in the township in 1832, settling on "a part of an old Indian farm" that contained "about seven Indian cabins scattered over the land" that was formerly a Shawnee village (Leeson 1885). (Harrison and Engel 1880; Howe 1854). The first mill in the township was built in 1835 by Daniel Hindel and Abel Tompkins. Many of the early European settlers immigrated from neighboring states and were of German descent (Harrison and Engel 1880; Howe 1854).

A rich and fertile soil makes up the area. Agriculture was the leading industry during the infancy of the level Shawnee Township, with main products consisting of corn, wheat and beans. As typical of families involved in agriculture at this time, children would often stay home from school in order to help their families with household duties (Miller 1906). The first schoolhouse in the township was inaugurated in 1835 from a cabin "formerly the home of Chief Pht", with Maria Hover as teacher (Leeson 1885). A schoolhouse was finally constructed by the European settlers in 1837 (Leeson 1885). Schoolhouses during this period were typically one room log constructions with multiple windows to provide light and a fireplace for heating. Due to the lack of funding, the windows were made from wax paper. By 1885, the township had nine schoolhouses. The schoolhouses additionally served the purpose as places of worship. The first congregation formed in 1840 with Thomas Hicknell as the preacher for the Lutheran denomination, while the earliest "religious society" was formed by the Methodist Reverend James B. Finley (Leeson 1885). The places of worship were critical to the rural communities, as gatherings at the church gave residents the opportunity to discuss local issues and organize community events. Due to the rural location of Shawnee Township, the township's earliest preachers were circuit preachers. The first church building in the township was a Lutheran church, located on the banks of Little Hog Creek (Harrison and Engel 1880; Howe 1906).

Hume Village was established in the southwest portion of the township as a railroad town by the Lake Erie & Western Railroad. At its peak, the town boasted a post office, two stores, a warehouse, a blacksmith shop, and a steam sawmill. In addition to the founding Lake Erie and Western Railroad, other railroads in the township included the Dayton & Michigan and the Chicago & Atlantic lines. Modern amenities were often slow to arrive to the rural township, with electricity expanding to most of the township by

the late 1930's, and paved roads beginning to take hold in place of the stone roads in the 1950's (Shawnee Township 2017). It was at this time that subdivisions came to Shawnee Township, likely coinciding with the need for paved roads (Shawnee Township 2017). Today the township retains its rural nature, with a mixture of suburban housing and farmland. The suburban community of Fort Shawnee is situated in the southeast corner of the township, having been formed as a village in 1960, only to be dissolved as a village in 2012 (Fort Shawnee; Harrison and Engel 1880; Howe 1906).

Auglaize County History

Auglaize County was established on February 14, 1848. Carved from Allen and Mercer Counties to the north and west, respectively, Auglaize County is located at the southern extremity of the Black Swamp within parts of the Lake Erie and Scioto River watersheds (USDA, SCS 1981). The Auglaize, Maumee, St. Marys, and Scioto are its four major rivers, all critical to the Miami, Wyandot, Shawnee and later the French, British, and American colonizers. The region was included in the 1795 Treaty of Greenville (Simkins 1901; Williamson 1905).

Wapakoneta was incorporated in Allen County and is one of Auglaize's two largest cities; St Mary's was incorporated in Mercer County. The French arrived in 1748 built the trading outpost of Fort Auglaize, one of four forts along with Duchouquet, Loramie, and St. Marys constructed to protect the Louisiana Territory; they abandoned the area after the Battle of Fallen Timbers. After the removal of the Shawnee and dissolution of their reservation in 1832, Wapakoneta rapidly developed into a frontier economic hub (Howe 1888; Knapp 1872; McMurray 1923; Meyer 1917; Simkins 1901; Sutton 1880; Williamson 1905).

In 1819 Isaac and Henry Harvey opened a Quakers of Philadelphia mission with a gristmill and a sawmill. That same year War of 1812 veteran Captain John Elliot was sent to the Shawnee reservation as the government blacksmith. Modern Wapakoneta was organized in 1833 when James Gardner, Joseph Barnett, Peter Aughenbaugh, and Jonathan Wiles purchased and platted their lands. Wapakoneta was selected as the county seat in 1848 with the creation of Auglaize and incorporated as a town the following year (Howe 1888; Knapp 1872; McMurray 1923; Meyer 1917; Sutton 1880; Williamson 1905).

St. Marys was founded in the late eighteenth century as a small fur trading outpost known as "Girty's Town," named after trader James Girty and is considered the county's first permanent Euro-American settlement (McMurray 1923). In 1820 speculators William Houston, John McCorkle, and Charles Murray purchased and platted lands, formalized in 1823. St. Marys was the seat of Mercer County until Celina was selected in 1840. It lobbied for the seat of Auglaize County, but Wapakoneta was ultimately chosen. It was incorporated as a city in 1903 (Howe 1888; Knapp 1872; McMurray 1923; Meyer 1917; Sutton 1880; Williamson 1905).

The St. Marys region was the site of key frontier military outposts: General Anthony Wayne's fort, built in 1784, hosted the Treaty of St. Marys; General William Henry Harrison constructed Fort Barbee on the site of Wayne's decommissioned installation; and in 1812 Colonel Thomas Poague built Fort Amanda along the west bank of the Auglaize River to provide a vital link to frontier supply lanes. Fort Amanda was abandoned after the American victory in the War of 1812 and four years later settlers temporarily occupied its buildings while they cleared and developed the land (Howe 1888; Knapp 1872; McMurray 1923; Meyer 1917; Sutton 1880; Williamson 1905).

Dr. George W. Holbrook arrived in the region in 1834 and is credited with the county's establishment. Holbrook persistently lobbied the State Legislature for its organization, granted in 1848. A series of decades-long infrastructure projects beginning in 1837 vastly improved the region's connectivity and economy. Hundreds of laborers built the Miami and Erie Canals, completed 1845, including Lake St. Marys' transformation into a feeder reservoir. German immigrants comprised a large portion of the workers and remained after its competition. Auglaize County's transportation markedly improved in the 1850's with roads and turnpikes, and again in 1858 when the Dayton and Michigan Railroad laid the county's first tracks; the Lake Erie and Western Railroad line opened in 1877. The discovery of oil and gas in the 1880's was an economic boon. Several companies, drills, mains, wells, and related infrastructure were rapidly organized and built throughout the county (Howe 1888; Knapp 1872; McMurray 1923; Meyer 1917; Sutton 1880; Williamson 1905).

Auglaize County is renowned for its Native American sites and eight mastodons discovered in the 1870's (Simkins 1901).

Logan Township History

Logan Township covers 28 square miles in northern Auglaize County, bounded to the north by Allen County, to the east by Duchouquet Township in Allen County, to the south by Moulton Township, and the west by Noble and Salem Townships (Williamson 1905). The Auglaize River runs south to north as a tributary to the Maumee River and is navigable to Wapakoneta (von Steinweher 1875).

During the War of 1812, General William Harrison ordered the construction of Fort Amanda to command the "site of the old Ottawa village" on the west bank of the Auglaize as a supply depot and troops operating in the region (M^{c}Murray 1923.). Fort Amanda was built in 1813 by Col. Pogue on the east bank of the Auglaize from the Ottawa town (Sutton 1880).

The first settlements in what became Logan Township date to about 1823 with "the Ft. Amanda farm" by Andrew Russell (Sutton 1880). The land was reserved by the government for canal use, but when freed up for sale in 1848 settlement occurred more rapidly (Sutton 1880). The first post office was established at Fort Amanda with Samuel Washburn as postmaster (Sutton 1880).

Logan Township was organized in 1848 from three tiers of Amanda and one tier of Moulton Townships in Allen County at the time Auglaize County was formed from parts of Allen and Mercer counties (Sutton 1880, Williamson 1905, M^{c}Murray, William J. 1923). Named for Captain Logan (Spamagelabe), a noted Indian Scout who was killed during the war of 1812 serving the United States under General William Harrison (Williamson 1905, M^{c}Murray 1923).

The Logan Section, a land allotment of 640 acres, was a grant from "the government to the Indian Captain Logan" (Sutton 1880, Walsh 1898). The Auglaize River runs through the township including past the Logan section providing wildlife and fishing opportunities (Walsh 1898).

Logan Township is an agricultural setting. Logan Township has many fertile fields (Walsh 1898). Logan Township, along with the other townships of Auglaize County, ranges in size with many ranging from 200-400 acres with the county average around 70 acres (Ohio State Board of Agriculture 1871, Walsh 1898). Cattle and grains were the main crops of the township. In the late 19th-century, an oil drilling industry existed with many of the lands developed by the turn of the 20th-century notably to the east in Duchouquet Township (Orton 1887, Walsh 1898,). In 2015 there are hundreds of gas and oil sites from abandoned to active in the county (ArcGSI REST Services Directory). There appears that currently no active oil and gas wells in the township in 2021 (Ohio Oil & Gas Well Database).

Buckland is a village, and the only town in the township, along the southern edge of the township. Originally named White Feather after an Indian chief (Walsh 1898). The name was changed to honor General Buckland of Fremont, Ohio who, like many post-Civil War officers engineered railroads across the nation. The name change was not made official until 1891 when the town was incorporated (Walsh 1898). Josiah Clawson and John H. Gochenour organized and platted the town in November 1872 to access the Lake Erie and Western Railroad (Walsh 1898). It operated a small railroad station for the Lake Erie and Western Railroad. By 1855, Buckland boasted about 20 houses (Sutton 1880). In 2019, the population was 222 (City-Data.com).
The Logan Township was divided into "six sub-school districts, with two east and four west of the Auglaize" (Sutton 1880). The Place School, Jericho School, Shadyside School, Germany School, Sodom School, and Elmtree School appear in the early 20th-century (United States Geological Survey 1908, 1911).

Wapakoneta Turnpike (State Route 197) runs from Buckland northwest across the township to Kossuth. It was an improved gravel road by 1927 (Clason Map 1927). State Route 198 runs from Wapakoneta for 11 miles north through Logan Township was established on the present location in 1926 (Simpson 2003). National Road runs east-west splitting the township approximately in half is also known as Ohio 210 west of Ohio 198 and Ohio 208 east.

Research Design

The purpose of this Phase I survey is to locate and identify cultural resources that will be affected by the planned Birch Solar Farm development. This pertains to archaeological deposits for the purposes of this report; the history/architecture component is contained in a separate document. Once these resources are identified, they are evaluated for their eligibility to the NRHP. The literature review aspect of these investigations is to answer or address the following questions:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

Archaeological Field Methods

The survey conducted for this project could use any one or combination of sampling methods. These include shovel testing, surface collection, and visual inspection. Metal detection was conducted in some select areas. The conditions of the project were photographically documented. The following describes the survey methods that may apply to this project:

Shovel test unit excavation. Shovel test units were placed at 15-m intervals where adequate surface visibility was lacking. These measure 50 cm on a side and are excavated to 5 cm below the topsoil/subsoil interface. Individual shovel test units are documented regarding their depth, content and color (Munsell). Wherever sites are encountered, Munsell color readings are taken per shovel test unit. All of the undisturbed soil matrices from shovel test units are screened using .6 cm hardware mesh. When sites are identified, additional shovel test units will be excavated at 7.5 m intervals extending on grid and in the four cardinal directions from the positive locations.

Shovel probe excavation. The excavation of shovel probes is reserved for locations where severe disturbance was prevalent, but not obvious on the surface. These will be initially excavated in a manner similar to a shovel test unit and to a depth that was usually to the subsoil or about 20 cm below the ground surface. This will be accomplished to better understand the nature of the disturbance and verify that intact deposits are lacking. These are spaced at no further than 30 m intervals. If intact soils are identified, the shovel probe will be treated as a shovel test unit.

Surface Collection. This method was the dominant means of archaeological sampling for this project and was conducted wherever suitable for surface collection strategies. The bare ground visibility necessary to utilize this method effectively is 50 percent or greater. Pedestrian transects are spaced at 7.5-10 m intervals through these

applicable areas. If artifacts are identified during this survey, they are flagged and plotted using a Trimble GeoXT global positioning system for the purposes of demonstrating distribution and for GIS layering.

Metal Detection. This method of investigation was conducted in concurrence with shovel testing methods. This used intensive coverage of the areas and focused on all metals. Any identified materials were excavated and inspected to determine cultural affinity. Any older materials that might date from the Reservation era were to be plotted individually.

Visual inspection. This method is conducted to document the nature of the project area and its conditions, disturbed setting, general nature of the area, and presence of any unmarked buildings. This method is used to verify the absence or likelihood of any cultural resources within and around the project area to assist in defining the APE.

The application of the resulting field survey methods was documented in field notes, field maps, and project plan maps.

Historic Period Artifact Analysis

The artifacts recovered during these investigations will be inventoried and analyzed. The inventory will be specific to type and age if the artifact is temporally diagnostic. The functional inventory of the site will be similar to that of South (1977) where artifacts are segregated into categories such as kitchen, arms, architecture, and etcetera. South's (1977) theoretical approach also emphasizes the development and interpretation of artifact patterns found at sites. This method can be used to understand depositional patterning on the intra- and inter-site level. Ball (1984) modified this approach, making it applicable for use in the Ohio Valley.

Artifacts recovered from the subsurface testing will be inventoried and the results analyzed to identify differential patterning of functionally specific artifact groups within areas of high and low artifact density. The specific historic period temporal affiliation of the artifacts will be determined by relative dating. The identification of historic artifacts for purposes of determining age is guided by ceramic/artifact analyses or source books by Carskadden et al. (1985); Cushion (1980); Dalrymple (1989); Deiss (1981); Esary (1982); Ewins (1997); Greer (1981); Hughes and Lester (1981); Hume (1991); Lang (1995); Majewski and O'Brien (1987); Mansberger (1981); McConnell (1992); McCorvie (1987); Miller (1987); Newman (1970); Ramsay (1976); Sonderman (1979); Spargo (1926); Sprague (2002); Stelle (2001); Sunbury (1979); Sussman (1977); Visser (1997); and Zimler (1987).

Prehistoric Artifact Analysis

An artifact inventory was accomplished upon completion of the fieldwork. This involved identifying the functional attributes of individual artifacts, as well as the artifact

cluster(s) or site assemblage collectively. The prehistoric artifact types and material were identified during the inventory process. The lithic artifact categories are modeled after Flenniken and Garrison (1975) and include the following:

Biface. A biface is defined as an artifact that has been culturally modified on two faces (ventral and dorsal). Complete and fragmentary preforms, manufacturing rejects, projectiles, or knives are included in this category.

Blocky Irregular. These are chunks and amorphous chert fragments that are produced during core reduction. These frequently occur during the creation of a striking platform or by accident. They represent a transitional core reduction stage similar to that of primary thinning.

Broken Flake. This flake type is common. Flakes for this investigation are considered broken when diagnostic attributes (e.g., flake scarring or platform) are absent from the artifact. Therefore, a flake that is broken in half and retains the platform is considered complete because the function can be ascertained regardless of its obvious fragmentary nature.

Celt. These artifacts are typically polished/ground stone pieces that are likely to have been used for cutting/dismembering/hammering. It is common for these to have a bit and poll end to serve as a duel function. They were often hafted and used like a modern hatchet.

Core. A core represents the initial stage of chert procurement and reduction. A core has evidence of flake removal or checking present to delineate that the object has been culturally modified. Cores can be recovered from bedded outcrops or gathered from alluvial and glacial deposits.

Potlid. These artifact types are reflective of accidental overheating of chert (Luedtke 1992). Small semi-circular fragments of chert pop off a flake or artifact during firing or through fortuitous deposition in a hearth. Potlids lack a striking platform but are indicative of thermal activity at a site. One should use caution when using these artifacts to interpret or recreate site formation processes because they can occur during post-depositional activities.

Pottery. This is typically recovered as fired clay sherds that are tempered with various materials. It is used for cooking vessels, storage, transport, or for serving. However, sherds are generally fragile and decompose with exposure and plowing.

Primary Decortication Flake. This flake type represents the initial reduction of a core. Generally, these flakes have a natural patina or cortex over most of the dorsal side and are void of other flake scars. Artifact assemblages with chert

resources obtained from bedded resources usually do not have decortication flakes of any kind because there is no patina/cortex formation.

Primary Thinning Flake. This flake type represents a transitional mode of chert reduction. The intent of this reduction activity is to reduce a core to a crude biface. Flakes have a steep platform angle (i.e., >65°) and lack cortex. However, occasional small remnants of cortex are prevalent at this point, especially on the striking platform.

Secondary Decortication Flake. These flakes occur as a by-product of patina/cortex removal of a core. They are differentiated from the previous flake type by a lesser amount of cortex evident on the dorsal side and at least one or part of one previous flake scar. These flakes have steep flake platform angles (>75°).

Secondary Thinning Flake. These flake types represent a reduction mode that is a direct result of the previous reduction activities (i.e., primary thinning). Soft, antler billet percussion and pressure flaking are used for this mode of reduction. At this point, the chert artifact being reduced or thinned is a biface rather than a core. The striking platform for this flake type is commonly represented by the edge of the biface. The platform angle is typically acute but can range from 30° to 65°. Previously removed flake scars are common on the dorsal side.

Sharpening Flake. These flake types are created during pressure flaking of a tool edge. The flakes are often very small with a tiny platform and are often conical. They are also created from reworking a tool edge after it has been dulled from use.

Shatter or Angular Shatter. These artifacts most frequently occur during percussion flake reduction of cores. These artifacts lack striking platforms, are thin, narrow, and triangular. They cannot be definitively associated with a specific functional category of chert reduction due to their ubiquity.

Uniface. A uniface only has evidence of use-wear on one side of the artifact. Unifacial artifacts include utilized flakes, end and side scrapers, and bladelets. However, bladelets are typically categorized as blades or lamellar flakes and are diagnostic of the Middle Woodland period.

Identification of the material type of individual artifacts is based on several attributes, including color, inclusions, and luster. Several resources were used to aid in the inventory of the material types, including Converse (1994), DeRegnaucourt and Georgiady (1998), and Stout and Schoenlaub (1945).

Curation

There were archaeological materials identified during these investigations. The relative landowners will be contacted to determine if they choose to donate the materials for curation or retain them. Notes and maps affiliated with this project will be maintained at Weller & Associates, Inc. files.

Literature Review

The literature review study area is defined as a 1.6 m (1.0 mi) area extending from the edge of the project area. In conducting the literature review, the following resources were consulted at the Ohio State Historic Preservation Office (SHPO) and the State Library of Ohio:

1) *Archeological Atlas of Ohio* (Mills 1914)
2) SHPO United States Geological Survey (USGS) 7.5' series topographic maps
3) Ohio Archaeological Inventory (OAI) files
4) Ohio Historic Inventory (OHI) files
5) National Register of Historic Places (NRHP) files
6) SHPO consensus Determinations of Eligibility (DOE) files
7) SHPO CRM/contract archaeology files;
8) County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s); and
9) Online and genealogical cemetery resource data.

A review of the *Atlas* (Mills 1914) was conducted; there are no sites indicated, according to this resource, near the project area. There is a burial indicated to the west of the project area.

A review of the OAI files did not identify any relative cultural resources; there are no archaeological sites identified within the project area; there are six sites indicated in the study area. There are three sites that are indicated as being isolated prehistoric period sites. One site is a prehistoric period artifact scatter consisting of Archaic and Woodland period materials. There are two sites, 33AL0027 and 33AL0028, that are indicated as being associated with Shawnee occupation and include a "Shawnee Cabin" and a "Shawnee Burial Ground". These sites are located outside of the project area. In the context of this area and their presence within the former reservation, these would likely be regarded as significant resources. These two sites are located to the north and east of the project area and are along the Little Ottawa River drainage.

Table 2. Previously Recorded Archaeological Sites Located in the Study Area.

Site Number	Temporal Affiliation	Site Type	Site Size (m^2)
AL0233	Unassigned	Isolated find	1
AL0028	Unknown Archaic, Unknown Woodland	Artifact scatter	
AL0026	Unknown Archaic; Protohistoric/Aboriginal	Cemetery; artifact scatter	1830

Table 2. Previously Recorded Archaeological Sites Located in the Study Area.			
Site Number	**Temporal Affiliation**	**Site Type**	**Site Size (m^2)**
AL0234	Unassigned	Isolated find	1
AL0027	Unknown Archaic, Protohistoric/Aboriginal	Shawnee Cabin	2806
AL0235	Unassigned	Isolated find	1

The OHI files indicated that there are six relative recorded resources in the study area (Table 3). None of these architectural resources are located within or near the project area.

Table 3. Ohio Historic Inventory Sites Filed in the Study Area.						
OHI #	**Present/ Other Name**	**Address**	**Architectural Style**	**Arch Style II**	**Historic Use**	**Date**
ALL0070306	Antioch Chapel	7301 Ft Amanda Rd	Italianate	Dominant Style	Church/Religious Structure	1887
ALL0072407	Legacy Farm Properties - Bungalow	5490 Fort Amanda Road	Craftsman/Arts and Crafts	Dominant	Single Dwelling	c. 1926
ALL0072107	Yoakam Property	S. Side of Norfolk St., East of SR 501		None	DEFENSE/FORTIFIED/MILITARY	c. 1940s
ALL0072507	Legacy Farm Properties - Residence	5040 Fort Amanda Rd.	Colonial Revival	Element	Single Dwelling	c. 1925
AUG0029503	Bridge, Off SR 501	Off SR 501	Bowstring Truss Bridge			1874
ALL0072607	Allen Residence	4595 Hume Road	Colonial Revival	None	Single Dwelling	c. 1850s-1880s

A review of the NRHP files and SHPO consensus DOE files was conducted. There are no such resources indicated in the project or its surrounding study area.

A review of the CRM/contract files indicates that there has been one professional survey completed within the study area (Weller 2017). This survey was completed in and area immediately adjacent to the project area, but to the north and east. It was completed for an electric station and transmission line. There were no significant resources identified during this prior survey.

Historical atlases were reviewed for this project. The 1875 *Atlas of Allen County, Ohio* (Harrison 1880) indicated that there were buildings scattered within and around the project area, most are located along roadways. This is similar to the results upon inspection of the early twentieth century topographic maps according to the USGS *1906 Lima, Ohio 15 Minute Series (Topographic)* map (Figure 3). There are no communities within the project area at this time, but Hume is in the vicinity. Inspection of the *USGS 1984 Cridersville, Ohio 7.5 Minute Series (Topographic)* map indicated sparse building/residential locations within and around the project. The project area is located in

a setting that is associated with agriculture. Aerial images support this interpretation as open, undeveloped fields are throughout the area.

There is one cemetery located in the study area for this project. The Saint Mathews Evangelical Lutheran Cemetery is located to the east of the project area.

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed?
2) Are cultural resources likely to be identified in the project area?

The project covers a large area that is located in an upland, till plain setting in northwestern Ohio. Typically, such areas are expected to have low-density prehistoric period deposits scattered diffusely and somewhat unpredictably across the landscape and are reflective of logistical/short-termed activities. Dense prehistoric period sites would not be anticipated from this setting. Historic period deposits would be expected to be relative to locations as indicated from atlas/cartographic references with few exceptions. However, most of the central and eastern parts of the project area are within a former Shawnee reservation. There are two archaeological sites recorded in the study area that are just east of the project and are affiliated with this reservation, a burial ground and a cabin. These are on elevations that are along the Little Ottawa River. There is only a small part of the project that is bordering this drainage. There are several hinterland tributaries of Twomile Creek in the project; however, there are no historic references to any sites in this area. This reservation was not noted as being densely populated. There were reportedly cabins and/or habitations noted on elevations along the south side of the river and east of the project. Based on the author's experience in northwestern Ohio and surveys within former reservations, it is possible to encounter reservation-related materials/sites but not likely as the habitations and select locations are typically known.

Archaeological Fieldwork Results

The Phase I archaeological field investigations for this project were initiated in 2020 but not completed until December 2021. The weather at the time of survey was not a hindrance, as the survey was spread out over a long period of time and the field days could be selected accordingly. As it turned out, intense rainfall benefitted some of the surface collection conditions as the area was so flat and poorly drained. The field investigations were largely focused on surface collection methods as these are the most effective means of site identification; however, shovel testing was used as a supplementary method in some select areas. Visual inspection was used to verify the conditions and the surrounding setting. The entire project area is contained within agricultural field conditions so severe disturbances were comparably minimal. These

investigations resulted in the identification of 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261.

The project area is located in an upland and very gently undulating setting that includes part of the Twomile Creek and Little Ottawa River drainages. The eastern part of the project area is located within the former Hog Creek Reservation (Shawnee) which dates from the early part of the nineteenth century. The literature review noted the presence of a Shawnee cabin, burial grounds, and a series of occupations; however, none of these were indicated within the project area. All of these reservation-era sites are located to the east of the project. Weller noted the site locations and especially elevated landforms with proximity to drainages. The cabin site was noted as being in an upland setting, on an elevation, and bordering low-lying areas. The locations of these particular sites guided some of the selected areas for shovel testing and metal detecting method that were utilized during this survey. The same areas that were subject to shovel testing were investigated using metal detecting methods. There were no older materials identified during the metal detection, only occasional farm machinery parts.

The fieldwork was conducted at two generally different times. This was mostly conducted in such a manner to take advantage of some surface collection availability and to avoid time-consuming and costly subsurface testing methods. The initial round of field reconnaissance work was conducted in the Spring of 2020 and the final round of work was conducted in December 2021. There was an artifact collection that was inspected that was derived from the Kurt Swygart collection. In speaking with this local artifact collector and reviewing some of the collected material, it was clear that some of it was derived from the project area. However, it seemed to be scattered and relatively diffuse without any particular area or landform being ‘dense’ with artifacts. Many of the prehistoric period points appear to be Late Archaic. There was some historic period materials/artifact that were collected but none of these appeared to be affiliated with the reservation-era. Weller’s investigations did not identify any sites or materials similar to what Mr. Swygart had collected. There were few prehistoric artifacts identified and they were scattered diffusely through the project area.

During the initial part of the field investigations, the focus was on field areas that had suitable conditions for surface collection. This pertains to bare ground surface conditions where there was at least 50 percent visibility, in accordance with State guidelines. There were some locations that were initially not suitable for surface collection. As a result, Weller focused on what were considered to be more apt to harbor archaeological deposits, especially reservation-era materials. This pertained to areas within the project that are elevated and positioned along drainages and where surface collection was not viable at the time.

Subsurface testing was conducted within the project area, but at select locations. The shovel testing involved the excavation of 1,400 shovel test units in parts of several agricultural fields. The intent was to account for what was considered to be the most likely area to identify archaeological sites in lieu of wanting surface visibility. These efforts turned out to be regarded as supplementary as most of the areas

were suitable for surface collection after they had been subsurface tested. The shovel testing determined that the topsoil is largely consistent with the plowzone and it is relatively shallow through this area. The topsoil is dark grayish brown (10YR3/3) silt loam/silty clay loam with subsoil that is dark yellowish brown (10YR4/6) silt loam/silty clay loam (Figure 54). There were three sites that were identified during shovel testing including 33AL0250, 33AL0252, and 33AU0382.

Many of the areas that were shovel tested were eventually subject to surface collection methods of investigation and sampling. Surface collection was the preferred method of site identification and sampling, especially for a large area such as the project and for the location of the project. This was conducted in suitable soybean stubble, corn stubble, cropped field, and tilled field conditions. Sites in upland areas are often sparse or small and these are less likely to be identified during shovel testing. Pedestrian surface collection was conducted at 7.5-10 m intervals throughout the applicable areas within the project. Individual prehistoric artifacts were plotted using a GPS unit while several of the historic period sites documented by using the GPS unit to plot the boundaries or perimeter of the artifact scatters. Upon identification of any artifacts, the surrounding area was further and more intensively inspected at 2-3 m intervals. All but the aforementioned three sites were identified during surface collection.

Metal detection was conducted within selected areas within the project area. This was conducted at the same locations where the 'select' shovel test unit areas were designated. The entirety of the shovel tested areas were metal detected by Michael Spicer, someone that is well-known for this procedure and with some archaeological training and process. He was directed to plot any artifact locations and field verify anything identified. Other than miscellaneous farm machinery parts and modern trash, there were no artifacts identified during the metal detection efforts.

Archaeological Site Descriptions

There were 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261 identified during these investigations. The sites include prehistoric and historic period components and range from isolated finds to low-density artifact scatters. The following text describes these sites in greater detail, individually.

33AU0380

This site is a prehistoric period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Northwest Quarter of Section 24 of Logan Township and is about a quarter mile east of Bowsher Road. The site is located on a upland rise that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Delaware chert (Table 4). This is functionally indicative of biface reduction activity. This artifact is not considered to be temporally diagnostic.

Table 4. Artifact Inventory.

Site	Bag	Artifact	Material	Count	Notes
AU0380	1	Secondary Thinning Flake	Delaware	1	
AU0381	2	Whiteware	Ceramic	9	Plain
		Decalware	Ceramic	2	
		Spongeware	Ceramic	2	Blue
		Stoneware	Ceramic	10	
		Doorknob	Ceramic	1	
		Bottle Glass	Glass	2	Brown
		Bottle Glass	Glass	6	Clear
		Bottle Glass	Glass	3	Cobalt
		Bottle Glass	Glass	6	Blue-Green
		Canning Jar Seal	Porcelain	2	
		Milk Glass	Glass	5	
		Fence Insulater	Ceramic	1	
		Pane	Glass	3	
		Electric Hardware		1	
		Battery Rod	Carbon	1	
		Marble	Glass	1	
		Conch		1	
AL0245	3	Biface	Wyandotte	1	Midsection
AL0246	5	Button	Prosser	1	2-hole
AU0382	6	Secondary Thinning Flake	Upper Mercer	1	
AU0383	7	Blocky Irregular	Upper Mercer	1	
AL0247	8	MacCorkle Stemmed	Upper Mercer	1	Proximal
AL0248	9	Biface	Upper Mercer	1	Potlided
AL0249	10	Flow Blue	Ceramic	1	
AL0250	11	Blocky Irregular	Delaware	1	
AL0251	12	Whiteware	Ceramic	4	
		Stoneware	Ceramic	3	
		Bottle Glass	Glass	1	Clear
		Bottle Glass	Glass	1	Flint

Table 4. Artifact Inventory.

Site	Bag	Artifact	Material	Count	Notes
		Pane	Glass	1	
		Jar Lid	Porcelain	1	
AL0252	13	Stoneware	Ceramic	1	
		Doll?	Porcelain	1	
	14	Stoneware	Ceramic	1	
	15	Whiteware	Ceramic	4	
		Bottle Glass	Glass	2	Clear
	16	Whiteware	Ceramic	2	
		Stoneware	Ceramic	1	
	17	Flow Blue	Ceramic	1	
		Pane	Glass	1	
	18	Candy Dish	Glass	1	Clear
	19	Tile	Ceramic	1	
		Whiteware	Ceramic	2	
		Roofing Slate	Slate	1	
AL0253	20	Biface	Columbus-Delaware	1	Ovoid
AL0254	21	Pane	Glass	1	
		Bottle Glass	Glass	1	Blue-Green
		Cinder		1	
		Round Nail	Iron	1	
	22	Stoneware	Ceramic	1	
	23	Whiteware	Ceramic	1	
	24	Mirror Fragment	Glass	1	Vehicle
	25	Pane	Glass	1	
	26	Stoneware	Ceramic	5	
	26	Whiteware	Ceramic	2	
	26	Rockingham	Ceramic	1	
	26	Strap Spike	Iron	1	
	26	Parafin	Wax	1	
	35	Bottletop	Glass	1	Corktop
	35	Marble	Glass	1	
	36	Mug Handle	Ceramic	1	
		Bottle Glass	Glass	1	
AL0256	30	Primary Thinning Flake	Delaware	1	
	31	Blocky Irregular	Delaware	1	
AU0384	39	Core	Glacial	1	

Table 4. Artifact Inventory.

Site	Bag	Artifact	Material	Count	Notes
		Primary Thinning Flake	Columbus	1	
		Erie Bifurcated Base	Columbus-Delaware	1	
AU0385	40	Secondary Thinning Flake	Columbus	1	
AU0386	41	Scraper	Flint Ridge	1	
	42	Primary Thinning Flake	Columbus	1	
	44	Biface	Upper Mercer	1	Fragment
AU0387	43	Primary Thinning Flake	Columbus-Delaware	1	
AL0255	27	Biface	Upper Mercer	1	Knife
	28	Secondary Thinning Flake	Upper Mercer	1	
	29	Blocky Irregular	Unidentified	1	
AL0260	45	Hardin Barbed	Liston chert	1	
AL0261	46	Primary Thinning Flake	Columbus	1	

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0381

This site is a historic period artifact scatter that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility . This site is located on an elevation that is in the Northwest Quarter of Section 24, Logan Township. It is about a quarter mile south of the Allen-Auglaize Countyline and is east of Bowsher Road. The lateral site boundaries were plotted with a GPS unit. The site is located on an elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 53 m north-south by 19 m east-west, the site size is considered to be 568 sq m.

There is a residence indicated at the eastern end of a driveway that is very near this site location, circa 1906. The modern topographic mapping does not indicate any buildings. Late nineteenth century atlases do not depict residences.

There were 50 artifacts identified from this site (Table 4). Decalware and the type of spongeware identified are ceramic artifacts that are indicative of the early to middle twentieth century (Ramsey 1969; Miller 1980). Other artifacts that represent this period include a glass toy marble, conch shell, ceramic fence insulator, and probably the various bottle glass fragments that bear seams and molding (Newman 1970). Collectively, the assemblage appears to indicate an early to middle twentieth century (Figure 31) occupation or secondary deposit associated with a residence.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The site has a numerically and functionally limited artifact assemblage. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0382

This site is a prehistoric period isolated find that was identified during shovel test unit excavation in a farm field. Radial shovel test units were excavated but failed to identify any additional cultural materials. This site is located in the Northeast Quarter of Section 25, Logan Township, is to the south of Zerkle Road, and is to the west of Alline Road. The site is located on an elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Upper Mercer chert (Table 4). This is functionally indicative of biface reduction activity. This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0383

This site is a prehistoric period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility . Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Southeast Quarter of Section 24 of Logan Township and is just west of the Hume Road/Alline Road intersection. The site is located in a nearly flat area that is drained by Twomile Creek. This creek flows into the

Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a blocky irregular fragment of Upper Mercer chert (Table 4). This is functionally indicative of core reduction activity. This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0384

This site is a prehistoric period artifact scatter that was identified during surface collection of a corn stubble field that offered from 50-70% bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals to identify any additional materials. This is located in the Southeast Quarter of Section 24 of Logan Township and is just under half a mile north of Zerkle Road. The site is located on a slight upland elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 1 m north-south by 25 m east-west, the site size is considered to be 25 sq m.

There were three artifacts identified from this site (Table 4). The material assemblage includes Glacial, Columbus, and Columbus-Delaware chert. Early-stage lithic reduction is represented by a small core of Glacial chert. There was one flake identified that is functionally indicative of core reduction activity. These are not temporally diagnostic; however, there was a hafted biface identified from this site that is temporally diagnostic.

The majority of a very small Lake Erie Bifurcated Base point was identified (Figure 32). This was manufactured from Columbus-Delaware chert. The blade portion is triangular and has been heavily reworked, but it is symmetrical. The base is small and each of the small lobes of the bifurcation have been fractured, but their former existence is recognizable. This is functionally indicative of its likely use as a projectile point. These point types date from the Early Archaic period from about 6300-5800 BC (Justice 1987:95).

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The artifact assemblage is numerically and functionally limited

and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0385

This site is a prehistoric period isolated find that was identified during surface collection of a corn stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Southeast Quarter of Section 24 of Logan Township and is to the north of Zerkle Road about a quarter mile. The site is located on a slight upland elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Columbus chert (Table 4). This is functionally indicative of biface reduction activity. This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The artifact assemblage is numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0386

This site is a prehistoric period artifact scatter that was identified during surface collection of a soybean stubble field (50-70% surface visibility) and in a tilled field area (80-100% surface visibility). Pedestrian transects were reduced to 3 m intervals to identify any additional materials. This is located in the Southeast Quarter of Section 25 of Logan Township and is just over a mile west of the Community of Hume. The site is located on a slight upland elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 22 m north-south by 1 m east-west, the site size is considered to be 22 sq m.

There were three artifacts identified from this site (Table 4). The material assemblage includes Flint Ridge, Columbus, and Upper Mercer chert. There was one flake identified that is functionally indicative of core reduction. There were two tools identified. One is a unifacial scraper of Flint Ridge that would have been used for cutting/scraping activity. The other is a very fragmented part of a biface that is not functionally distinctive. These are not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI,

NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage that lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AU0387

This site is a prehistoric period isolated find that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Southeast Quarter of Section 25 of Logan Township and is just over a mile west of the Community of Hume. The site is located on a slight upland elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Columbus-Delaware chert (Table 4). This is functionally indicative of core reduction activity. This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The artifact assemblage is numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0245

This site is a prehistoric period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but there were no additional materials identified. This is located in the Southwest Quarter of Section 19 of Shawnee Township and is to the east of Alline Road. The site is located on an elevation that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a biface midsection that was manufactured from Harrison County/Wyandotte chert (Table 4). The cross-section of the biface is rhomboid due to the intensive beveling. This would have functioned as a knife. This likely dates from the Early Archaic period based on the degree of beveling, but this cannot be definitively determined due to the fragmented nature of the artifact.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI,

NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The artifact assemblage is numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0246

This site is a historic period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but there were no additional materials identified. This is located in the Southwest Quarter of Section 19 of Shawnee Township and is to the east of Alline Road. The site is located on the slope of an elevation that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a two-hole Prosser button (Table 4). These date from the middle of the nineteenth century from about 1840-1880 (Hughes and Lester 1981). A review of atlas/cartographic resources did not identify any buildings previously existing at this location.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The artifact assemblage is numerically and functionally limited. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0247

This site is a prehistoric period isolated find that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This site is located just east of the Allen-Auglaize Countyline and in the Southwest Quarter of Section 30 of Shawnee Township; it is to the south of Hume Road. The site is located in a nearly flat area that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is the proximal portion of a MacCorkle Stemmed point of Upper Mercer chert (Figure 32). The remaining biface edges have been heavily retouched/reworked but it is too fragmented to determine if they were beveled. There is no evident grinding on the base or stem. The shoulders are weak to subtle from re-sharpening. The irregularity and reworking of the blade edges suggests

it formerly functioned as a knife. MacCorkle points date from the Early Archaic period from about 7000-6500 BC (Justice 1987:89).

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The artifact assemblage is numerically and functionally limited. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0248

This site is a prehistoric period isolated find that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This site is located just east of the Allen-Auglaize Countyline and in the Southwest Quarter of Section 30 of Shawnee Township; it is to the south of Hume Road. The site is located in a nearly flat area that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a very fragmented and potlidded biface (Table 4). This was manufactured from Upper Mercer chert. There is one bifacially beveled edge that is remaining. This is not considered to be either functionally or temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage and lacks diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0249

This site is a historic period isolated find that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This site is located to the east of the Allen-Auglaize Countyline and in the Southwest Quarter of Section 30 of Shawnee Township; it is to the south of Hume Road about half a mile. The site is located on a slight rise in an area that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a single sherd of Flow Blue ware (Figure 33). This is temporally indicative of the late nineteenth to early twentieth century (Miller 1980; Majewski and O'Brien 1987). Inspection of atlas/cartographic mapping did not indicate any buildings had formerly been situated at this location.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The site has a numerically and functionally limited artifact assemblage. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0250

This site is a prehistoric period isolated find that was identified during shovel test unit excavations. The excavation of radial shovel test units failed to identify any additional sites. This site is located to the east of the Allen-Auglaize Countyline and in the Southwest Quarter of Section 30 of Shawnee Township; it is to the south of Hume Road about a quarter of a mile. The site is located in a nearly flat area that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a blocky irregular fragment of Delaware chert (Table 4). This is functionally indicative of core reduction activity. This is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited artifact assemblage. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0251

This site is a historic period artifact scatter that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals to recover any additional materials. This site is located to the east of the Allen-Auglaize Countyline and in the Southwest Quarter of Section 30 of Shawnee Township; it is to the south of Hume Road about a quarter of a mile. The site is located on a slight upland elevation that is drained by an unnamed tributary of Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 37 m north-south by 55 m east-west, the site size is 1,096 sq m.

Atlas and cartographic maps were reviewed as part of this project. There is not a housing or building noted at this specific location, but there is a building(s) noted to the east and outside of the project area according to modern topographic resources. This same residence is depicted in that are circa 1906 and no buildings are indicated in the latter part of the nineteenth century circa (Harrison 1880).

There were 11 artifacts identified from this site (Table 4; Figure 33). These are mostly affiliated with kitchen-related materials and appear to date from the late nineteenth to twentieth century; however, the assemblage is relatively generic. None of the materials are datable to a specific historic period.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The site has a numerically and functionally limited assemblage. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0252

This site is a historic period artifact scatter that was identified during shovel test unit excavations of a farm field. This included the excavation of radial shovel test units to further defined site boundaries and identify additional materials. This site is located to the east of the Allen-Auglaize Countyline, north of Hume Road, and in the Northwest Quarter of Section 30 of Shawnee Township. The site is located in a nearly flat area that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 38 m north-south by 38 m east-west, the site size is 719 sq m.

Atlas and cartographic maps were reviewed as part of this project. There are no buildings indicated in this area according to the modern topographic maps. There are no buildings in the area according to the late nineteenth century atlas (Harrison 1880). However, there is a residence noted at this location dating circa 1906. The artifacts that were identified from this location are not aberrant to the probable site date that was derived from these resources.

There were 19 artifacts identified from this site (Table 4; Figure 34). These are mostly affiliated with kitchen-related materials such as ceramic wares and bottle glass fragments. There was a sherd of Flow Blue ware that is datable to the late nineteenth to early twentieth century (Figure 34; Majewski and O'Brien 1987). Other ceramic sherds are more generic regarding dating. Materials such as stoneware and some whiteware may date from the nineteenth century; however, the artifacts collectively appear to be from the early to middle twentieth century; however, the assemblage is relatively generic. None of the materials are datable to a specific historic period.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The site has a numerically and functionally limited assemblage. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0253

This site is a prehistoric period isolated find that was identified during surface collection of a soybean stubble field that offered from 50-70 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Northwest Quarter of Section 30 of Shawnee Township and is to the north of Hume Road. The site is located in a nearly flat area that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is an oval-shaped biface that was manufactured from Columbus-Delaware chert. The edges are all finished and refined indicating that it was formerly used as a knife. Despite its complete form, this is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0254

This site is a historic period artifact scatter that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals to recover additional materials. The perimeter of the site was plotted with a GPS unit. This is located to the northwest of the intersection of SR 501 and Bowsher Road. It is in the Southeast Quarter of Section 19 of Shawnee Township. The site is located on a subtle rise that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 53 m north-south by 30 m east-west, the site size is considered to be 985 sq m.

Review of atlas/cartographic resources indicates a building/residence at this location dating from 1906 to the modern era. There were no buildings in this area dating from the latter part of the nineteenth century (Harrison 1880).

There were 22 artifacts identified from this site (Table 4; Figure 35). The assemblage includes architectural hardware as well as kitchen-related materials. There was a cut or strap nail/spike identified that dates from the nineteenth century (Greer 1980). The stoneware sherds can date from the either the nineteenth or twentieth century in this context. However, the remainder of the materials appear to be affiliated with early to late twentieth century occupation/use. These include a multi-colored glass marble and vehicle mirror fragment. Other artifacts are likely associated with the twentieth century, but they lack definitive temporal-defining characteristics.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of this area. The site has a numerically and functionally limited and lacks temporally separable diagnostic materials, the site is only known from the plowzone. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0255

This site is a prehistoric period lithic scatter that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals and identified additional materials which were plotted with a GPS unit. This is located in the Northeast Quarter of Section 20 of Shawnee Township and is to the south of Breese Road. The site is located on a subtle rise that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 13 m north-south by 17 m east-west, the site size is considered to be 113 sq m.

There were three artifacts identified from this site (Table 4). The material assemblage includes Upper Mercer (n=2) and an unidentified chert (n=1). The debitage is functionally indicative of core and biface reduction activities. There was one tool identified, a well-formed bifacial knife of Upper Mercer. However, none of these artifacts are regarded as being temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0256

This site is a prehistoric period lithic scatter that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility.

Pedestrian transects were reduced to 3 m intervals and identified additional materials which were plotted with a GPS unit. This is located in the Northeast Quarter of Section 20 of Shawnee Township, is to the south of Breese Road, and is west of Sellers Road. The site is located on a subtle rise that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The dimensions of the site are 1 m north-south by 35 m east-west, the site size is considered to be 35 sq m.

There were two artifacts identified from this site and they are both of Delaware chert (Table 4). These are functionally indicative of core reduction activity. They are not regarded as being temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0260

This site is a prehistoric period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Southwest Quarter of Section 30 of Shawnee Township and is to the south of Hume Road. The site is located in a nearly flat area that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a complete Hardin Barbed point (Figure 2), this was manufactured from Liston chert. The blade is finely serrated and evidences reworking as it is also beveled. The shoulders are barbed. The cross-section is rhomboid due to the beveling. The base is slightly expanding and is ground. Based on the size and the edge wear and characteristics, this artifact would have functioned as a knife. Hardin Barbed points date from the Early Archaic period from about 8000-5500 BC (Justice 1987:53).

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33AL0261

This site is a prehistoric period isolated find that was identified during surface collection of a tilled field that offered from 80-100 percent bare ground surface visibility. Pedestrian transects were reduced to 3 m intervals but failed to identify any additional materials. This is located in the Southwest Quarter of Section 30 of Shawnee Township and is to the south of Hume Road. The site is located in a nearly flat area that is drained by Twomile Creek. This creek flows into the Auglaize River and is part of the Maumee River watershed that flows to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Columbus chert (Table 18). This is functionally indicative of core reduction activity. This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of this area. The site has a numerically and functionally limited and lacks temporally diagnostic materials. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

Fieldwork Summary

The types of sites that were identified during these investigations are akin to what would be anticipated from upland, relatively homogeneous settings in this region of Ohio. The prehistoric period sites ranged from isolated finds to low-density lithic scatters. There were no dense prehistoric sites identified, and this was anticipated. The only historic period deposits that were identified post-date the Hog Creek Reservation era. These are affiliated with either random loss or with former/extant buildings. There were no artifacts or materials that were regarded as dating from the reservation era occupation and ownership. None of the sites that were identified are considered to be significant resources.

APE Definition and NRHP Determination

The APE is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. The project involves the installation and/or use of the surveyed area for solar farm facilities. The archaeological APE for this project is considered to be the footprint of the planned development, which is currently considered to be the project area. Weller surveyed the entire project area intensively. The survey resulted in the identification of 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261. These are not considered to be significant resources; they are not landmarks.

Recommendations

In December of 2021, Weller & Associates, Inc. completed Phase I Archaeological Investigations for the 570.8 ha (1,410.5 ac) Birch Solar Project in Shawnee Township, Allen County and Logan Township, Auglaize County, Ohio. The archaeological fieldwork involved visual inspection, surface collection, subsurface testing, and photographic documentation. There were no sites or artifacts identified that could be definitively associated with the former Hog Creek Reservation. These investigations resulted in the identification of 22 previously unrecorded archaeological sites including 33AU0380-387 and 33AL0245-256, 260-261. These are not considered to be significant resources or landmarks. No further archaeological work is considered to be necessary for this project.

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Figures

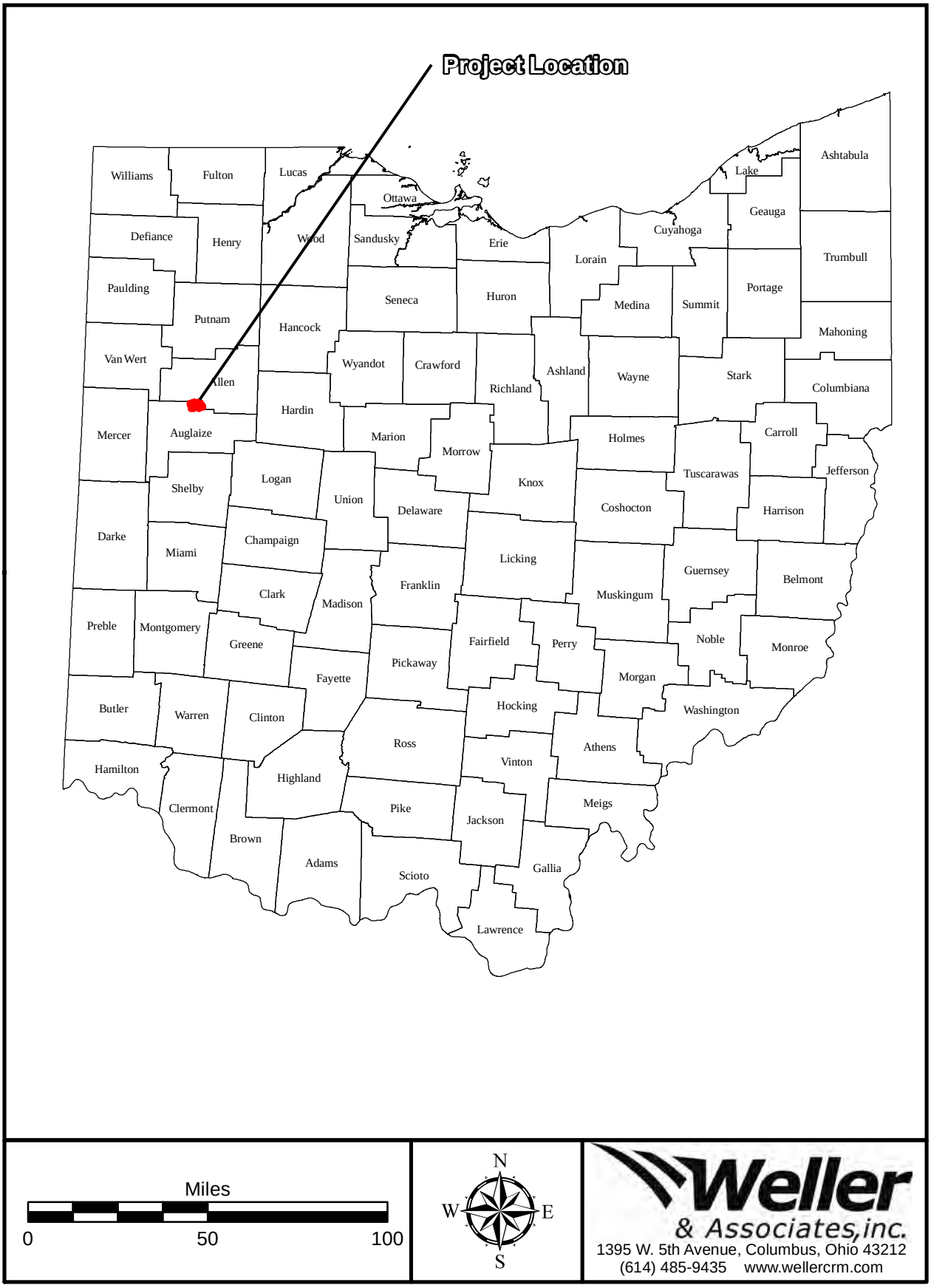
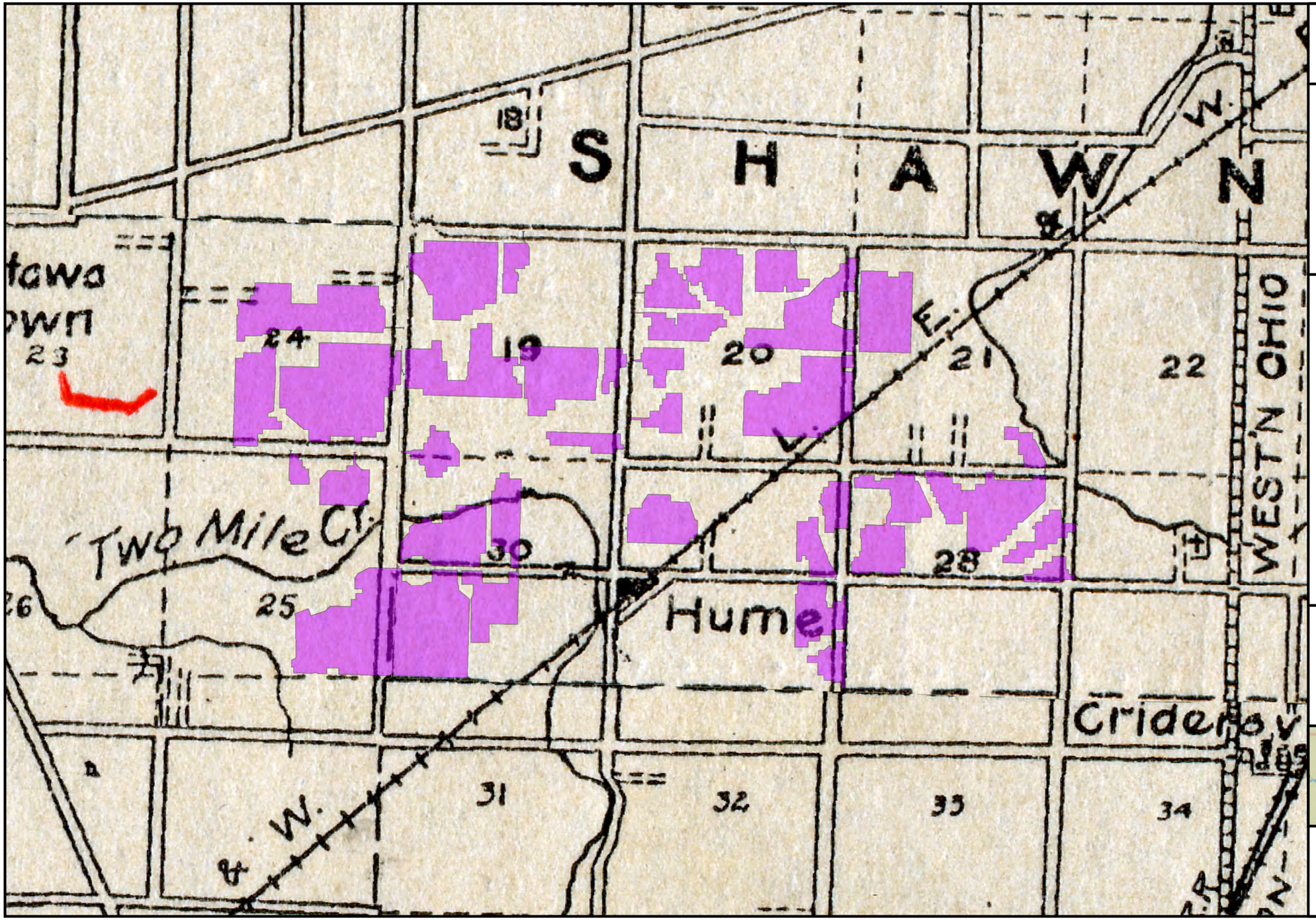


Figure 1. Political map of Ohio showing the approximate location of the project.



Scale in Feet

0 1,500 3,000

Project Area

Figure 2. Portion of the *Archeological Atlas of Ohio* (Mills 1914) indicating the approximate location of the project.

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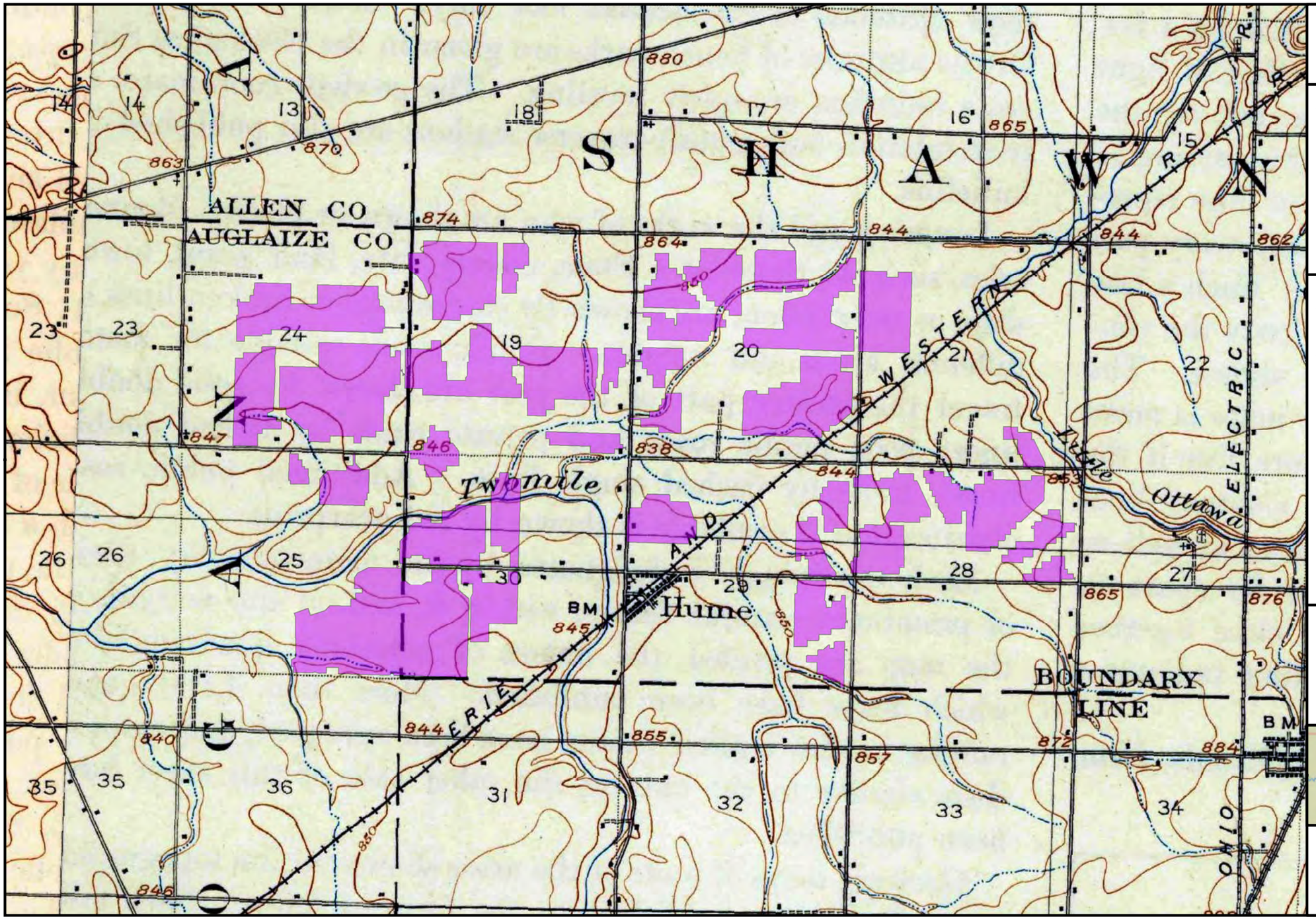

Scale in Feet

0 1,500 3,000

Project Area

Figure 3. Portion of the USGS *1906 Lima, Ohio 15 Minute Series (Topographic)* map indicating the approximate location of the project.

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Figure 4. Surface collected soybean field east of S. Wapak Rd.

Figure 5. Surface collected wheat field south of Breese Rd.

Figure 6. Surface collected tilled field west of Sellers Rd.

Figure 7. Surface collected tilled field east of Sellers Rd.

Figure 8. Surface collected soybean field subjected to shovel testing.

Figure 9. Surface collected soybean field east of S. Wapak Rd.

Figure 10. Surface collected soybean field west of S. Wapak Rd.

Figure 11. Surface collected tilled field south of W. Breese Rd.

Figure 12. Surface collected tilled field south of W. Breese Rd.

Figure 13. Surface collected tilled field east of S. Kemp Rd.

Figure 14. Surface collected tilled field north of Zerkle Rd.

Figure 15. Surface collected tilled field north of Zerkle Rd.

Figure 16. Surface collected soybean field south of Zerkle Rd.

Figure 17. Surface collected tilled field east of S Kemp Rd.

Figure 18. Corn stubble field subjected to shovel testing.

Figure 19. Shovel tested field in the southwestern portion of the project.

Figure 20. Surface collected soybean field west of the Norfolk Southern Railroad.

Figure 21. Surface collected tilled field east of S. Wapak Rd.

Figure 22. Surface collected tilled field south of W. Hume Rd.

Figure 23. Surface collected corn stubble west of Sellers Rd.

Figure 24. Surface collected tilled field south of Bowsher Rd.

Figure 25. Surface collected tilled field west of Beeler Rd.

Figure 26. Visibility typical throughout the surface collected soybean fields in the project.

Figure 27. Visibility typical throughout the surface collected wheat fields in the project.

Figure 28. Visibility typical throughout the surface collected cornfields in the project.

Figure 29. Visibility typical throughout the surface collected tilled fields in the project.

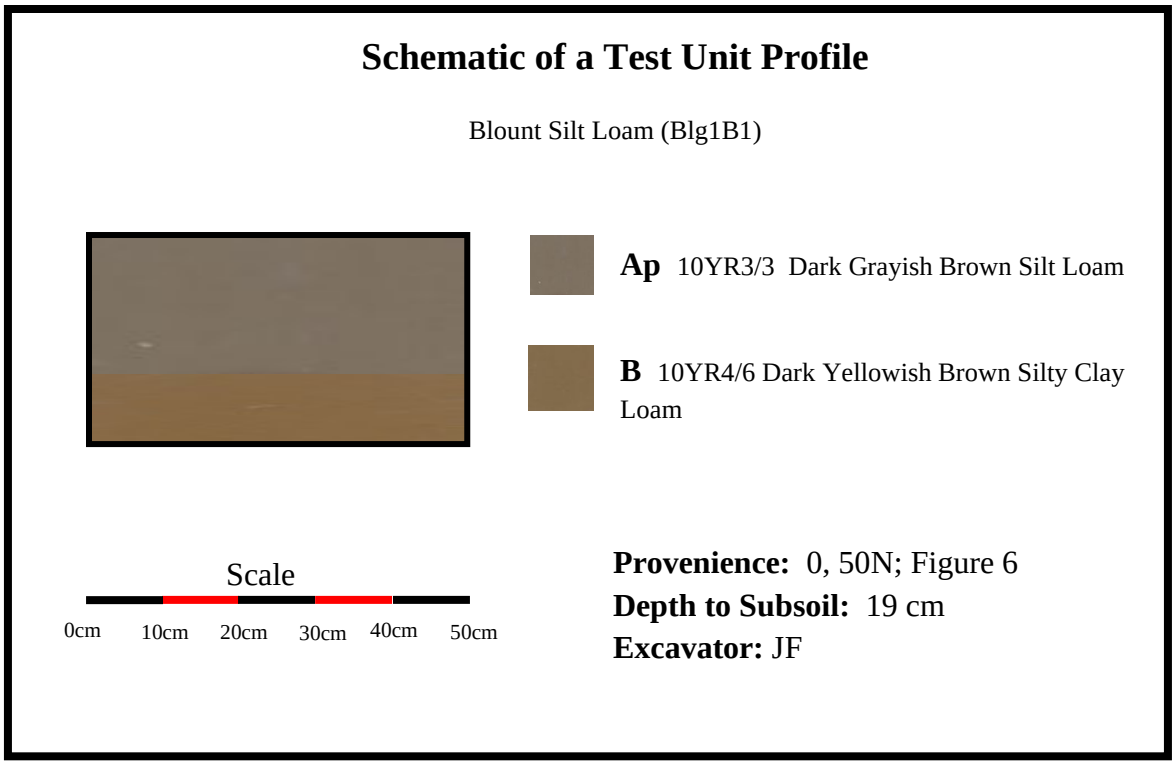
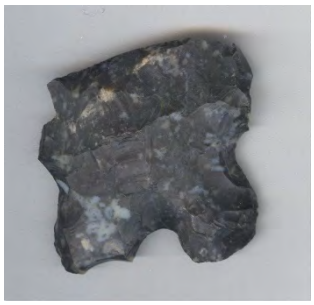


Figure 30. Profile of a typical shovel test unit excavated within the project.

Figure 31. Some of the historic artifacts from the project.

AL0247



MaCorkle

Length:	na
Width:	29.7mm
Stem Length:	14.4mm
Neck Width:	23.4mm
Thickness:	06.5mm
Material:	Upper Mercer

AU0384

Erie Bifurcated Base

Length:	14.9mm
Width:	11.5mm
Stem Length:	04.0mm
Neck Width:	09.6mm
Thickness:	04.0mm
Material:	Columbus-Delaware

Scale

0 12.7mm 25.4mm

0 ½” 1”

Figure 32. Some of the prehistoric artifacts from the project.

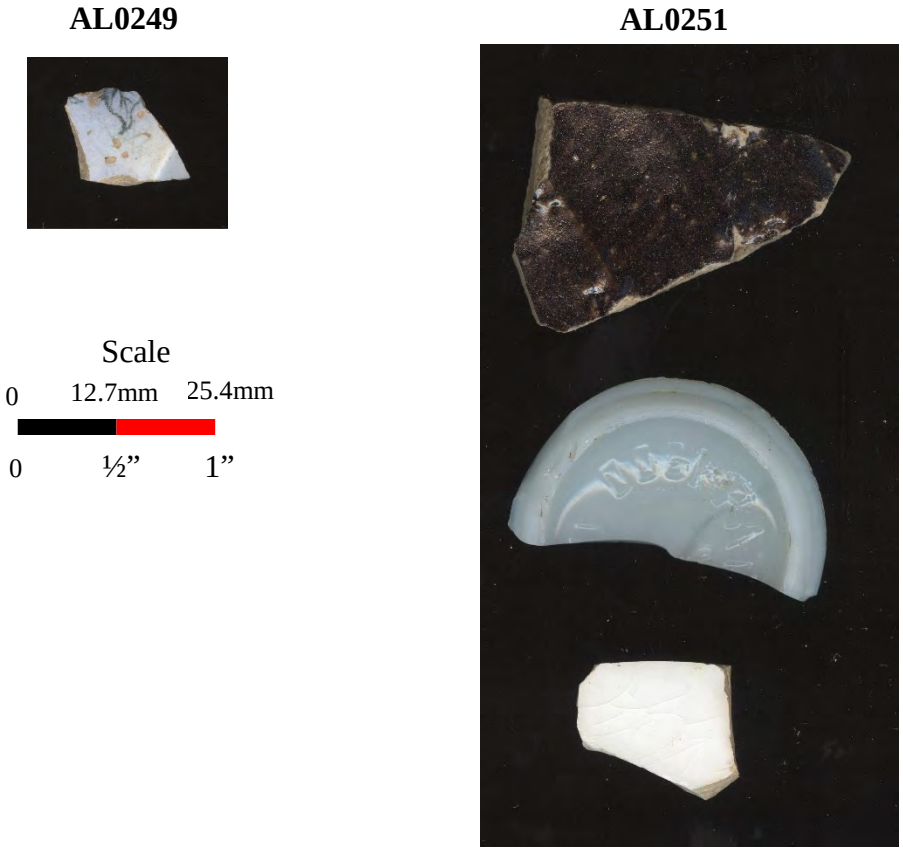


Figure 33. Some of the historic artifacts from the project.

AL0252

Figure 34. Some of the historic artifacts from the project.

AL0254

Figure 35. Some of the historic artifacts from the project.

Summary: Response - Supplemental Response to Tenth Data Request from Staff of the Ohio Power Siting Board and Response to Staff Report of Investigation Conditions 33 and 44. electronically filed by Christine M.T. Pirik on behalf of Birch Solar 1, LLC