



Union Ridge Solar

Exhibit O

Geology and Hydrogeology Report

Case No. 20-1757-EL-BGN



January 22, 2021

Mr. Chris Cunningham
Senior Project Manager/Midwest Practice Leader Environmental
Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C.
274 North Goodman Street
Rochester, New York 14607

RE: Geology and Hydrogeology Report, Union Ridge Solar Project in Licking County, Ohio;
EVD008.0002

Dear Mr. Cunningham:

Hull & Associates, LLC (Hull) is pleased to provide Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR and Client) with this Geology and Hydrogeology Report for the proposed Union Ridge Solar Project located in Licking County, Ohio (Project). The proposed development is a 100-megawatt AC (MW_{AC}) solar energy facility in an approximate 500-acre rural area in southwestern Licking County (Project Area). Development of the Facility will include up to 465 acres of solar panels, along with associated infrastructure such as access roads, electrical collection lines, and a project substation.

The purpose of this report is to provide the appropriate investigation and analysis to support the Client's application to the Ohio Power Sitting Board (OPSB) to construct and operate the Project. Specifically, the report provides information relevant to the following two provisions of Ohio Administrative Code (OAC) 4906-4, OPSB's rules for applications for electric generation facilities:

OAC 4906-4-08(A)(4)

- (4) Water Impacts. The applicant shall provide information regarding water impacts
- (a) Provide an evaluation of the impact to public and private water supplies due to construction and operation of the facility.
 - (b) Provide an evaluation of the impact to public and private water supplies due to pollution control equipment failures.
 - (c) Provide existing maps of aquifers, water wells, and drinking water source protection areas that may be directly affected by the proposed facility.
 - (d) Describe how construction and operation of the facility will comply with any drinking water source protection plans near the project area.
 - (e) Provide an analysis of the prospects of floods for the area, including the probability of occurrences and likely consequences of various flood stages, and describe plans to mitigate any likely adverse consequences.

OAC 4906-4-08(A)(5)

- (5) Geological features. The applicant shall provide a map of suitable scale showing the proposed facility, geological features of the proposed facility site, topographic contours, existing oil and gas wells, and injection wells. The applicant shall also:
- (a) Describe the suitability of the site geology and plans to remedy any inadequacies.

- (b) Describe the suitability of soil for grading, compaction, and drainage, and describe plans to remedy any inadequacies and store the soils during post-construction reclamation.
- (c) Describe plans for the test borings, including closure plans for such borings. Plans for the test borings shall contain a timeline for providing the test boring logs and the following information to the board:
 - (i) Subsurface soil properties
 - (ii) Static water level
 - (iii) Rock quality description
 - (iv) Per cent recovery
 - (v) Depth and description of bedrock contact

For this report, the following definitions have been used when describing the Project pursuant to the OPSB's current rules (OAC 4906-1-01):

- **Project Area:** "all land within a contiguous geographic boundary that contains the facility, associated setbacks, and properties under lease or agreement that contain any components of the facility" (OAC 4906-1-01(GG)).
- **Facility:** "the proposed major utility facility and all associated facilities" (OAC 4901-1-01(W)).
- **Study Area:** is defined by Hull to better describe the region outside of the Project Area that was included during database searches of available public information. The Study Area includes all of Erie County, Sandusky County and Huron County so as to capture all areas whose physical characteristics could globally impact the Project Area (e.g., floodplains, faults, regional geology).

STUDY APPROACH

A literature review of readily available hydrogeological and geotechnical documents was completed to develop a generalized understanding of the suitability of conditions within the Project Area for the construction of the proposed Facility. The information summarized in this report was obtained from available online databases and/or documents maintained or produced by the following federal, state, and local agencies:

1. Federal Emergency Management Agency (FEMA);
2. Ohio Department of Agriculture (ODA);
3. Ohio Department of Natural Resources (ODNR);
4. Ohio Environmental Protection Agency (Ohio EPA);

5. Ohio Department of Transportation District 5 (ODOT);
6. Office of the Licking County Engineer;
7. United States Department of Agriculture (USDA); and
8. United States Geological Survey (USGS).

No environmental studies or structural evaluations were performed as part of the scope of work for this report, and therefore no information relative to environmental or structural considerations are included in this report.

This study also included a reconnaissance of the Project Area, interviews of certain government agency personnel, and preliminary construction considerations.

PROJECT LOCATION

The Project Area comprises approximately 500 acres of rural property in Harrison Township near the city of Pataskala in southwestern Licking County, Ohio, as shown on Figure 1 and subsequent figures presented in this report.

DESK-TOP INFORMATION REVIEW AND ANALYSIS

The following provides a summary of the information reviewed and its applicability to the proposed Project.

Regional Geology

The Study Area lies within the Galion Glaciated Low Plateau region of Till Plains section of the Central Lowland Physiographic Region. The surface topography within the Project Area largely consists of a rolling upland transitional between the gently rolling Till Plan and the hilly Glaciated Allegheny Plateau; mantled with thin to thick drift. Surface elevations in the Galion Glaciated Low Plateau range from approximately 800 to 1400 feet above mean sea level (msl) with moderate relief. Bedrock is mantled by medium to low-lime Wisconsinan-age till over Mississippian-age shales and sandstones (Ohio Division of Geological Survey, 1998).

The predominant uppermost bedrock units within the Project Area are the Logan and Cuyahoga Formations (Mlc), undivided (Upper and Lower Mississippian) followed by the Sunbury Shale, Berea Sandstone, and Bedford Shale (MDsb), undivided (Lower Mississippian and Upper Devonian (see Figure 2)). The Logan and Cuyahoga formation is composed of shale, siltstone, sandstone, conglomerate and limestone. This formation is comprised of multiple units; however, the Maxville Limestone, is regionally located within the Study Area. The Maxville Limestone is crystalline to coarse grained, interbedded with chert and shale, locally dolomitic and fossiliferous. The Sunbury Shale, Berea Sandstone, and Bedford Shale consists of Brownish black, brown and gray shale, siltstone, and sandstone (Ohio Division Geological Survey, 2006).

The bedrock topographic surface is shown on Figure 3. The top of bedrock occurs at approximately 850 to 900 feet msl in the southern and eastern portion of the Project Area. The top of bedrock decreases to elevations between 600 and 650 feet msl in the northern portion of the Project Area. ODNR water well logs obtained for the Project Area indicate bedrock was encountered at a minimum depth of 45 feet below ground surface (bgs) at one location and below a depth of 213 feet bgs at another location.

Karst Topography

Information obtained from ODNR, Division of Geological Survey, was used to prepare Figure 4. As shown on the figure, there are no verified or suspect karst areas identified within the Study Area. The nearest karst features are unverified and located approximately 7.5 miles west of the Project Area in Franklin County. (ODNR Web, 2020).

Seismicity

Structural features (e.g. faults, folds) and earthquake epicenters within the Study Area are shown on Figure 5. A review of the geologic and seismic information indicated that no historical earthquake epicenters are mapped within the Project Area or within Licking County. The nearest seismic events, with a magnitude of 1.5 and 2.9, in 2016 and 1870, respectively, were in Fairfield County. The earthquake epicenters are approximately 18 miles south-southeast of the Project Area (ODNR Web, 2020). There are no mapped faults located within the Project Area. The nearest fault, the Harlem Fault, is located approximately 16 miles north-northwest of the Project Area.

The design of the Facility will follow the Ohio Building Code (OBC) which has provisions for earthquake design data.

Hydrology and Hydrogeology

Surface water flow within the Project Area is generally toward the south to southeast. The entire Project Area is located within the Ohio River Drainage Basin. Surface water bodies present within the Project Area include the South Fork Licking River, located in the southwestern portion of the Project Area, and its unnamed tributaries. To the north of Refugee Road, the South Fork Licking River generally flows north to south. Upon crossing to the southern side of Refugee Road, the South Fork Licking River flows west to east, exiting the Study Area. Surface water runoff flows into tributaries of the South Fork Licking River which generally bisects the northeastern and western portions of the Project Area. The South Fork Licking River continues to flow generally eastward into the Licking River, which drains into the Muskingum River and then into the Ohio River.

Figure 6 was prepared using information obtained from the ODNR and FEMA and shows there are 100-year floodplains areas mapped within the southern and western portions of the Project Area surrounding the South Fork Licking River. A 100-year floodplain is an area where an extreme hydrologic event could result in a flood having a 100-year recurrence interval (i.e., a flood of that magnitude has a 1 percent chance of happening in any given year). The Client has confirmed that the Facility will not be constructed within the 100-year floodplain. All areas within the Project Area outside the 100-year floodplain are designated by FEMA as an Area of Minimal Flood Hazard. Therefore, construction of the Facility should have minimal impact on the surface drainage in the Project Area. Conversely, there should be minimal impact to the Facility as a result of surface water flow in the Project Area.

All or portions of approximately seven potential wetland areas were noted by the National Wetlands Inventory and are located sparsely across the Project Area. These areas are shown on Figure 6. These potential wetland areas appear to be relatively small in size and concentrated in the central and northern portion of the Project Area. What appears to be a pond and wetlands bordering the South Fork Licking River and its tributary are located in the southern and western portions of the Project Area.

The Ground Water Resources of Licking County (Hartzell, 1982) indicates the principal groundwater sources for the majority of the Project Area are the sand and gravel deposits located along the valleys of the South Fork Licking River and its tributaries. Figure 7 includes the aquifers in the Project Area, the Johnstown-Groveport Complex Aquifer and the South Fork Licking Buried Valley Aquifer. Yields approaching 100 to

200 gpm are possible in the thick sand and gravel deposits along the valley of South Fork Licking River while yields approaching 20 gpm can be developed in the valleys of the smaller tributaries.

The Project Area lies within a rural area. Some property owners within the Project Area utilize private wells to supply potable water. Locations of these water wells are shown in Figure 7. Hull reviewed over 25 Well Log and Drilling Reports that were reportedly located within an area including the Project Area and an approximate 500-foot area around the Project Area. The well locations are shown on Figure 7 and the Well Log and Drilling reports are included as Attachment A. The majority of the wells were installed within sand and/or gravel deposits at depths of 45 feet or more bgs. Static water levels measured in the wells completed in the sand and gravel ranged from 12 to 84 feet bgs depending on the depth of the well. At least six of the wells were installed in the underlying bedrock, either in sandstone, shale or limestone. Sandstone was encountered in one well at a depth of 45 feet bgs. One of the sand and gravel wells was completed at a depth of 213 feet bgs with no indication of any bedrock on the well log. Static water levels measured in the bedrock wells also ranged from approximately 12 feet to 48 feet depending on the formation and depth of the well.

The presence of Source Water Protection Areas (SWPAs) for public water systems within the Project Area was evaluated. SWPAs are areas defined and approved by the Ohio EPA for the purpose of protecting drinking water resources. The SWPA map provided by Ohio EPA, Division of Drinking and Ground Waters, included in Attachment B shows SWPAs on the western and southern portions of the Project Area for the Pataskala City and Southwest Licking Community Water Systems, respectively. (Ohio Environmental Protection Agency Web, 2020).

Environmental regulatory programs of the Ohio EPA, as well as other regulatory agencies such as the Ohio Bureau of Underground Storage Regulations (BUSTR), have adopted regulations that restrict specific activities within SWPAs. These activities include concentrated animal feeding operations, wastewater treatment land application systems, industrial, municipal and residual waste landfills, leaking underground storage tanks (LUSTs), and voluntary action program (VAP) cleanups. The restrictions typically apply to SWPAs relying on groundwater as their drinking water source. Hull has reviewed the range of programs which have adopted rules related to the presence of SWPAs and has concluded that construction of the proposed solar farm facility will not constitute an activity that would be restricted within either a surface water or groundwater SWPA.

Well Survey

Hull mailed a brief well survey to one property owner within the Project Area that was under contract with the Client at the time the hydrogeology review commenced in January 2021. The name and address for the property owner was provided by the Client. The survey included multiple questions regarding the number, depth, installation date, and construction of wells on their properties. Additional information was requested regarding the aquifer type, depth to water, and yield of each well. The survey also requested information regarding any problems experienced by the property owners with their wells.

This property owner indicated that there were no working wells located on their property, and that the well had been abandoned.

Oil and Gas Wells and Injection Wells

Based on the geocoding of oil and gas wells and active Class II injection wells from ODNR, no oil & gas wells are located within the Project Area. The closest oil & gas well is located approximately 152 feet east of the Project Area with the status of a "dry hole". The closest active oil & gas well is located approximately

3,425 feet southeast of the Project Area. There are no Class II injection wells within 10 miles of the Project Area. Oil and gas well locations are shown in Figure 7.

Soil Survey

Soil surveys provide maps of surficial soils and general descriptions of the various soil types over the survey area and can be used as a tool to compare the suitability of large areas for general land uses. The majority of the surficial soils within the Project Area include 26.1% Centerburg Silt loam (CeB), 23.4% Pewamo silty clay loam, low carbonate till (Pa), 20.3% Bennington silt loam, 2 to 6% slopes (BeB), and 12.2% Bennington silt loam, 0 to 2% slopes (BeA) (USDA Web, 2020). The remainder of the Project Area is covered by various silt and silty-clay loams as show in the soil types map, Figure 8.

The soil survey information suggests that the silty loams range from 0 to 6 percent slopes. The Pewamo silty clay loam is very poorly drained, Bennington silt loams are somewhat poorly drained, and the Centerburg silt loam is moderately well drained. The permeability of the Pewamo and Centerburg silt loam are moderately high whereas both Bennington silt loams are moderately low to moderately high. Available water capacity for the Bennington, Centerburg and Pewamo loams ranges from 8.0 to 8.5 inches. Depth to the seasonal high-water table include Bennington soils 6 to 12 inches, Pewamo soils 0 to 12 inches and Centerburg soils 12 to 24 inches (USDA Web, 2020).

Underground and Surface Mines

Information obtained from the ODNr Division of Mineral Resources (ODNR Web, 2020) indicates that there are no mapped abandoned underground or surface mines in the Project Area. The nearest mines to the Project area are two active surface mines operated by Shelly Materials, Inc and Brookside Materials, LLC approximately 7.5 miles north of the Project Area. Figure 9 illustrates that no known coal, underground, abandoned, or surface mines are mapped within the Project Area.

PROJECT AREA RECONNAISSANCE

Hull completed a field reconnaissance of the Project Area on October 9, 2020, to observe site conditions including topography, surface geologic features, and surface water conditions. The areas within and adjoining the Project Area predominantly consist of agricultural fields. In general, the Project Area appears to be adequately drained. However, it should be noted that no significant rain events had occurred within several days prior to this reconnaissance. Based on a review of the existing topography of the Project Area and the visual observations completed by Hull, it is anticipated that the potential for rockfalls and landslides is very low due to the relative flat topography of the Project Area. In addition, due to crop vegetation, Hull did not observe sinkholes, depressions, or evidence of karst topography within the Project Area. Representative photographs from the site reconnaissance and a photo location map are presented in Attachment C which illustrate the general Project Area conditions.

AGENCY INTERVIEWS

Hull contacted the ODOT District 5 and Licking County Engineer's offices to inquire about their knowledge and experience of previous construction projects, subsurface conditions, and maintenance history within the Project Area. Jared Knerr, P.E., P.S. with the Office of the Licking County Engineer indicated that little information was available for the vicinity of the Project Area and was unable to provide any information regarding subsurface conditions or maintenance history within the Project Area.

Nikunj Kadakia, P.E. with ODOT District 5 directed us to ODOT's Transportation Information Mapping System (TIMS) to review any available information near the project area. The ODOT TIMS indicated that borings for

two ODOT projects were completed within one mile to the south of the Project Area; one project completed in 2013 near the intersection of Refugee Road and York Road and the other on Watkins Road south of Refugee Road. These borings indicated that subsurface soils at these locations generally consisted of very loose to medium dense gravel and sand or medium stiff to very stiff sandy silt with variable sand, clay and gravel to the termination depths of the borings (i.e., approximately 40 to 75 feet bgs).

Finally, it should be noted that ditch and drain tile crossings that are maintained by the County Engineer, if present, will likely require crossing permits.

PRELIMINARY CONSTRUCTION CONSIDERATIONS

Based on our understanding of the Project Area (as discussed above), our experience with earthwork in the region and our understanding that solar array equipment is lightly loaded, and conventional driven steel piles and/or helical piles are typical foundation support for solar modules, we believe the Project Area and subsurface conditions can support the proposed site development. However, this will need to be confirmed through geotechnical exploration and evaluation for each solar array site (i.e., each solar module and associated access road locations). If it is determined that driven steel piles or helical piles are not suitable for structural support, alternate foundation systems, such as auger cast piles, concrete foundations, ballasted foundations, or rammed aggregate pier systems, may be necessary to support solar modules and site improvements. The Geotechnical Engineer should evaluate the subsurface conditions at the site as a basis for determining appropriate foundation support of the planned improvements, review foundation designs and suitability for the site soils, and approve the work prior to construction of foundation components.

Based on the information collected to date, it is anticipated that there will be limited risk associated with construction concerns related to the access roads. Like any preparation work related to access roads, localized subgrade areas may need to be stabilized by undercutting, chemical stabilization, placement of geogrid reinforcement, etc. However, this assumption will need to be confirmed by a geotechnical exploration and evaluation of each access road location.

Adequate surface water runoff drainage should be established at each solar array, access road, and other improvement locations to minimize the potential to increase in the moisture content of the subgrade material. Surface water runoff should be properly controlled and drained away from the work areas during construction. Positive drainage should be created by gently sloping the ground surface toward existing or proposed drainage swales. It should be noted that the subgrade soils are subject to shrinking and swelling with variation in seasonal moisture content and consideration should be given during constructability reviews to determine how best to deal with potential moisture fluctuations.

Site dewatering may be required during construction if excavations extend below the water table, or significant precipitation events occur when foundation excavations are exposed. The contractor should be able to minimize the amount of excavation exposed at one time, especially when precipitation is forecasted. Fluctuations in the groundwater level may occur seasonally due to variations in rainfall, construction activity, surface runoff, and other factors. Because such variation is anticipated, we recommend that design drawings and specifications accommodate such considerations and that construction planning be based on the assumption that such variation can occur.

It is understood that the foundations and excavations are to be designed by the Client's structural designer. The contractor should be solely responsible for constructing stable, temporary excavations and should shore, slope, or bench the sides of excavations as required to maintain stability of both the excavation sides and bottoms. All excavations should comply with applicable local, state, and federal safety regulations including

the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards (29 CFR Part 1926).

Based on a review of the soil survey information and our experience with earthwork in the Study Area, the soils are expected to be suitable for grading, compaction, and drainage when each solar array is prepared as discussed in the Geotechnical Engineering Report to be prepared for the project. Due to the apparent depth of bedrock, it is anticipated that excavation within bedrock will be unlikely within the Project Area. Furthermore, no karst areas were identified in the Project Area. We recommend that a final geotechnical investigation be performed to determine recommendations for the final foundation system and access road design and construction.

Additional considerations relative to site preparation, suitability of fill materials, fill placement and weather limitations are presented in Attachment D for reference. These considerations are provided as general guidelines and may not be applicable to site-specific conditions. The contractor is responsible for selecting and implementing the most appropriate construction techniques (e.g., construction means, methods, sequences or procedures, and safety precautions or programs) for each site-specific condition(s).

SUMMARY

Based on the information reviewed to date and the field reconnaissance, it does not appear that the local geology and/or hydrogeology will be prohibitive regarding construction of the proposed solar modules, access roads, and associated site improvements. Likewise, based on Hull's knowledge of typical solar module foundation construction, it does not appear that the construction of the proposed solar array will have a significant impact on the local geology and/or hydrogeology of the Project Area.

The 100-year floodplain areas mapped within the Study Area are mostly surrounding the South Fork Licking River along the western portion of the Project Area. Construction and operation of the Facility is anticipated to necessitate only minor grading that would not result in significant changes to the topography within the Project Area. Therefore, construction and operation of the Facility is not anticipated to result in any significant negative impact to the 100-year floodplain.

Based on the construction and operation of the Facility, there will be no hazardous substances and/or petroleum underlying or emanating from the Project Area. All oils used within the electrical substation will be non-polychlorinated biphenyls (PCBs) and a spill control plan will be prepared if applicable. Review of the Well Log and Drilling Reports for wells installed and adjoining the Project Area indicate that the depth to water bearing units in the Project Area appears to be a minimum of approximately 45 feet bgs across the Project Area. Therefore, it is unlikely that the construction and operation of the Facility will impact public and private water supplies. With the methods of construction and operation of the Facility, no pollution control equipment will be required.

As previously discussed, adequate surface water drainage should be established at each Project Area, access road, and array location to minimize any increase in the moisture content of the subgrade material. Surface water drainage can be managed by implementing techniques such as surface water swales, drainage berms, etc. Based on a review of the soil survey information and our experience with earthwork in the Study Area, the soils are expected to be suitable for grading, compaction, and drainage for the solar arrays. During construction, topsoil will be removed and stockpiled from areas where soils are planned to be disturbed. The stockpiled topsoil will be reused during site restoration activities to provide a surficial layer that supports vegetation growth. Site-specific geotechnical information should be obtained by the Client prior to design of the solar array foundations, and prior to preparation of construction specifications

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and design plans. This may require, but not be limited to, completion of geotechnical explorations to further evaluate the *in-situ* materials at each location. A generalized scope of work template for the geotechnical explorations has been provided in Attachment E, which can be used to prepare detailed Requests for Proposals for the individual Facilities.

The conclusions included in this Desktop Document Review are based on general summaries available through the resources previously listed. There may be anomalies in the hydrogeology or geotechnical conditions of a specific Facility that cannot be resolved at the scale of the publicly available data used in this study. As noted previously, site-specific geotechnical information should be obtained/reviewed prior to final solar array foundation design and construction.

STANDARD OF CARE

Hull has performed its services using that degree of care and skill ordinarily exercised under similar conditions by reputable members of its profession practicing in the same or similar locality at the time of service. No other warranty, expressed or implied, is made or intended by our proposal or by our oral or written reports. The work does not attempt to evaluate past or present compliance with federal, state, or local environmental or land use laws or regulations. Conclusions presented by Hull regarding the area within the Project Area are consistent with the Scope of Work, level of effort specified, and investigative techniques employed. Reports, opinions, letters, and other documents do not evaluate the presence or absence of any condition not specifically analyzed and reported. Hull makes no guarantees regarding the completeness or accuracy of any information obtained from public or private files or information provided by subcontractors. If you have any questions regarding the summary and conclusions presented in this Desktop Document Review, please do not hesitate to contact either of the undersigned at your convenience.

Sincerely,



Cory E. Schoonover
Project Manager



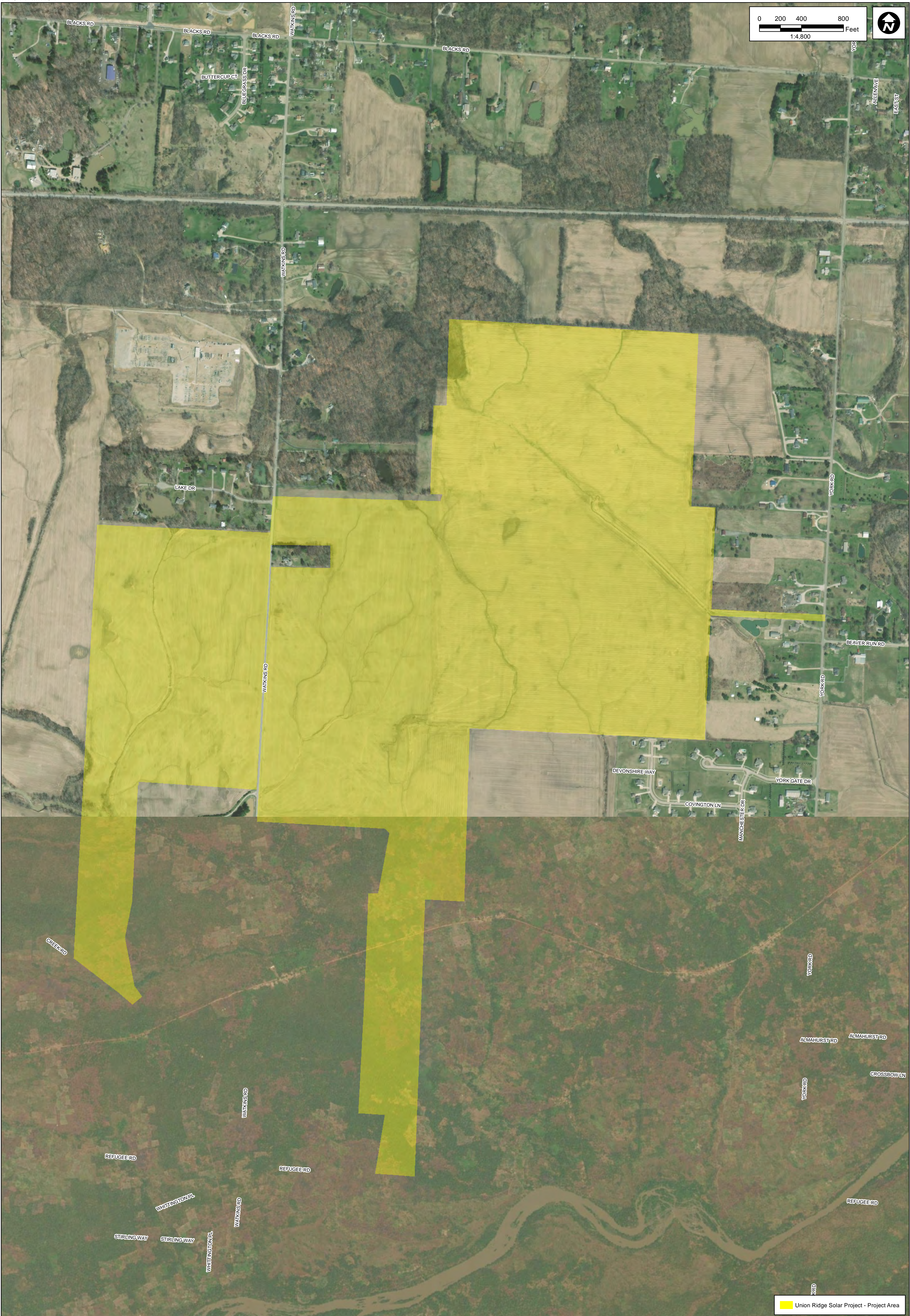
Trent Hathaway, P.E.
Project Engineer

Attachments

REFERENCES

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9. United States Department of Agriculture, *Web Soil Survey*. Retrieved September 2020, from Natural Resources Conservation Service-site: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>
10. Hartzell, Glenn W., 1982, Ground-Water Resources of Licking County, Ohio Department of Natural Resources, Division of Water.

FIGURES



Note:
The aerial photo was acquired through the Esri Imagery web service. Aerial photography dated 2019.

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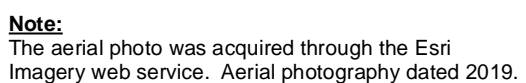
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Geology and Hydrogeology Report

Project Map
Licking County, Ohio

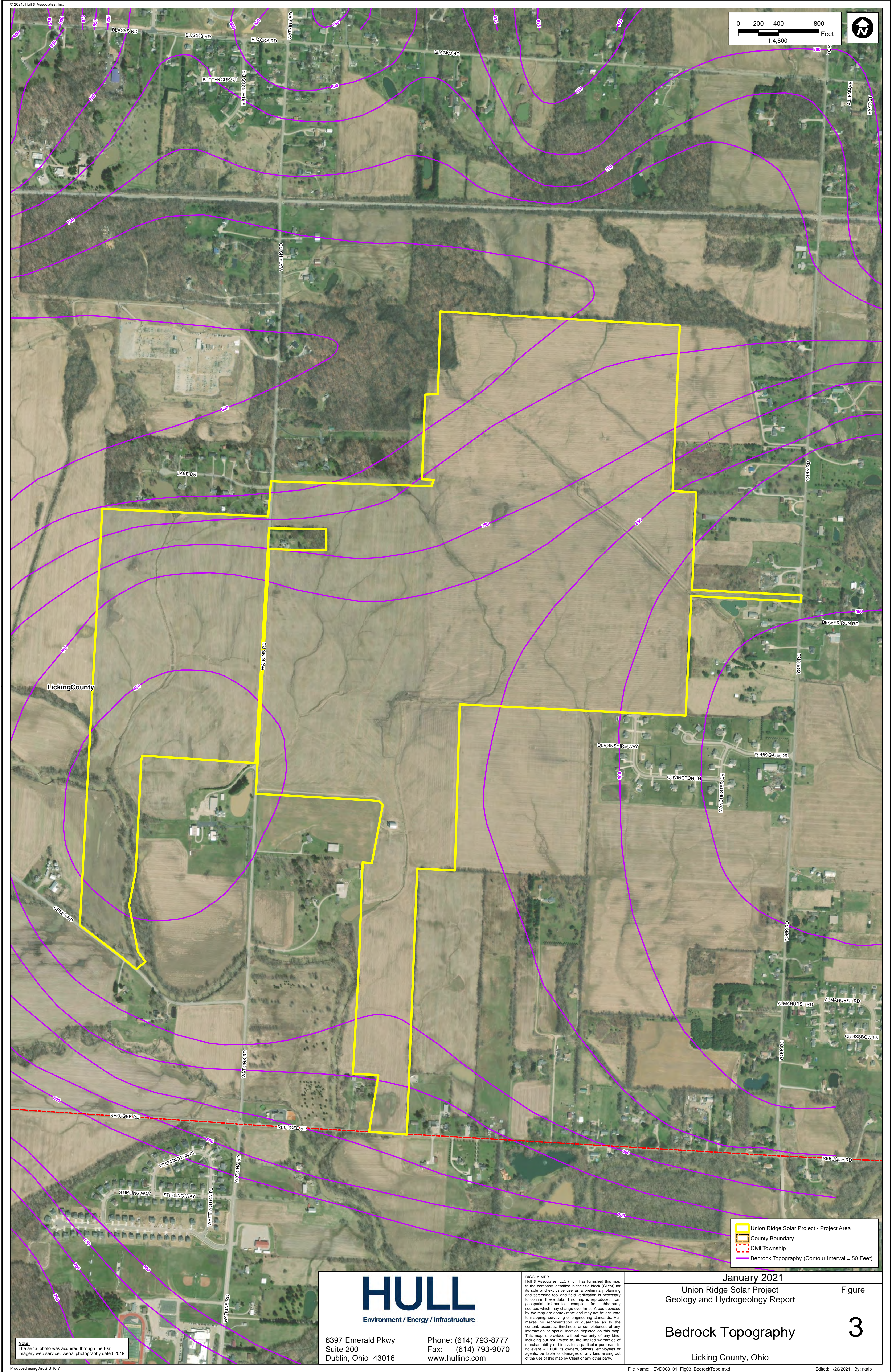
Figure
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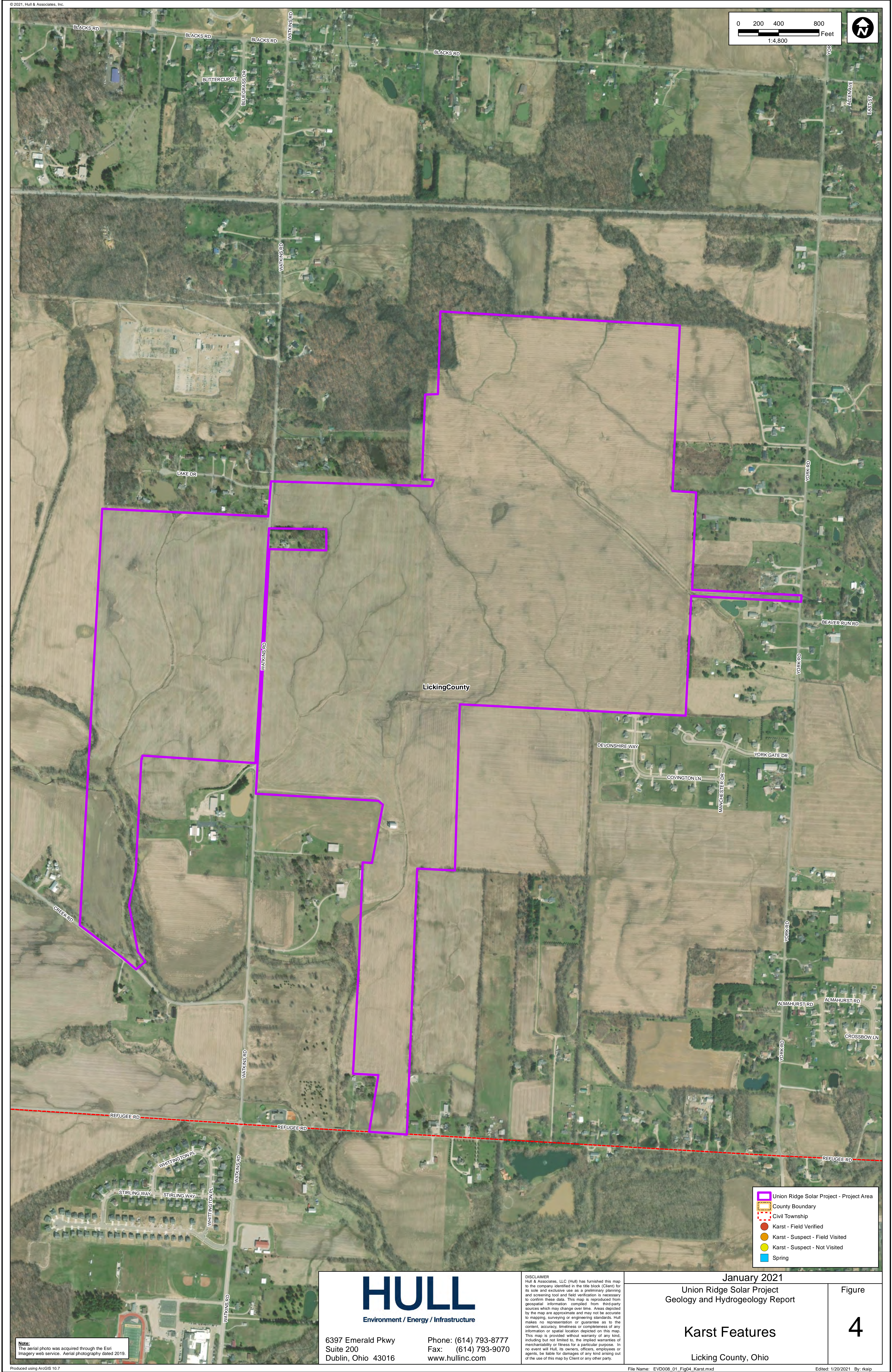


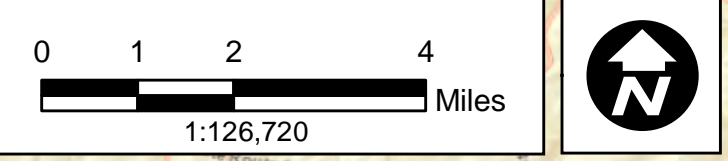
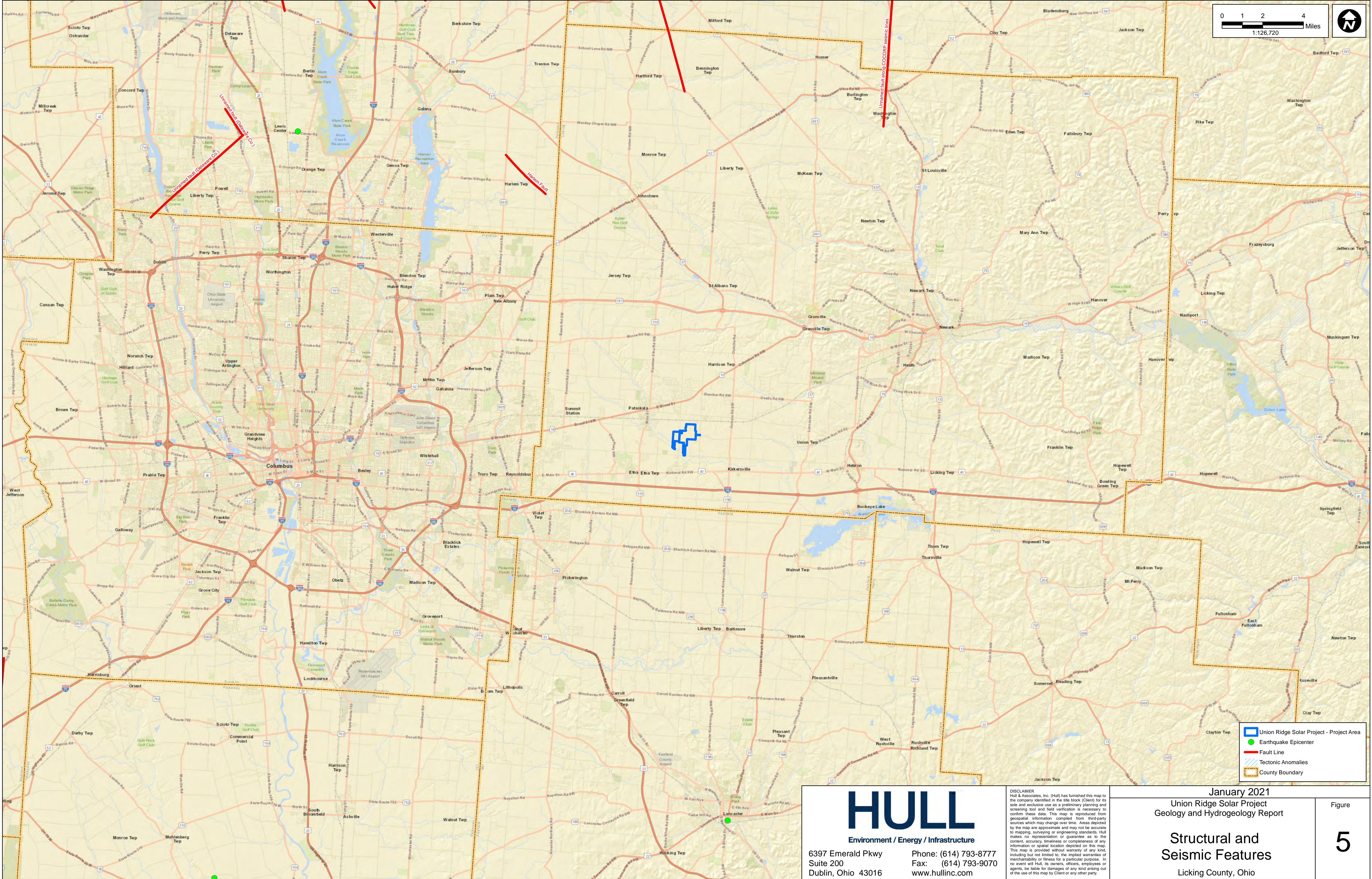
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Licking County, Ohio

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- Union Ridge Solar Project - Project Area
- Earthquake Epicenter
- Fault Line
- Tectonic Anomalies
- County Boundary

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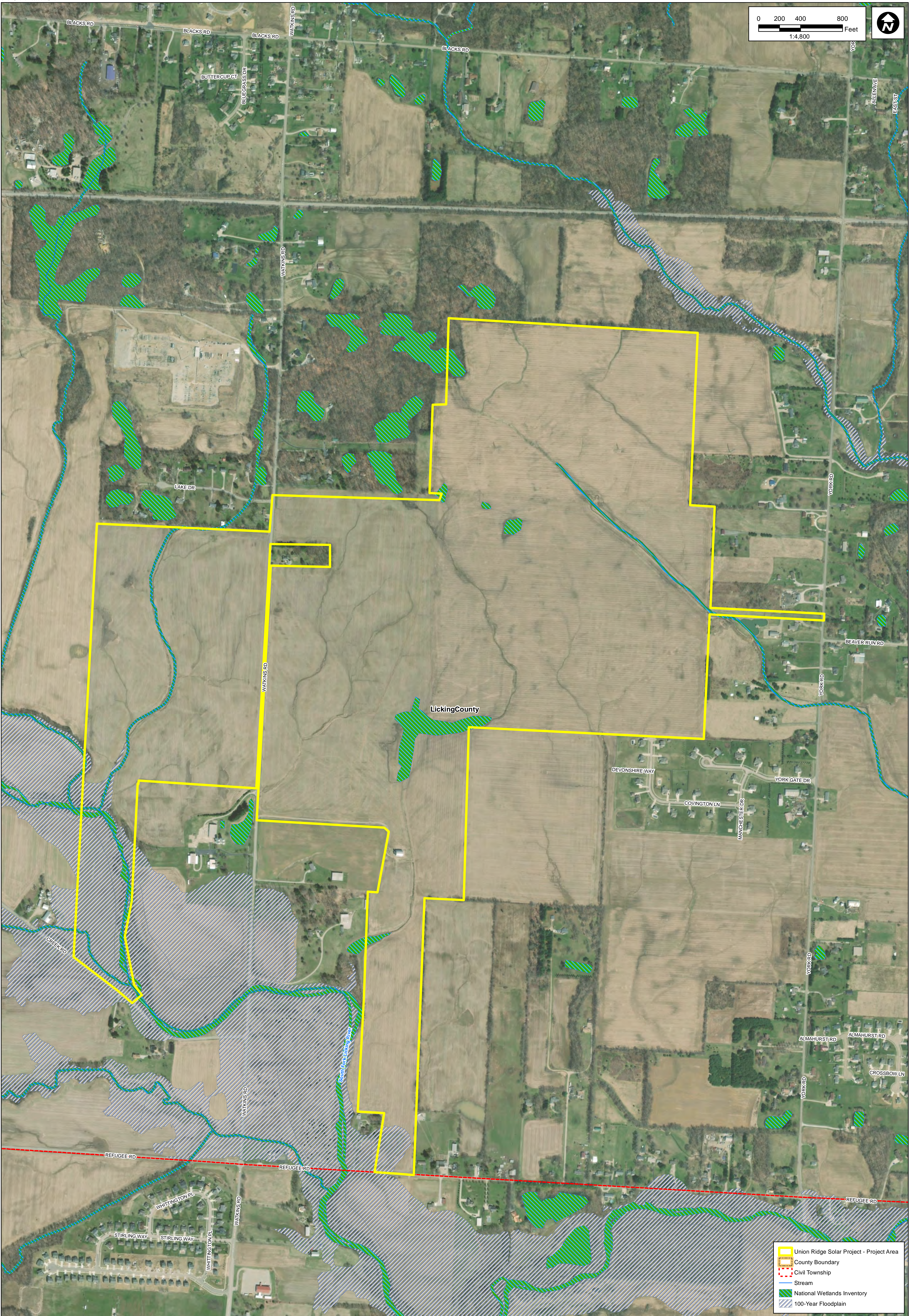
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**Structural and
Seismic Features**
Licking County, Ohio

Figure
5



Note:
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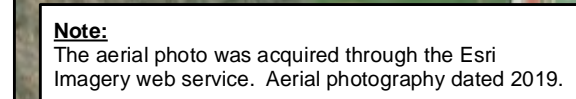
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January 2021
Union Ridge Solar Project
Geology and Hydrogeology Report
**Surface Water, Floodplain,
and Wetland Information**

Licking County, Ohio

Figure
6



6397 Emerald Pkwy
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
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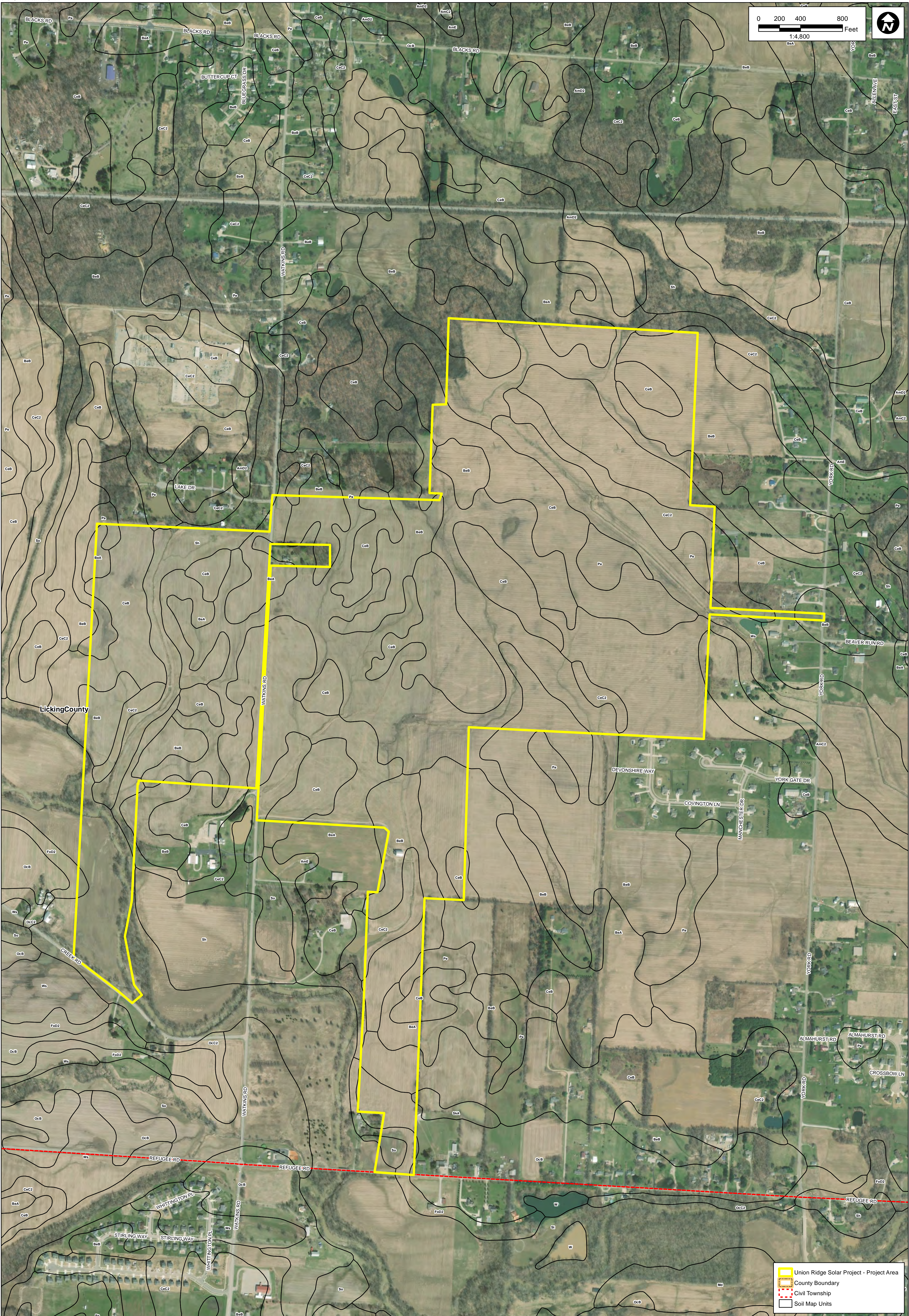
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Aquifers and Wells

Licking County, Ohio

Figure

7



Note:
The aerial photo was acquired through the Esri Imagery web service. Aerial photography dated 2019.

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Environment / Energy / Infrastructure

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Dublin, Ohio 43016

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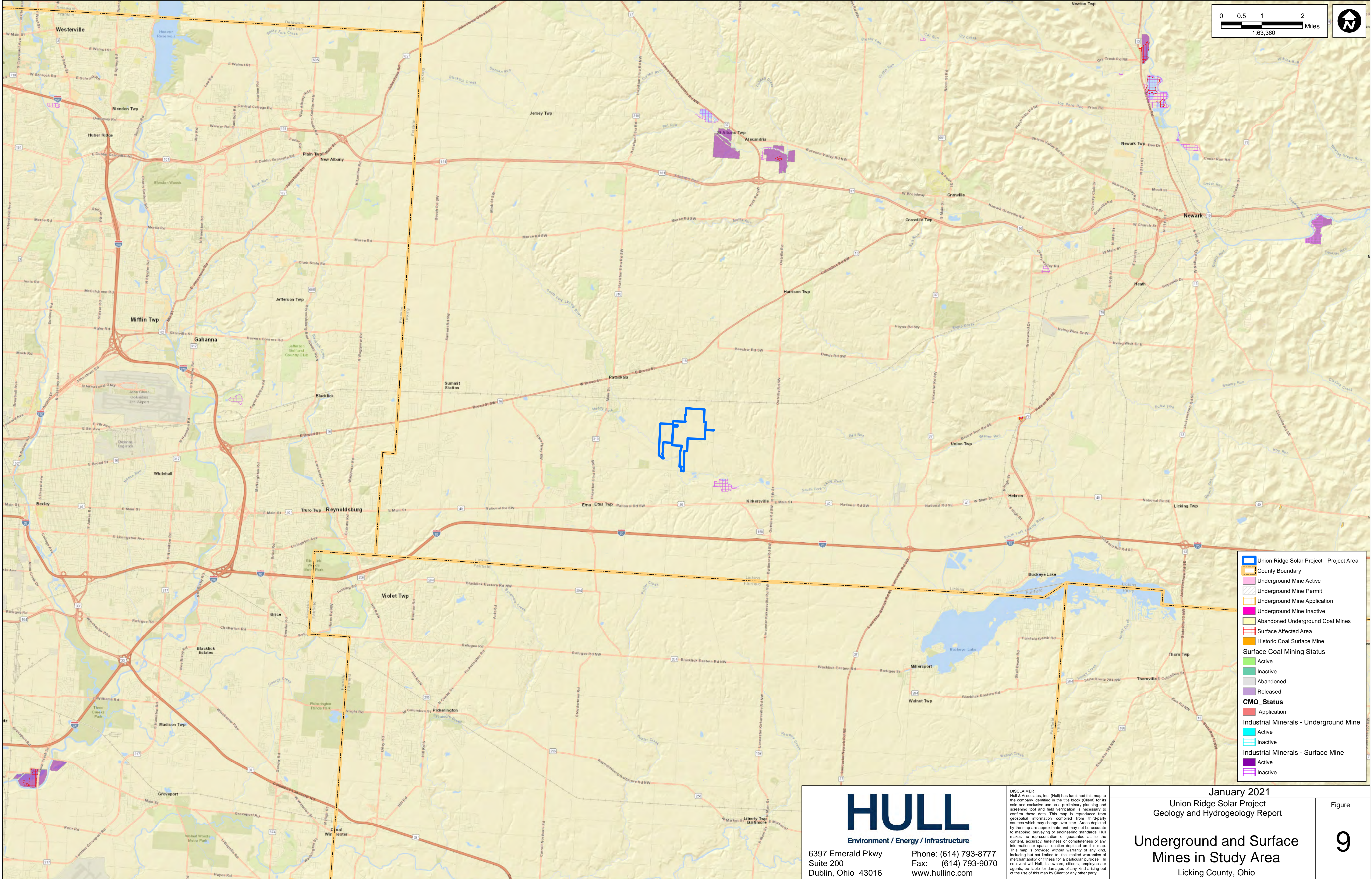
January 2021
Union Ridge Solar Project
Geology and Hydrogeology Report

Soil Types

Licking County, Ohio

Figure

8



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January 2021
Union Ridge Solar Project
Geology and Hydrogeology Report

Underground and Surface
Mines in Study Area
Licking County, Ohio

Figure

9

ATTACHMENT A

Well Logs and Drilling Records

ORIGINAL
Searched by [illegible] #120

**Division of Water
1562 W. First Avenue
Columbus, Ohio 43212**

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL

Nº 4342794

**1562 W. First Avenue
Columbus, Ohio 43212**

Location of property Licking Co. Rd. 30 - Harrison Twp.

BAILING OR PUMPING TEST

Pumping Rate 30 G.P.M. Duration of test 2 hrs.
 Drawdown 8 ft. Date 1-18-67
 Static level-depth to water 19' ft.
 Quality (clear, cloudy, taste, odor) MILKY
 Pump installed by _____

SKETCH SHOWING LOCATION

Locate in reference to numbered
State Highways, St. Intersections, County roads, etc.

N.

ST #16

W.

Pe. RR, & B+C

E.

S.

See reverse side for instructions

Date Jan. 18, 1967 **LOCATED**
Signed W.W. Watson

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL
OR TYPEWRITER

DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES

Division of Water

1562 W. First Avenue
Columbus, Ohio 43212

No. ⁸⁶ 371835

County Licking Township Harrison Section of Township _____

Owner Walter Weaver Address RR 1 Pataskala

Location of property Ohio River Twp 151

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing 55'

Type of screen 510TS Length of screen 2'

Type of pump SVOM

Capacity of pump 800 g.p.m.

Depth of pump setting 40'

Date of completion 9-14-69

BAILING OR PUMPING TEST

Pumping Rate 15 G.P.M. Duration of test 1 hrs.

Drawdown 10 ft. Date 9-13-69

Static level-depth to water 20 ft.

Quality (clear, cloudy, taste, odor)

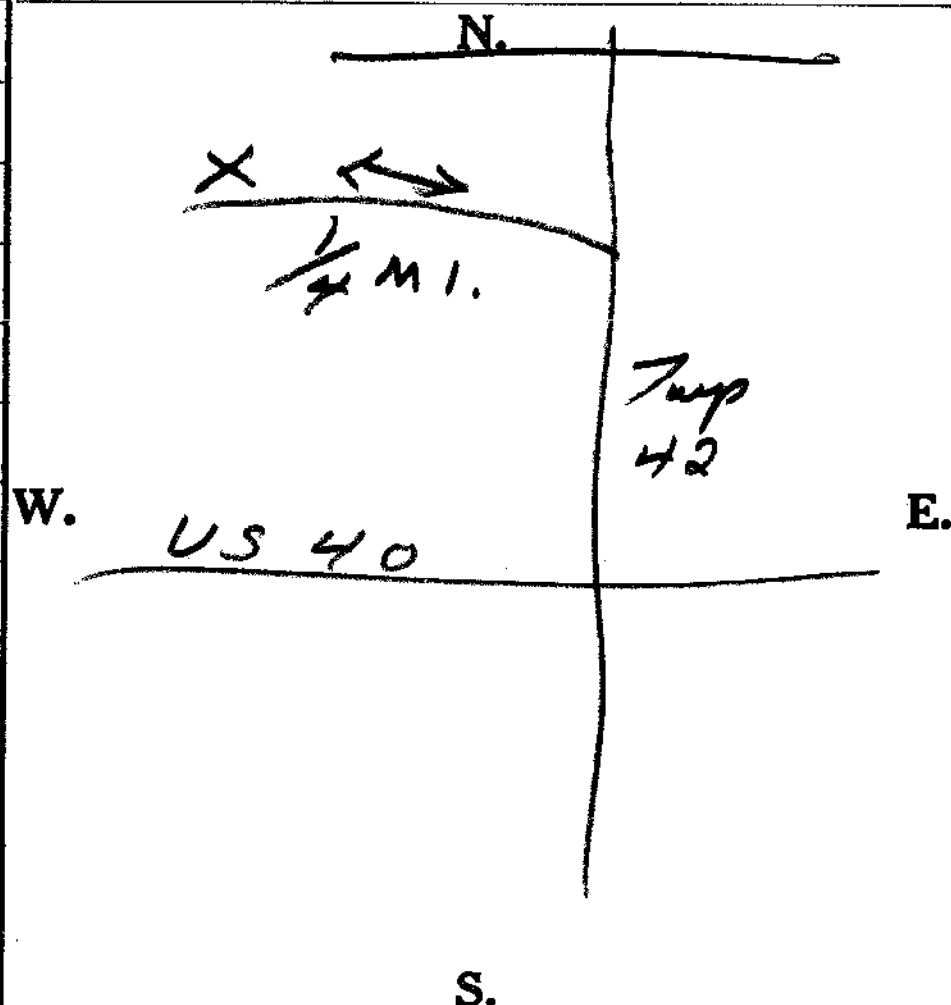
Pump installed by Leidichner

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
<u>Clay</u>	0 Feet	8 Ft.
<u>Dry sand</u>	8	35
<u>Sand 3 g.p.m.</u>	35	36
<u>Clay</u>	36	50
<u>Sand</u>	50	55

SKETCH SHOWING LOCATION

Locate in reference to numbered
State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Leidichner

Address Buckeye Lake, Ohio

Date 9-18-69

Signed W. R. Leidichner

LOCATED

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

ORIGINAL

NO CARBON PAPER
NECESSARY—
SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

No. 87 421006

County LICKING Township HARRISON Section of Township _____
Owner NIP ZEUNE Address R#2 PATASKALA. O
Location of property R# 42

CONSTRUCTION DETAILS 1 1/2" PIPE	BAILING OR PUMPING TEST (Specify one by circling)
Casing diameter <u>5 1/2" O.D.</u> Length of casing <u>132'</u>	Test Rate <u>24</u> G.P.M. Duration of test <u>2</u> hrs.
Type of screen _____ Length of screen <u>none</u>	Drawdown <u>35</u> ft. Date <u>4/28/71</u>
Type of pump <u>3/4 H.P. WEBTROL SUB.</u>	Static level-depth to water <u>48</u> ft.
Capacity of pump <u>15 G.P.M.</u>	Quality (<u>clear</u> , cloudy, taste, odor) _____
Depth of pump setting <u>105'</u>	
Date of completion <u>5/1/71</u>	Pump installed by <u>RAY VOLLMUTH Co.</u>

WELL LOG*			SKETCH SHOWING LOCATION
Formations Sandstone, shale, limestone, gravel and clay	From	To	Locate in reference to numbered State Highways, St. Intersections, County roads, etc.
<u>CLAY</u>	<u>0 Feet</u>	<u>118 Ft.</u>	<div style="text-align: center;"> <p>N.</p> <p>W. E.</p> <p>S.</p> </div>
<u>GRAY SHALE</u>	<u>118</u>	<u>143</u>	
<u>" HARD SHALE</u>	<u>143</u>	<u>155</u>	
<u>WATER</u>			

Drilling Firm Ray Vollmuth Co. Date 5/1/71
Address R#3 Pataskala, O Signed Ray Vollmuth

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

ORIGINAL

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

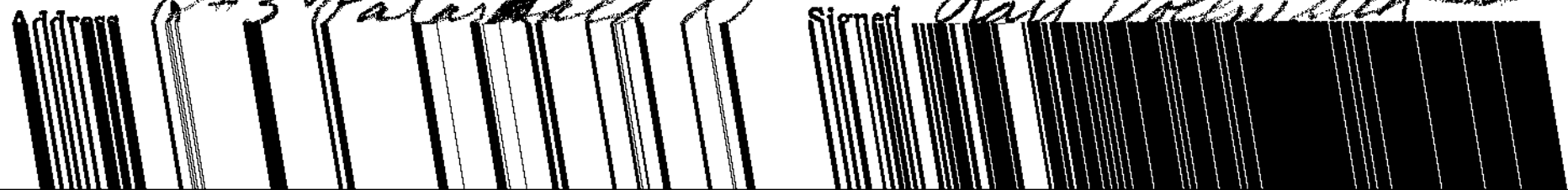
8437989

County LICKING Township HARRISON Section of Township _____
Owner RALPH E. DELONG Address WAGRAM RD. REYN. OHIO
Location of property ESSEX ADD. OFF R# 42

CONSTRUCTION DETAILS	BAILING OR PUMPING TEST (Specify one by circling)
Casing diameter <u>5 1/2" OD</u> Length of casing <u>56'</u>	Test Rate <u>12</u> G.P.M. Duration of test <u>2</u> hrs
Type of screen <u>DRILLED</u> Length of screen <u>4'</u>	Drawdown <u>4</u> ft. Date <u>11/24/72</u>
Type of pump <u>1/3 HP SUB.</u>	Static level-depth to water <u>16</u> ft.
Capacity of pump <u>10 G.P.M.</u>	Quality (clear, cloudy, taste, odor) _____
Depth of pump setting <u>45'</u>	Pump installed by <u>RAY VOLLMUTH CO.</u>
Date of completion <u>11/24/72</u>	

WELL LOG*			SKETCH SHOWING LOCATION
Formations Sandstone, shale, limestone, gravel and clay	From	To	Locate in reference to numbered State Highways, St. Intersections, County roads, etc.
<u>CLAY</u>	<u>0 Feet</u>	<u>51 Ft.</u>	<p>N.</p> <p>W. ESSEX ADD.</p> <p>R# 151</p> <p>R# 42</p> <p>R# 40</p> <p>S.</p>
<u>SAND & GRAVEL</u>	<u>51</u>	<u>56</u>	
<u>WATER</u>			

Drilling Firm Ray Vollmuth Co. Date 11/25/72
R#3 Pataskala P.
 Signed Ray Vollmuth



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SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

563625

 C_n

COUNTY Seckong TOWNSHIP Harrison SECTION OF TOWNSHIP _____
OWNER Fred Goldstein ADDRESS 8725 Creek Rd S.W
LOCATION OF PROPERTY 8725 Creek Rd S.W

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing 8.5'
Type of screen perf Length of screen 1'
Type of pump 1/2 Myers sub.
Capacity of pump 1490 m
Depth of pump setting 42'
Date of completion _____

BAILING OR PUMPING TEST

(specify one by circling)

Test rate 15 gpm Duration of test _____ hrs
Drawdown No ft Date _____
Static level (depth to water) 22 ft
Quality (clear, cloudy, taste, odor) _____
Clear
Pump installed by _____

WELL LOG#

[illegible]

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.

N

W

E

Creek Rd

Watkins Rd

0.22 mi. W of CR 42

S. side (new)

W of Miller house

S

DRILLING FIRM Bunkowen Bros
ADDRESS Johnstown O

DATE 12-3-83
SIGNED Wm Montgomery

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

592254

COUNTY Licking TOWNSHIP Harrison SECTION OF TOWNSHIP _____
OWNER Harry W. Zeune ADDRESS Watkins Rd. S.W.
LOCATION OF PROPERTY Watkins Rd just North of Creek Rd Pataskala O.

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing 90'
Type of screen None Length of screen —
Type of pump 1/2 hp Sub Pump
Capacity of pump 12 gpm
Depth of pump setting 80'
Date of completion 6-27-84

BAILING OR PUMPING TEST

(specify one by circling)

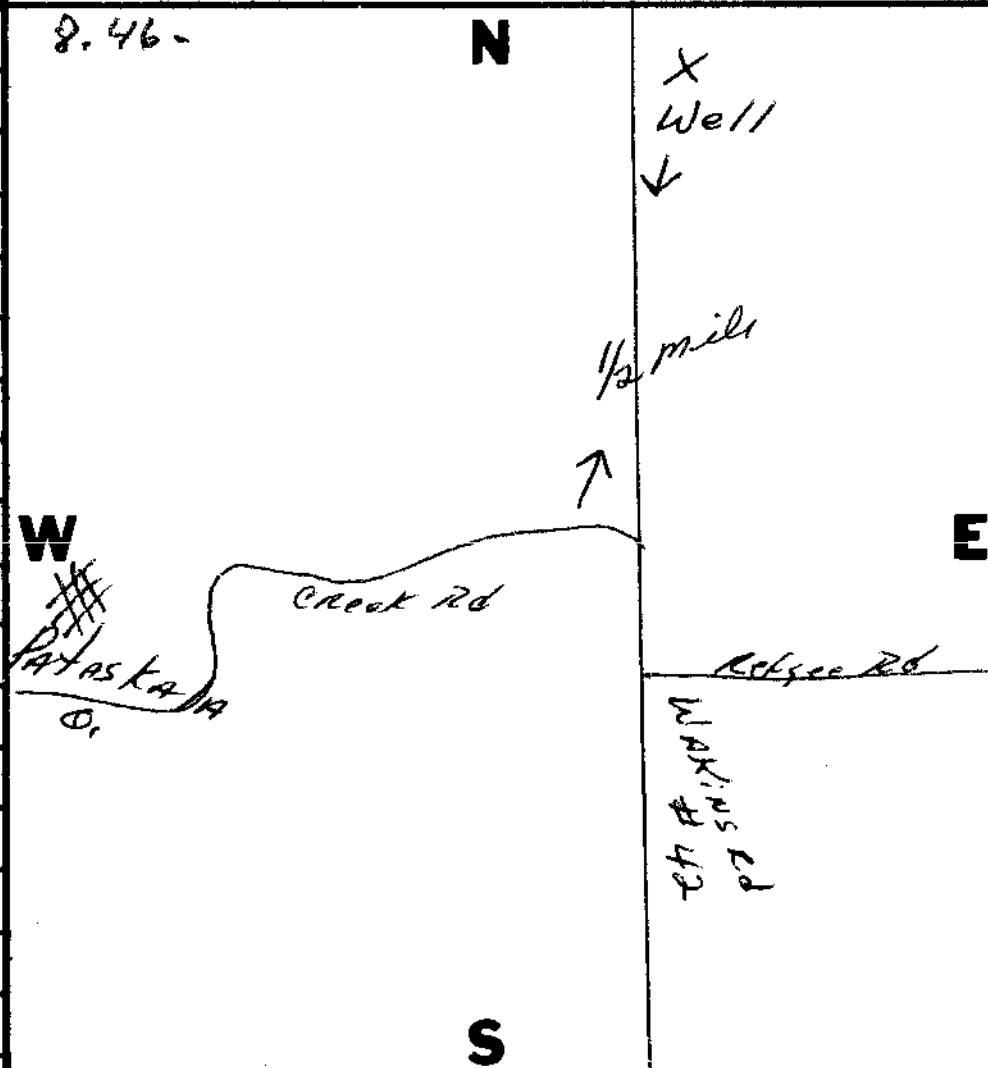
Test rate 20 gpm Duration of test 2 hrs
Drawdown 2' ft Date 6-25-84
Static level (depth to water) 35' ft
Quality (clear, cloudy, taste, odor) Clear
Pump installed by Charles Allen Drilling Co.

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
Top Soil & Brown Clay	0 ft	24 ft
GRAY CLAY	26	34
BANK RUN dry Gravel	34	39
Soft GRAY CLAY	39	45
Fine Sand & Gravel CLAY	45	56
Clay w/scattered Gravel	56	71
Coarse Gravel w/Sand	71	79
Soft GRAY CLAY (Rock mud)	79	83
GRAY Bed Rock	83	140
Most water at		
110'-130'		

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM Charles Allen Drilling
ADDRESS Main St Pataskala O.

DATE 6-27-84
SIGNED Charles Allen

WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

592292

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP _____
OWNER MARK D. ZEUNE ADDRESS 7226 WATKINS RD
LOCATION OF PROPERTY NORTH OF CREEK RD ON WATKINS RD

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing 90'
Type of screen NONE Length of screen —
Type of pump 1/2 hp
Capacity of pump 600 GPH
Depth of pump setting 75'
Date of completion 4-14-87

BAILING OR PUMPING TEST (specify one by circling)

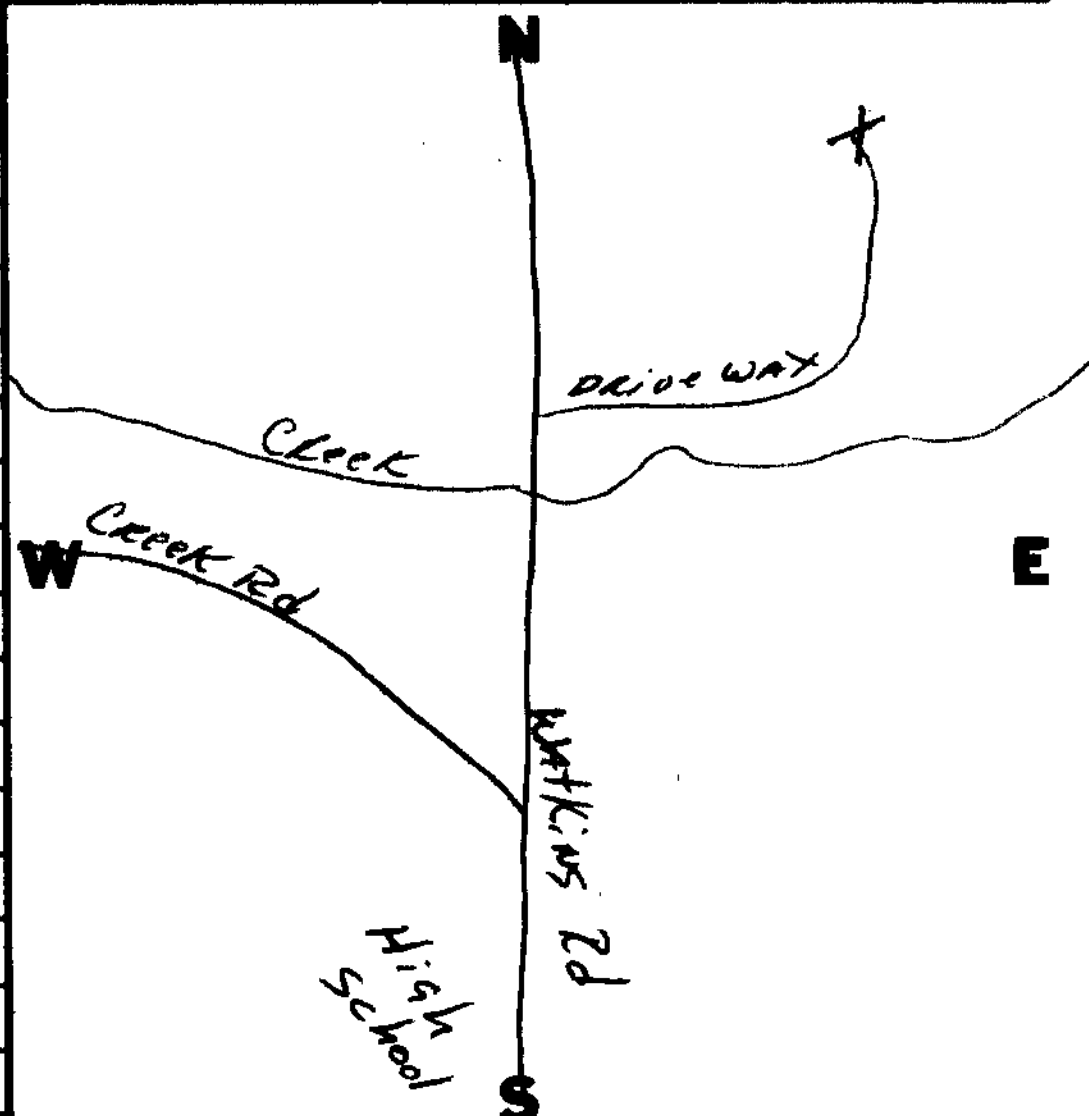
Test rate 20 gpm Duration of test 2 hrs
Drawdown — ft Date 4-13-87
Static level (depth to water) 38 ft
Quality (clear, cloudy, taste, odor) CLEAR
Pump installed by _____

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>Top Soil</u>	<u>0 ft</u>	<u>4 ft</u>
<u>DRY BANK RUN GRAVEL</u>	<u>4</u>	<u>87</u>
<u>GRAY ROCK CLAY</u>	<u>87</u>	<u>89</u>
<u>HARD GRAY ROCK</u>	<u>89</u>	<u>120</u>

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM Charles Allen Drilling
ADDRESS MAIN ST. PATASKALA, OH

DATE 4-16-87
SIGNED Charles Allen

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL COPY - ODNR, DIVISION OF WATER, FOUNTAIN SQ., COLS., OHIO 43224

136 ✓

592361

Identify one by circling

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WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

16a
594462

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4
OWNER MR ZEINBY - LICKING CO. COMMISSIONERS ADDRESS NEWARK OHIO
LOCATION OF PROPERTY NORTH EAST CORNER OF CR #42 & TR #30

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing REMOVED
Type of screen — Length of screen NONE
Type of pump TEST HOLE WELL PLUGGED
Capacity of pump —
Depth of pump setting —
Date of completion 3/6/84

BAILING OR PUMPING TEST (specify one by circling)

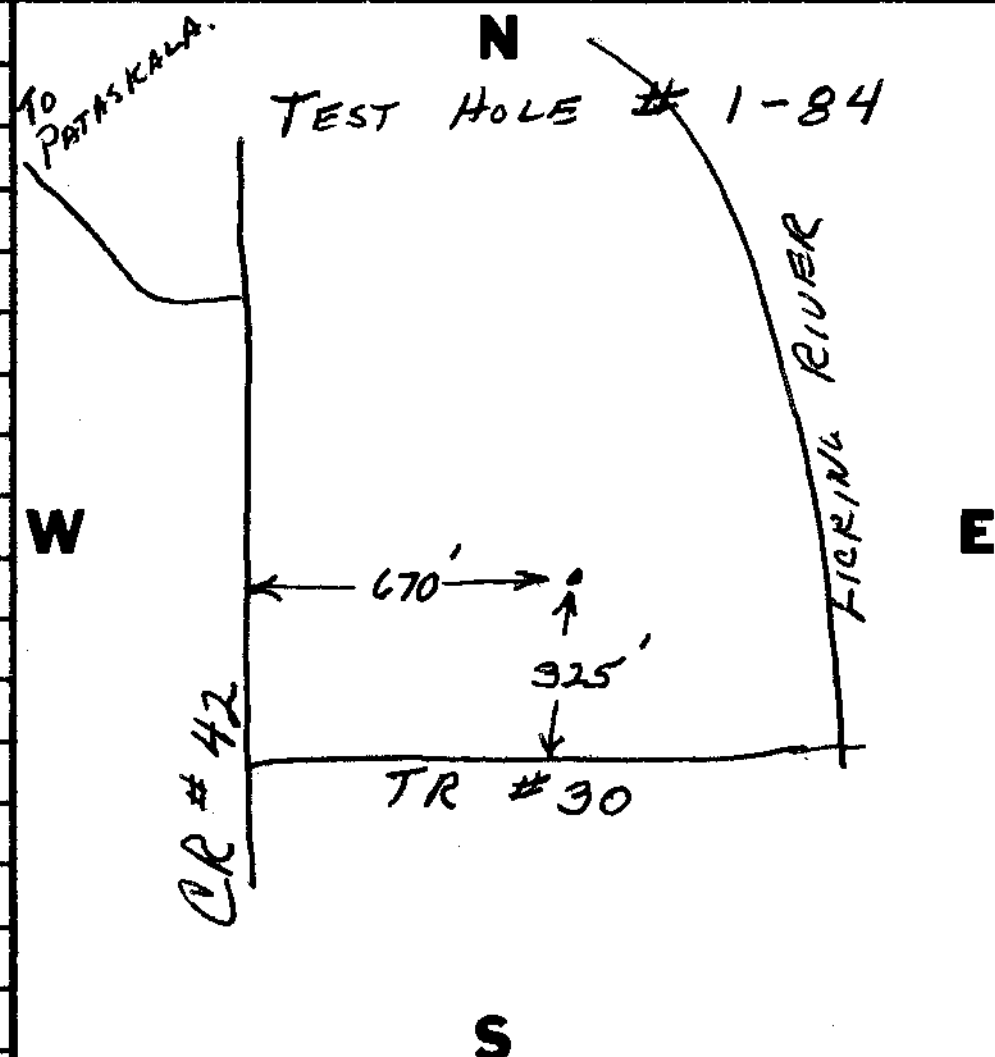
Test rate — gpm Duration of test — hrs
Drawdown — ft Date —
Static level (depth to water) 16' ft
Quality (clear, cloudy, taste, odor) —
Pump installed by —

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY</u>	<u>0 ft</u>	<u>16 ft</u>
<u>S & G W/ CLAY</u>	<u>16</u>	<u>20</u>
<u>CLAY (GRAY)</u>	<u>20</u>	<u>29</u>
<u>SAND & GRAVEL W/CLAY</u>	<u>29</u>	<u>35</u>
<u>CLAY</u>	<u>35</u>	<u>42.5</u>
<u>S & G.</u>	<u>42.5</u>	<u>67</u>
<u>S & G W/CLAY</u>	<u>67</u>	<u>75</u>
<u>S & G.</u>	<u>75</u>	<u>91</u>
<u>CLAY - HARD PAN</u>	<u>91</u>	<u>100</u>

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM G.M. BAKER & SON DATE 3/13/84
ADDRESS 1091 STIMMEL RD COLS. OHIO SIGNED E.S. Schlaack

*If additional space is needed to complete well log, use next consecutive numbered form.

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WELL LOG AND DRILLING REPORT

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DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

594463

16a ✓

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4

OWNER ZEUNE FARMS - LICKING CO COMMISSIONERS ADDRESS NEWARK O.

LOCATION OF PROPERTY NE CORNER OF CR #42 & TR

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing REMOVED
Type of screen NONE Length of screen _____
Type of pump TEST HOLE - WELL PLUGGED
Capacity of pump _____
Depth of pump setting _____
Date of completion 9/13/84

BAILING OR PUMPING TEST

(specify one by circling)

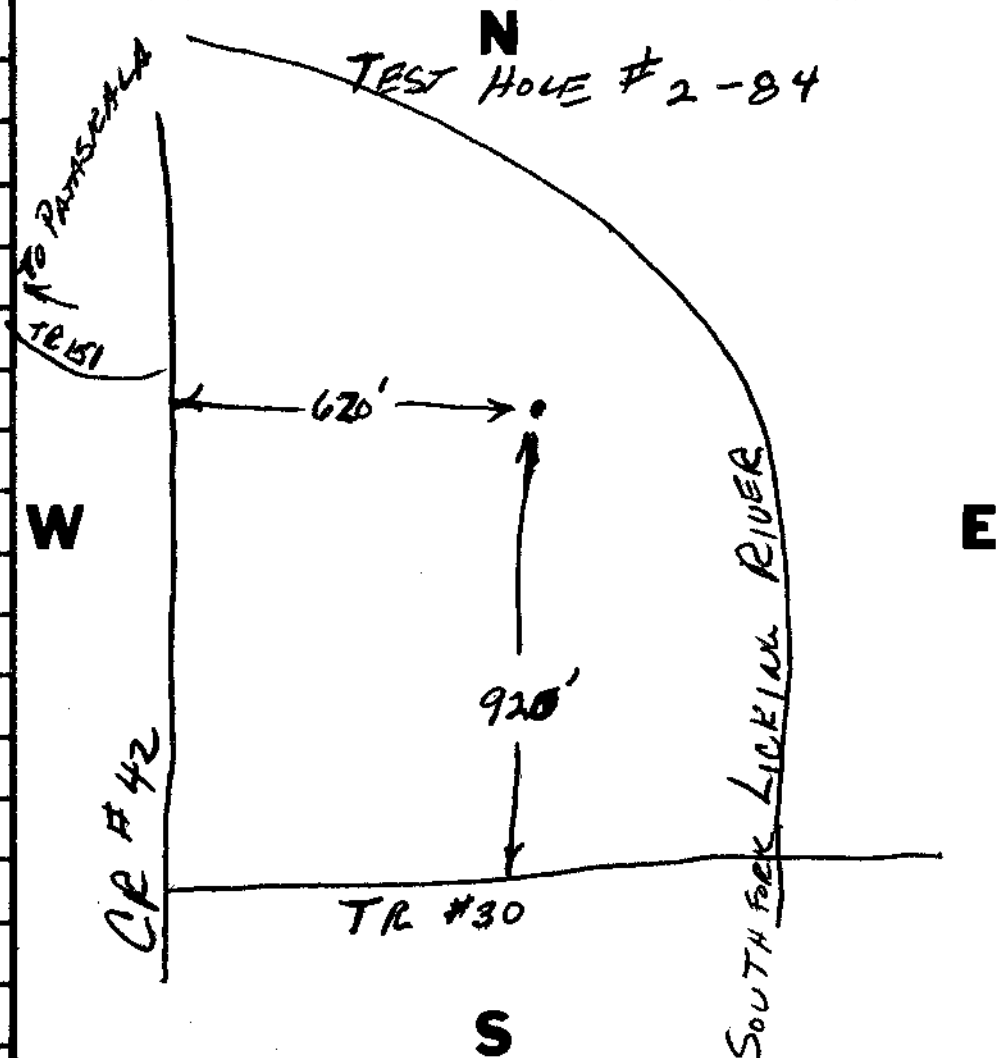
Test rate _____ gpm Duration of test _____ hrs
Drawdown _____ ft Date _____
Static level (depth to water) 18' ft
Quality (clear, cloudy, taste, odor) _____
Pump installed by _____

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY</u>	0 ft	23 ft
<u>DAY GRAVEL & CLAY</u>	23	26
<u>CLAY</u>	26	42
<u>COARSE SAND & GRAVEL</u>		
<u>W/ SILT</u>	42	60
<u>COARSE SAND - MED GRAVEL</u>		
<u>CLAY BALLS</u>	60	69
<u>C. SAND & GRAVEL W/ SILT</u>	69	73
<u>F. SAND & GRAVEL W/ CLAY</u>	73	75
<u>CLEAN MED SAND & GRAVEL</u>	75	79
<u>COARSE GRAVEL W/ SAND &</u>		
<u>CLAY</u>	79	88
<u>HARD PAN</u>	88	96

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM G.M. BAKER & SON
ADDRESS 1091 STIMMEL RD COLUMBUS O.

DATE 3/15/84
SIGNED E.S. Schaefer

WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

594466

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4

OWNER MR WEAVER - LICKING Co. COMMISSIONER'S ADDRESS NEWARK OHIO.

LOCATION OF PROPERTY WELL TEST HOLE 1620' W. OF & CR 42 1335' N & TR 151 ON N/3 LINE

CONSTRUCTION DETAILS

Casing diameter 6 5/8 Length of casing REMOVED
Type of screen NONE Length of screen —
Type of pump TEST HOLE - WELL PLUGGED
Capacity of pump —
Depth of pump setting —
Date of completion 3-26-84

BAILING OR PUMPING TEST

(specify one by circling)

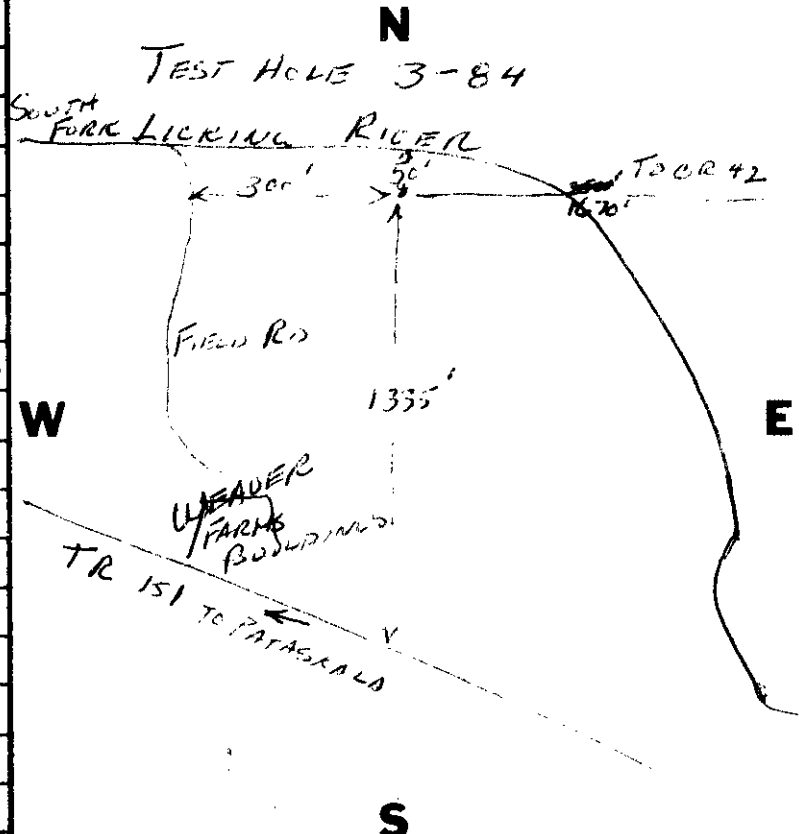
Test rate — gpm Duration of test — hrs
Drawdown — ft Date —
Static level (depth to water) 19' @ 50'-64' ft
Quality (clear, cloudy, taste, odor) —
Pump installed by —

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY</u>	<u>0 ft</u>	<u>26 ft</u>
<u>COARSE SAND & GRAVEL</u>	<u>26</u>	<u>30</u>
<u>GRAVEL W/CLAY</u>	<u>30</u>	<u>31</u>
<u>CLAY W/ GRAVEL</u>	<u>31</u>	<u>34</u>
<u>CLAY</u>	<u>34</u>	<u>50</u>
<u>COARSE SAND & GRAVEL</u>	<u>50</u>	<u>64</u>
<u>SAND & GRAVEL W/CLAY</u>	<u>64</u>	<u>72</u>
<u>CLAY</u>	<u>72</u>	<u>93</u>
<u>GRAY SAND STONE</u>	<u>93</u>	<u>100</u>
<u>HOLE PLUGGED</u>		

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM G. M. BAKER & SON

DATE 3/28/84

ADDRESS 1091 STIMMEL RD COLUMBUS O.

SIGNED Edward S. Schuck

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL COPY - ODNR, DIVISION OF WATER, FOUNTAIN SQ., COLS., OHIO 43224

G. M. BAKER & SON DIVISION

#9990939



MOODY'S of Dayton, Inc.

☒ TEST☐ PERMANENT

Job No. 24033

WELL LOG No. 3-84 CITY Pataskala

County Licking

Owner Licking County Commissioners

Township Harrison

Newark, Ohio (Weaver Property)

Section 4

Location

State Ohio

From Land Description 50' South of river, 300' East of Field Drive

From Street or Road 1670' West of C/L CR 42 - 1335' North of TR 151 C/L on N/S line

FORMATION FOUND - DESCRIBE FULLY	FROM NATURAL GROUND LEVEL			
	Depth to Top of Stratum	Depth to Bottom of Stratum	Thickness of Stratum	Static Water Level
Brown sandy clay	0	11	11	
Brown & gray clay	11	15	4	
Gray clay	15	26	11	
Coarse sand & gravel	26	30	4	12'
Coarse gravel w/clay balls	30	31	1	
Gray clay w/scattered large gravel	31	34	3	
Gray clay, no gravel	34	50	16	
Coarse sand & gravel up to 2" (59'-64" drilled out / 2" rocks)	50	64	14	19'
Sand & gravel w/clay balls	64	67	3	
Fine sand & gravel & clay (drilled open hole ahead)	67	72	5	
Gray clay	72	90	18	
Light gray clay (oil slicks)	90	93	3	
Gray sand stove	93	100	7	17'
BALES 20 GPM @ 40'				

Hole 6 "Dia Drilled by: { Cable Tool ☒ Rotary ☐ Jetting ☐
Reverse Circ. ☐ Bucket ☐ Auger ☐

Rotary Hole Grouted: Neat Cement ☐ Drilling Mud ☐ Other Bentonite & clay ☐Casing 6-5/8 "OD From ^{pulled}but "above ground to ☐ feet below ground. Weight 19 Pounds per footScreen " Set from ☐ to ☐ feet Make ☐ Type ☐ Slot ☐Pumping test ☐ GPM drawdown to ☐ feet after ☐ hours pumping

Date Completed 3-26-84 Driller Charles Wm. Allen

WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

16a
594471 ✓

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4
OWNER ZEUNE FARMS - LICKING COUNTY COMMISSIONERS ADDRESS NEWARK OHIO.
LOCATION OF PROPERTY N E CORNER OF CR 42 & TR 30

CONSTRUCTION DETAILS

Casing diameter 6 5/8" Length of casing REMOVED
Type of screen NONE Length of screen -
Type of pump TEST HOLE WELL PLUGGED
Capacity of pump -
Depth of pump setting -
Date of completion 4-18-84

BAILING OR PUMPING TEST

(specify one by circling)

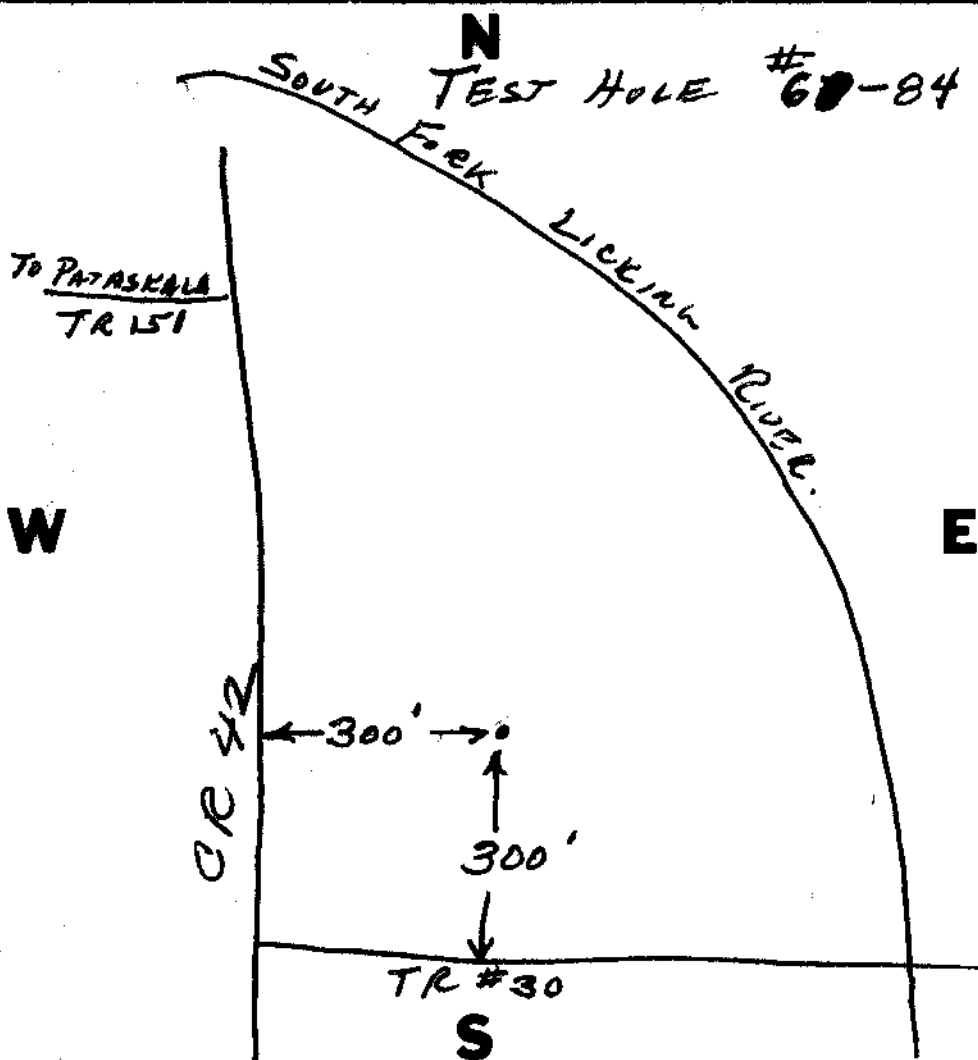
Test rate - gpm Duration of test - hrs
Drawdown - ft Date -
Static level (depth to water) 18' @ 48'-53' DEEP
Quality (clear, cloudy, taste, odor) -
Pump installed by -

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY</u>	<u>0 ft</u>	<u>25 ft</u>
<u>F. SAND & GRAVEL W/CLAY</u>	<u>25</u>	<u>29</u>
<u>CLAY W/ GRAVEL</u>	<u>29</u>	<u>40</u>
<u>C. SAND & GRAVEL W/CLAY</u>	<u>40</u>	<u>48</u>
<u>COARSE SAND & GRAVEL DIRTY</u>	<u>48</u>	<u>53</u>
<u>C. SAND & GRAVEL W/CLAY</u>	<u>53</u>	<u>58</u>
<u>C. SAND & GRAVEL CLEAN</u>	<u>58</u>	<u>80</u>
<u>C. SAND & GRAVEL W/CLAY HARD</u>	<u>80</u>	<u>89</u>
<u>M. SAND & GRAVEL W/CLAY HARD</u>	<u>89</u>	<u>99</u>
<u>C. SAND & GRAVEL W/CLAY</u>	<u>99</u>	<u>109</u>
<u>M. SAND & GRAVEL</u>	<u>109</u>	<u>110</u>
<u>F. SAND & GRAVEL W/CLAY</u>	<u>110</u>	<u>113</u>
<u>C. SAND & GRAVEL W/CLAY & SGT</u>	<u>113</u>	<u>147</u>
<u>C. SAND - MED GRAVEL</u>	<u>147</u>	<u>153</u>
<u>GRAVEL W/ CLAY</u>	<u>153</u>	<u>155</u>
<u>CLAY</u>	<u>155</u>	<u>161</u>
<u>HARD PAN</u>	<u>161</u>	<u>180</u>

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM C. M. BAKER & SON
ADDRESS 1091 STIMMEL RD COLUMBUS O.

DATE 4/20/84
SIGNED E. S. Schack

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL COPY - ODNR, DIVISION OF WATER, FOUNTAIN SQ., COLS., OHIO 43224 193

WELL LOG AND DRILLING REPORT

NO CARBON PAPER
NECESSARY -
SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

16a
✓
594472

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4
OWNER ZEUNE FARMS - LICKING Co. COMMISSIONERS ADDRESS NEWARK OHIO
LOCATION OF PROPERTY NE CORNER OF CR 42 & TR 30

CONSTRUCTION DETAILS

Casing diameter 6 3/8 Length of casing PULL OUT
Type of screen - NONE Length of screen -
Type of pump TEST HOLE 100' WELL PLUGGED
Capacity of pump A 2" PVC W/ 5' ON BOTTOM
Depth of pump setting - SLOTTED SET FROM 42' - 85'
Date of completion 5-1-84

BAILING OR PUMPING TEST

(specify one by circling)

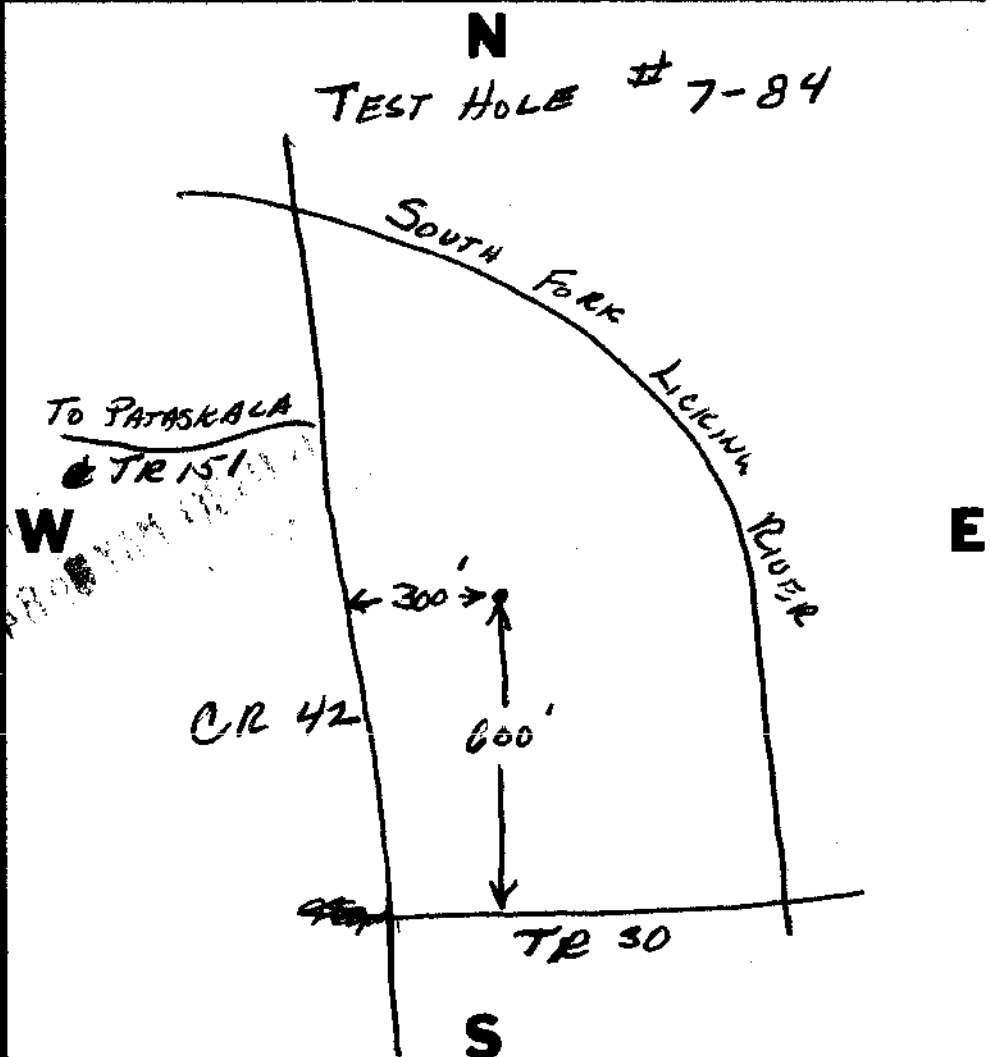
Test rate - gpm Duration of test - hrs
Drawdown - ft Date -
Static level (depth to water) 22' @ 77-89' DEPTH ft
Quality (clear, cloudy, taste, odor) -
Pump installed by -

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
CLAY	0 ft	45 ft
C. SAND & GRAVEL	45	65
C. SAND & GRAVEL w/CLAY	65	67
C. SAND & GRAVEL	67	71
CLAY	71	77
C. SAND & GRAVEL	77	89
CLAY	89	99
FINE SAND	99	102
CLAY	102	108
SAND & GRAVEL DIRTY	108	120
SILTY CLAY	120	130
SAND & GRAVEL	130	132
CLAY	132	150

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM G.M. BAKER & SON
ADDRESS 1091 STIMMEL RD COLS O.

DATE 5/5/84
SIGNED Edward S. Schlauch

*If additional space is needed to complete well log, use next consecutive numbered form.

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193

WELL LOG AND DRILLING REPORT

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

594473

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP 4
OWNER ZEUNE FARMS - LICKING CO. COMMISSIONERS ADDRESS NEWARK OHIO.
LOCATION OF PROPERTY NE CORNER, CR #42 & TR #30

CONSTRUCTION DETAILS

Casing diameter 10 Length of casing 116
Type of screen SS WIRE WOUND Length of screen 10'
Type of pump TEST
Capacity of pump WELL PULLED & PULLED
Depth of pump setting _____
Date of completion 6/14/84

BAILING OR PUMPING TEST

(specify one by circling)

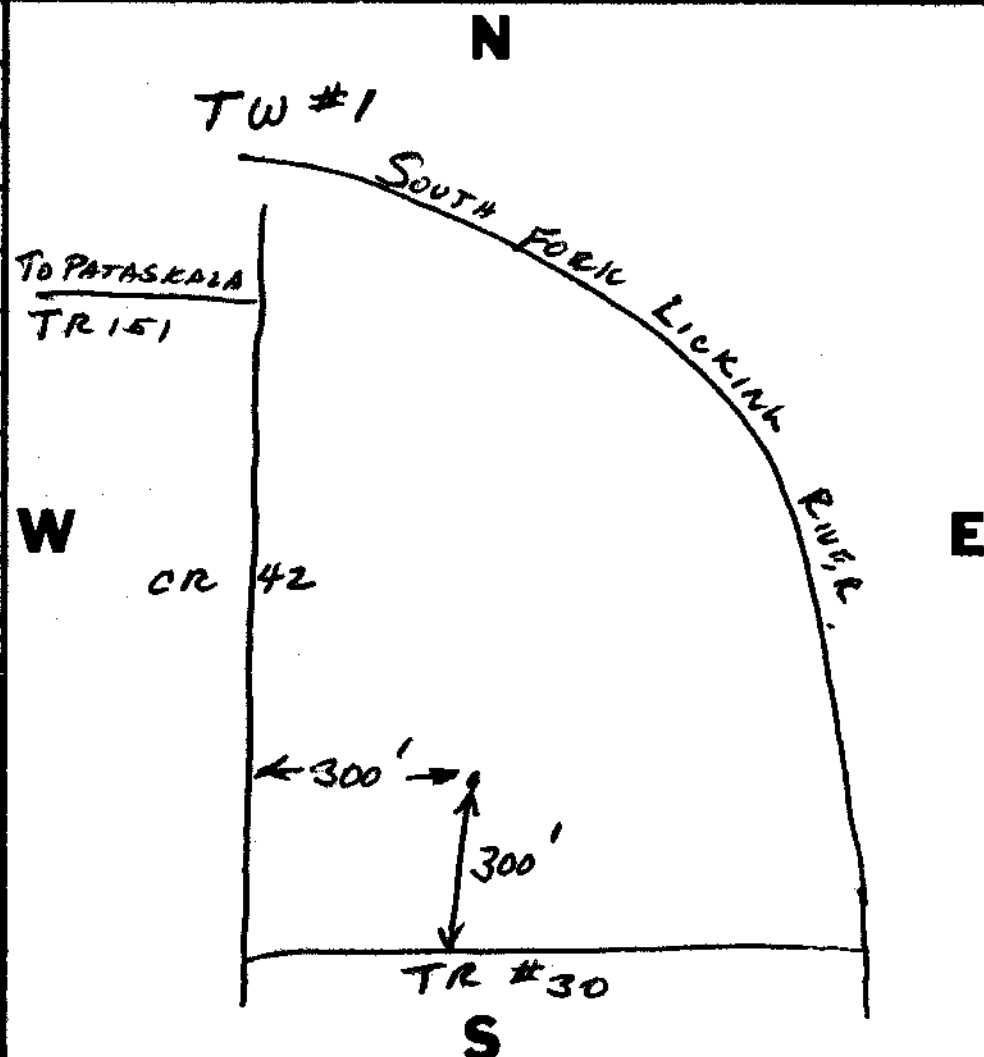
Test rate 180/230 gpm Duration of test 24 hrs
Drawdown 80.5/12.25 ft Date 6/1 & 6/12
Static level (depth to water) 125' LEVEL - 12'-5" ft
80' LEVEL 9'-6"
Quality (clear, cloudy, taste, odor) C. Clear.
Pump installed by G. M. Baker.

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY (SANDY)</u>	0 ft	55 ft
<u>COARSE SAND & GRAVEL</u>	55	64
<u>C-SAND & GRAVEL W/ ^{SMALL} BOULDERS</u>	64	74.5
<u>CLAY</u>	74.5	75
<u>C-SAND & GRAVEL ^{LARGE} ROCKS</u>	75	96
<u>GRAY CLAY</u>	96	112
<u>COURSE - DIRTY SAND & GRAVEL</u>	112	125
<u>WELL TESTED AT 115'-125'</u>		
<u>and 70'-80' For 24 hr & 5 steps</u>		
<u>WELL CASING & SCREEN PULLED</u>		
<u>WELL PLUGGED</u>		
<u>ABANDONED</u>		

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM G. M. Baker & Son Co.
ADDRESS 1091 STUMMEL RD COLS O.

DATE 6/19/84
SIGNED E. S. Schaeck

*If additional space is needed to complete well log, use next consecutive numbered form.

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126 ✓

613765

CONSTRUCTION DETAILS

(BAILING OR PUMPING TEST
(specify one by circling)

Test rate 10 gpm Duration of test 2 1/2 hrs

Drawdown _____ ft Date _____

Static level (depth to water) 30' ft

Quality (clear, cloudy, taste, odor) _____

Pump installed by Robert A. Kuscher

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.

Hand-drawn map showing the intersection of Bernwood Trails, Black Rd., and Rail Road. The map includes directional markers N, S, E, and W. A point is marked on Bernwood Trails, 1.47 miles from the intersection with Black Rd., and is labeled 'Xwell'. A distance of 754 ft is also indicated.

DATE _____

SIGNED

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WELL LOG AND DRILLING REPORT

NO CARBON PAPER
NECESSARY -
SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

12a
613767 ✓

COUNTY LICKING TOWNSHIP HARRISON SECTION OF TOWNSHIP _____

OWNER PAUL BODEN ADDRESS _____

LOCATION OF PROPERTY APPROX 2 MILES ON RT 42 - S.D. OF RT 16

CONSTRUCTION DETAILS

Casing diameter 7" Length of casing 57'
Type of screen _____ Length of screen 1"
Type of pump SUB
Capacity of pump 10 G.P.M.
Depth of pump setting 52'
Date of completion 4-26-1983

BAILING OR PUMPING TEST

(specify one by circling)

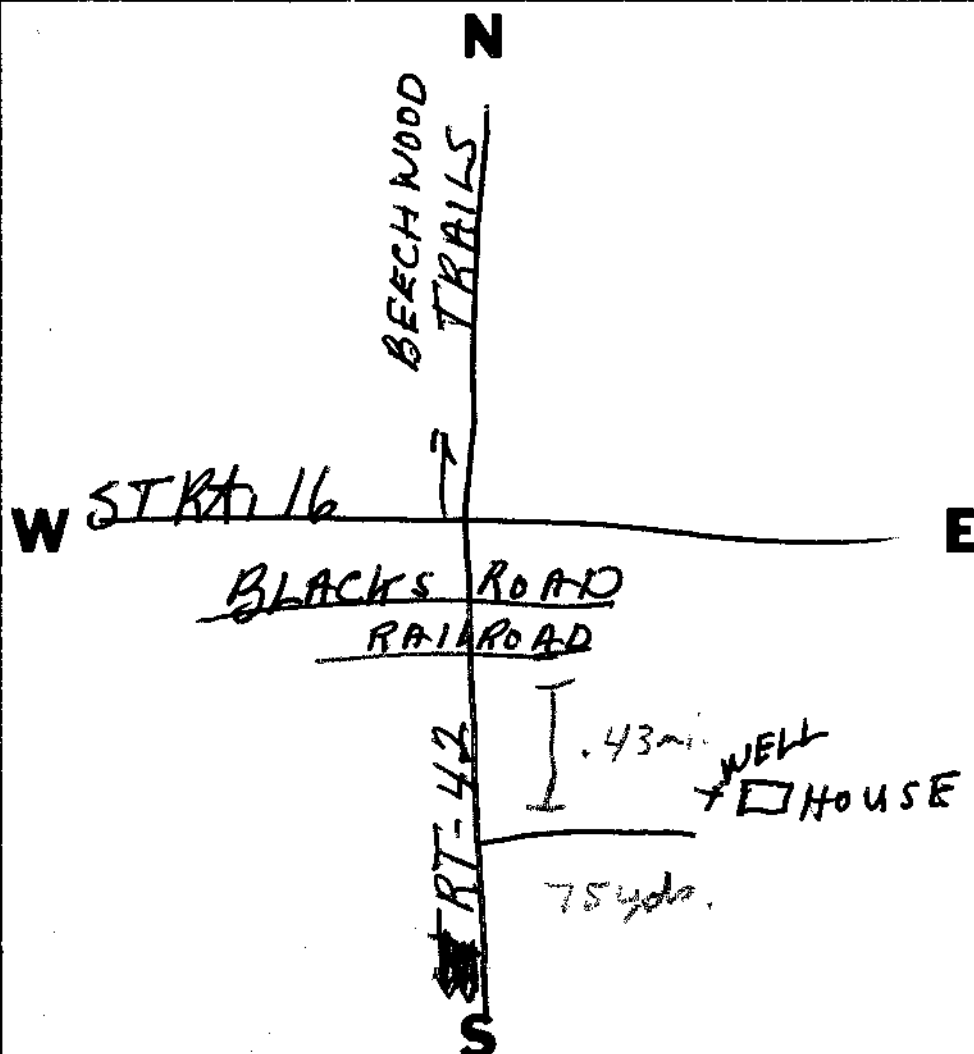
Test rate 15 G.P.M. Duration of test 4 hrs
Drawdown _____ ft Date 4-25-1983
Static level (depth to water) 19 ft
Quality (clear, ~~cloudy~~, taste, odor) _____
Pump installed by ROBERT LUPHER

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
<u>CLAY</u>	0 ft	16 ft
<u>SAND + GRAVEL</u>	16	25
<u>CLAY GRAVEL</u>	25	54
<u>GRAVEL</u>	54	57
<u>WATER AT</u>	54'	

SKETCH SHOWING LOCATION

Locate in reference to numbered
state highways, street intersections, county roads, etc.



DRILLING FIRM LUPHER DRILLING DATE 4-28-1983
ADDRESS 13555 HAMBY HILL RD. FRAZEEVILLE OHIO SIGNED Robert Luper

*If additional space is needed to complete well log, use next consecutive numbered form.

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189

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State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

COUNTY Licking TOWNSHIP Harrison SECTION OF TOWNSHIP _____
OWNER Rodney Bugher ADDRESS 7050 Beaver Run Rd.
LOCATION OF PROPERTY 1 mile. North of Rt. 40. York. & Beaver Run.

BAILING OR PUMPING TEST
(specify one by circling)

Casing diameter 5 1/2 Length of casing 61
Type of screen — Length of screen —
Type of pump —
Capacity of pump —
Depth of pump setting 50
Date of completion — 9-7-86

Test rate 10 gpm Duration of test 2 hrs
Drawdown 2 ft Date 9-7-86
Static level (depth to water) 30. ft
Quality (clear, cloudy, taste, odor) clear
Home. One will set pump
Pump installed by _____

SKETCH SHOWING LOCATION

Formations: sandstone, shale,
limestone, gravel, clay

From

To

0 ft

5 ft

1/2 - Clay
Blue clay
Sandstone

5

45

45

70

Water At 60.

Locate in reference to numbered
state highways, street intersections, county roads, etc.

N

Welt

BEAVER KILL

W

STG 40

S

DRILLING FIRM

DATE _____

SIGNED

• If additional space is needed to complete well log, use next consecutive numbered form

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WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1939 Fountain Square Drive
Columbus, Ohio 43224

684597

TYPE OR USE PEN
SELF-TRANSCRIBING
PRESS HARD

Permit Number 88-98

COUNTY Licking TOWNSHIP Harrison SECTION OF TOWNSHIP _____
OWNER Ralph Shaftner PROPERTY ADDRESS 196 Lake Dr
LOCATION OF PROPERTY same

CONSTRUCTION DETAILS

CASING

Casing Diameter 5" in. Length of Casing 58 ft.

Type: ☐ Steel ☐ Galv. ☒ PVC ☐ Other _____

Joints: ☐ Threaded ☐ Welded ☐ Solvent ☐ Other _____

SCREEN

Type (wire wrapped, louvered, etc.) _____ Material _____

Length 10 ft. Diameter _____ in.

Set between _____ ft. and _____ ft. Slot _____

GROUT

Material benite mud Volume used _____

Method of installation _____

Depth: placed from top ft. to bottom ft.

☒ Rotary ☐ Cable ☐ Augered ☐ Driven ☐ Dug ☐ Other _____

BAILING OR PUMPING TEST

(specify one by circling)

WELL TEST

Test rate 10 gpm Duration of test _____ hrs.

Drawdown (water level during pumping) _____ ft.

Measured from: ☐ top of casing ☐ ground level ☐ Other _____

Static Level (depth to water) 15 ft. Date: 6-20-88

Quality (clear, cloudy, taste, odor) _____

PUMP

Type of pump _____ Capacity _____ gpm

Pump set at _____ ft.

Pump installed by _____

Pitless Device ☐ Adapter ☐ Preassembled unit

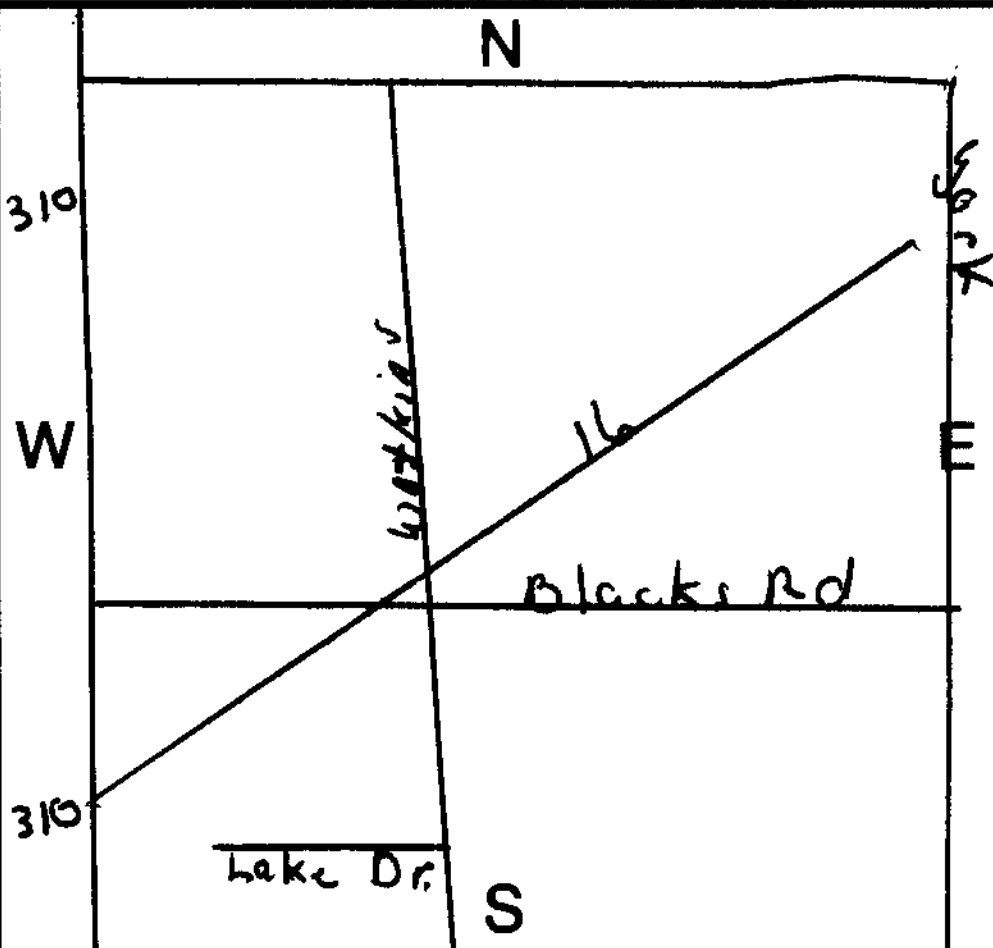
Use of Well _____

WELL LOG*

Show color, texture, hardness, and formation: sandstone, shale, limestone, gravel, clay, sand	From	To
Clay	0 ft.	10 ft.
Sand & gravel	10	19
Clay	19	36
Sand & gravel	36	40
Clay	40	51
Sand & gravel	51	56
Clay	56	58

SKETCH SHOWING LOCATION

Show distances well lies from numbered
state highways, street intersections, county roads, etc.



* If additional space is needed to complete well log, use next consecutively numbered form.

DNR 7802.88

DRILLING FIRM R.C. Barry Inc
ADDRESS 6473 W. Broad St.
CITY, STATE, ZIP Galloway Ohio 43119

SIGNED Everett Meenach Jr.
DATE 6-20-88
ODH REGISTRATION NUMBER 368

Completion of this form is required by 1521.05, Ohio Revised Code - file within 30 days after completion of drilling.

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DNR 7802.92
TYPE OR USE PEN
SELF TRANSCRIBING
PRESS HARD

WELL LOG AND DRILLING REPORT

Ohio Department of Natural Resources, Division of Water
1939 Fountain Square Drive, Columbus, Ohio 43224 Phone (614) 265-6739

774380

Permit Number 1632

COUNTY Licking TOWNSHIP Harrison SECTION/LOT No. _____
(CIRCLE ONE)

OWNER/BUILDER David Cummings PROPERTY ADDRESS 7115 Watkins
(CIRCLE ONE OR BOTH) (ADDRESS OF WELL LOCATION A)

LOCATION OF PROPERTY _____

CASING				CONSTRUCTION DETAILS			
<input checked="" type="checkbox"/> 1	Diameter	5	in.	Borehole Diameter	7 7/8	in.	GROUT
<input checked="" type="checkbox"/> 2	Diameter		in.	Length	203	ft.	Material <u>Granular Bentonite</u>
	Type:	<input type="checkbox"/> Steel <input type="checkbox"/> Galv. <input checked="" type="checkbox"/> PVC		Wall Thickness	SPR21	in.	Volume used <u>410</u> #
	Joints:	<input type="checkbox"/> Threaded <input type="checkbox"/> Welded <input checked="" type="checkbox"/> Solvent		Method of installation	<u>Jerome Pipe</u>		
	Liner:	Length <u>NA</u> Type <u>—</u> Wall Thickness <u>—</u> in.		Depth: placed from	203	ft. to	<u>Surface</u> ft.
SCREEN				GRAVEL PACK (Filter Pack)			
Type (wire wrapped, louvered, etc.) <u>wire wrapped</u>				Material <u>5/12 GP</u> Volume used <u>300</u> #			
Length <u>10</u> ft. Diameter <u>5</u> in.				Method of installation			
Set between <u>203</u> ft. and <u>213</u> ft. Slot				Depth: placed from <u>203</u> ft. to <u>213</u> ft.			
				Pitless Device <input checked="" type="checkbox"/> Adapter <input type="checkbox"/> Preassembled unit			
				Use of Well <u>Domestic</u>			
				<input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Cable <input type="checkbox"/> Augered <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Other			
				Date of Completion <u>7-26-93</u>			

WELL LOG*		
INDICATE DEPTH(S) AT WHICH WATER IS ENCOUNTERED.		
Show color, texture, hardness, and formation: sandstone, shale, limestone, gravel, clay, sand, etc.	From	To
<u>Clay</u>	<u>0</u>	<u>7</u>
<u>Granite & Bolder</u>	<u>7</u>	<u>10</u>
<u>C & G</u>	<u>10</u>	<u>59</u>
<u>S & G</u>	<u>59</u>	<u>61</u>
<u>Clay</u>	<u>61</u>	<u>82</u>
<u>C & G</u>	<u>82</u>	<u>99</u>
<u>Clay</u>	<u>99</u>	<u>190</u>
<u>C & G</u>	<u>190</u>	<u>205</u>
<u>S & G</u>	<u>205</u>	<u>210</u>
<u>C & G</u>	<u>210</u>	<u>213</u>

WELL TEST	
<input type="checkbox"/> Bailing	<input checked="" type="checkbox"/> Pumping*
Test rate <u>5 est.</u> gpm	Duration of test _____ hrs.
Drawdown _____ ft.	
Measured from: <input type="checkbox"/> top of casing <input checked="" type="checkbox"/> ground level <input type="checkbox"/> Other	
Static Level (depth to water) <u>84</u> ft.	Date: <u>7-26-93</u>
Quality (clear, cloudy, taste, odor) <u>Clear</u>	
*(Attach a copy of the pumping test record, per section 1521.05, ORC)	

PUMP	
Type of pump _____	Capacity _____ gpm
Pump set at _____	ft.
Pump installed by <u>Other</u>	

SKETCH SHOWING WELL LOCATION	
Show distances well lies from numbered state highways, street intersections, county roads, etc.	

If additional space is needed to complete well log, use next consecutively numbered form.

Drilling Firm R.C. Barry, Inc. Signed Everett Meenach Jr.
Address 6467 W. Broad St. Date 7-26-93
City, State, Zip Lalloway, Ohio 43119 ODH Registration Number 368

WELL LOG AND DRILLING REPORT

810580

Ohio Department of Natural Resources
Division of Water, 1939 Fountain Square Drive
Columbus, Ohio 43224 Phone (614) 265-6739

Permit Number

COUNTY Licking TOWNSHIP Harrison SECTION/LOT No. _____

OWNER/BUILDER
(Circle One or Both)

First

Last

PROPERTY ADDRESS
(Address of well location)

Number

Street

City

LOCATION OF PROPERTY

1/2 mile North of Refugee on Watkins Rd. East side

Zip Code + 4

CONSTRUCTION DETAILS

CASING *(Length below grade)		Borehole Diameter		in.		GROUT	
1. Diameter	<u>5</u> in.	Length*	<u>113</u> ft.	Wall Thickness	<u>1/4</u> in.	Material	Volume used
2. Diameter	in.	Length*	ft.	Wall Thickness	in.	Method of installation	
Type:	<u>1. Steel</u>	<u>1. Galv.</u>	<u>1. PVC</u>	<u>1.</u>	Depth: placed from	ft. to	ft.
	<u>2. Threaded</u>	<u>2. Welded</u>	<u>2. Solvent</u>	<u>2. Other</u>	GRAVEL PACK (Filter Pack)		
Joints:	<u>1. Threaded</u>	<u>1. Welded</u>	<u>1. Solvent</u>	<u>1.</u>	Material	Volume used	
	<u>2. Threaded</u>	<u>2. Welded</u>	<u>2. Solvent</u>	<u>2. Other</u>	Method of installation		
Liner:	Length	Type	Wall Thickness	in.	Depth: placed from	ft. to	ft.
SCREEN				Pitless Device			
Type (wire wrapped, louvered, etc.) <u>Perforated</u>				Material			
Length <u>2</u> ft.				Diameter			
Set between				ft. and			
ft.				Slot			
Use of Well				Date of Completion			
<u>Rotary</u> <u>Cable</u> <u>Augered</u> <u>Driven</u> <u>Dug</u> <u>Other</u>				<u>7-10-97</u>			

WELL LOG*

INDICATE DEPTH(S) AT WHICH WATER IS ENCOUNTERED.

Show color, texture, hardness, and formation:
sandstone, shale, limestone, gravel, clay, sand, etc.

	From	To
Top Soil	0	11
Gray Clay + (Boulders)	11	25
Light Gray Clay	25	100
Gray Potters Clay	100	110
Sand & Gravel	110	113

WELL TEST

<input checked="" type="checkbox"/> Bailing	<input checked="" type="checkbox"/> Pumping*	<input type="checkbox"/> Other	
Test rate	<u>10</u> gpm	Duration of test	<u>4</u> hrs.
Drawdown	<u>25</u>		ft.
Measured from:	<u>Top of casing</u>	<input type="checkbox"/> ground level	<input type="checkbox"/> Other
Static Level (depth to water)	<u>30</u> ft.	Date:	<u>7-10-97</u>
Quality (clear, cloudy, taste, odor)	<u>clearing</u>		
*(Attach a copy of the pumping test record, per section 1521.05, ORC)			

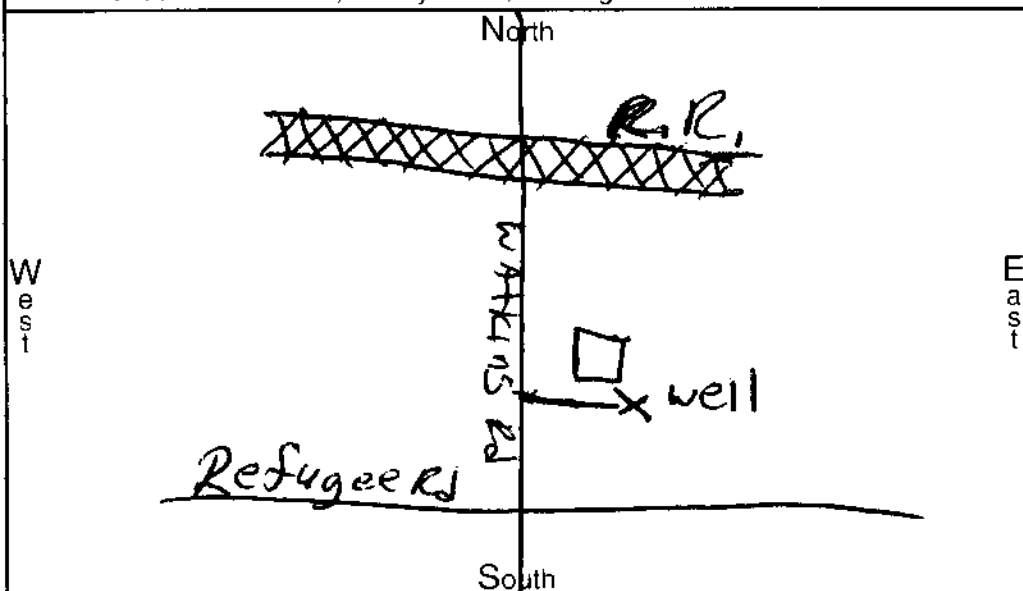
PUMP

Type of pump	<u>1/2 hp Sub</u>	Capacity	<u>10</u> gpm
Pump set at	<u>95</u>		ft.
Pump installed by	<u>Dan Allen Well Drilling</u>		

WELL LOCATION

Location of well in State Plane coordinates, if available:
Zone _____ x _____ y _____
Elevation of well _____ ft./m. Datum plain: ☐ NAD27 ☐ NAD83
Source of coordinates: ☐ GPS ☐ Survey ☐ Other

Sketch a map showing distance well lies from numbered state highways, street intersections, county roads, buildings or other notable landmarks.



*(If additional space is needed to complete well log, use next consecutively numbered form.)

I hereby certify the information given is accurate and correct to the best of my knowledge.

Drilling Firm Dan Allen Well Drilling Signed Rich Allen

Address 8472 Columbiakel S.W. Date 7-14-97

City, State, Zip Pataskala, OH 43062 ODH Registration Number 452

Completion of this form is required by section 1521.05, Ohio Revised Code - file within 30 days after completion of drilling.

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Blue - Customer's copy Pink - Driller's copy Green - Local Health Dept. copy

TYPE OR USE PEN
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PRESS HARD

WELL LOG AND DRILLING REPORT

Ohio Department of Natural Resources
Division of Water, 1939 Fountain Square Drive
Columbus, Ohio 43224-9971 Voice (614) 265-6739 Fax (614) 447-9503

950897

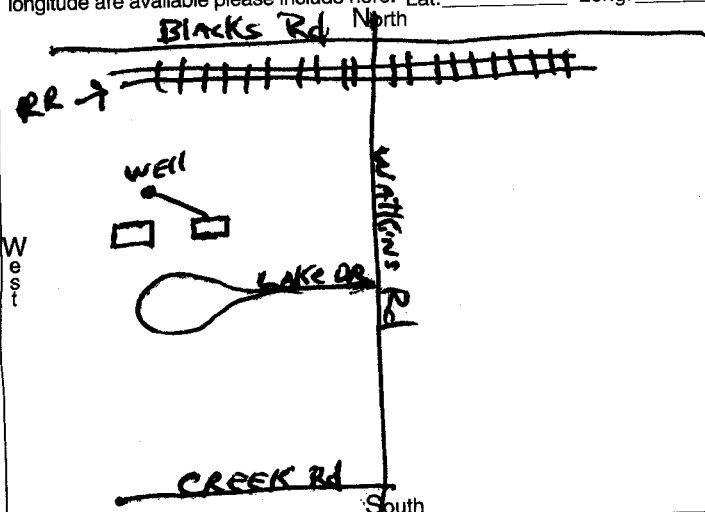
WELL LOCATION

County Licking Township HarrisonOwner/Builder N.J.W. Construction
(Circle One or Both) First LastAddress of Well Location 94 Lake Dr off Watkins
Number Street NameCity Pataskala Oh Zip Code 43062Permit No. Section/Lot No.
(Circle One or Both)Location of Well in State Plane
coordinates, if available:

Use of Well

N ☐ X ☐ +/- ft. or mS ☐ Y ☐ +/- ft. or m

Elevation of Well +/- ft. or m

Datum Plain: ☐ NAD27 ☐ NAD83 Elevation SourceSource of Coordinates: ☐ GPS ☐ Survey ☐ OtherSketch a map showing distance well lies from numbered state highways, street
intersections, county roads, buildings or other notable landmarks. If latitude and
longitude are available please include here: Lat: Long:

WELL TEST*

Pre-Pumping Static Level 20 ft. Date 5-18-03Measured from: ☒ Top of Casing ☐ Ground Level ☐ Other☐ Air ☒ Bailing ☐ Pumping* ☐ OtherTest Rate 10+ gpm Duration of Test 1 1/2 hrs.Feet of Drawdown 0 ft. Sustainable Yield gpm

*(Attach a copy of the pumping test record, per section 1521.05, ORC)

Is Copy Attached? ☐ Yes ☒ No Flowing Well? ☐ Yes ☒ No

Quality

PUMP/PITLESS

Type of pump 1/2 hp Sub Capacity 10 gpmPump set at 65 ft Pitless Type HarvardPump installed by Dan Solen Well Drilling

I hereby certify the information given is accurate and correct to the best of my knowledge.

Drilling Firm Dan Solen Well DrillingAddress 8472 Columbus RdCity, State, Zip Pataskala Ohio 43062Signed Dan Solen Date 5-18-03ODNR Registration Number 952

CONSTRUCTION DETAILS

☐ Rotary ☒ Cable ☐ Augered ☐ Driven ☐ Other

BOREHOLE/CASING (measured from ground surface)

1 ☐ Borehole Diameter inches Depth ft.Casing Diameter 5 in. Length 75 ft. Thickness 1/4 in.2 ☐ Borehole Diameter inches Depth ft.

Casing Diameter in. Length ft. Thickness in.

Casing Height Above Ground 3 ft.Type 1 ☒ Steel 1 ☐ Galv. 1 ☐ PVC 1 ☐2 ☐ 2 ☐ 2 ☐ 2 ☐ OtherJoints 1 ☒ Threader 1 ☐ Welded 1 ☐ Solvent 1 ☐2 ☐ 2 ☐ 2 ☐ 2 ☐ Other

SCREEN

Diameter Slot Size 3/16 holes Screen Length 2 ft.Type Perforation Material

Set Between ft. and ft.

GRAVEL PACK (Filter Pack)

Material/Size Volume/Weight Used

Method of Installation

Depth: Placed FROM ft. TO ft.

GROUT

Material Volume/Weight Used 200 lbsMethod of Installation Packed around casingDepth: Placed FROM Top ft. TO Bottom ft.

DRILLING LOG*

INDICATE DEPTH(S) AT WHICH WATER IS ENCOUNTERED.

Show color, texture, hardness, and formation:
sandstone, shale, limestone, gravel, clay, sand, etc.

From To

Yellow top soil
Gritty Grey clay
MEB Sand

0 18

18 71

71 75

*(If more space is needed to complete drilling log, use next consecutively numbered form.)

Date of Well Completion 5-18-03 Total Depth of Well 75 ft.

Completion of this form is required by section 1521.05, Ohio Revised Code - file within 30 days after completion of drilling.
ORIGINAL COPY TO - ODNR, DIVISION OF WATER, 1939 FOUNTAIN SQ. DRIVE, COLS., OHIO 43224-9971
Blue - Customer's copy Pink - Driller's copy Green - Local Health Dept. copy

WELL LOG AND DRILLING REPORT

TYPE OR USE PEN
SELF TRANSCRIBING
PRESS HARD

Ohio Department of Natural Resources
Division of Water, 1939 Fountain Square Drive
Columbus, Ohio 43224-9971 Voice (614) 265-6739 Fax (614) 447-9503

966109

WELL LOCATION

CONSTRUCTION DETAILS

County Licking Township Harrison

Owner/Builder Michael W. Medora
(Circle One or Both) First Last

Address of Well Location 7469 York Rd.
Number Street Name

City Pataaskala Zip Code +4 43062

Permit No. 7087 Section/Lot No. (Circle One or Both)

Location of Well in State Plane coordinates, if available:

Use of Well Domestic

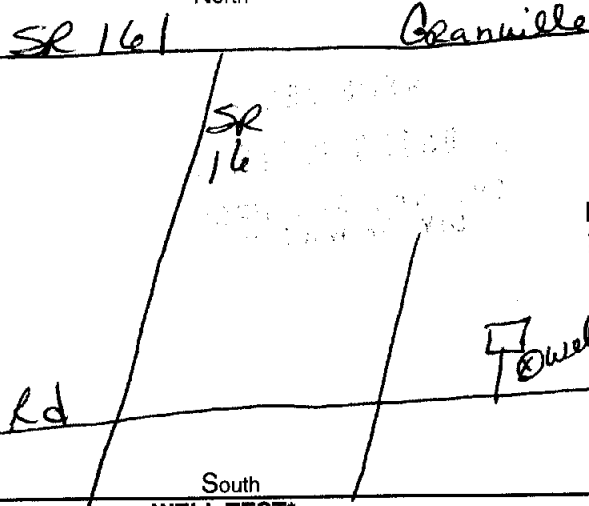
N ☐ X 1046 +/- 7 ft. or m

S ☐ Y 7 +/- 7 ft. or m

Elevation of Well 1046 Datum Plain: ☒ NAD27 ☐ NAD83 Elevation Source

Source of Coordinates: ☒ GPS ☐ Survey ☐ Other

Sketch a map showing distance well lies from numbered state highways, street intersections, county roads, buildings or other notable landmarks. If latitude and longitude are available please include here: Lat 39.98324 Long 82.62412
North



☒ Rotary ☐ Cable ☐ Augered ☐ Driven ☐ Other

BOREHOLE/CASING (measured from ground surface)

☒ Borehole Diameter 7 7/8 inches Depth 25 ft.

Casing Diameter 5 in. Length 75 ft. Thickness 1/2 in.

☒ Borehole Diameter 4.75 inches Depth 30 ft.

Casing Diameter 4 in. Length 2 ft. Thickness 1/2 in.

Casing Height Above Ground 2 ft.

Type 1 ☐ Steel 1 ☐ Galv. 1 ☒ PVC 1 ☐ Other

Joints 1 ☐ Threaded 1 ☐ Welded 1 ☒ Solvent 1 ☐ Other

SCREEN

Diameter 2 Slot Size 2 Screen Length 2 ft.

Type 2 Material 2

Set Between 2 ft. and 2 ft.

GRAVEL PACK (Filter Pack)

Material/Size 2 Volume/Weight Used 2

Method of Installation 2

Depth: Placed FROM 2 ft. TO 2 ft.

GROUT

Material Bentonite Volume/Weight Used 225 #

Method of Installation Stemmed Pipe

Depth: Placed FROM 2 ft. TO 25 ft.

DRILLING LOG*

INDICATE DEPTH(S) AT WHICH WATER IS ENCOUNTERED.

Show color, texture, hardness, and formation: sandstone, shale, limestone, gravel, clay, sand, etc.

	From	To
Brown Sandy Soil	0	7
Gray Clay & Gravel	7	25
Coarse Gravel	25	47
Gray Clay & Gravel	47	65
Gray Firm Clay & Gravel	65	71
Rotten Stone	71	72
Brown + Blue Sandstone	72	85
A. Gray Sandstone	85	105

Pre-Pumping Static Level 1 ft. Date 9-25-03

Measured from: ☒ Top of Casing ☐ Ground Level ☐ Other

☒ Air ☐ Bailing ☐ Pumping* ☐ Other

Test Rate 20 gpm Duration of Test 1 hrs.

Feet of Drawdown 0 ft. Sustainable Yield 20 gpm

*(Attach a copy of the pumping test record, per section 1521.05, ORC)

Is Copy Attached? ☐ Yes ☒ No Flowing Well? ☐ Yes ☒ No

Quality Clear

PUMP/PITLESS

Type of pump 1/2 hp Capacity 12 gpm

Pump set at 80 ft. Pitless Type Dickens

Pump installed by Keen Well & Pump

I hereby certify the information given is accurate and correct to the best of my knowledge.

Drilling Firm Keen Well & Pump

Address 20279, Coshocton Rd

City, State, Zip Mt. Vernon, Oh 43050

Signed Richard Hanger Date 10-6-03

ODH Registration Number 2626

*(If more space is needed to complete drilling log, use next consecutively numbered form.)

Date of Well Completion 9-25-03 Total Depth of Well 105 ft.

Completion of this form is required by section 1521.05, Ohio Revised Code - file within 30 days after completion of drilling.
ORIGINAL COPY TO - ODNR, DIVISION OF WATER, 1939 FOUNTAIN SQ. DRIVE, COLS., OHIO 43224-9971
Blue - Customer's copy Pink - Driller's copy Green - Local Health Dept. copy



Water Well Log and Drilling Report

Ohio Department of Natural Resources
Division of Soil and Water
Phone: 614-265-6740 Fax: 614-265-6767

Well Log Number: **2055422**

[View Image of Original Well Log](#)

ORIGINAL OWNER AND LOCATION

Original Owner Name: *MICHAEL DORAN*

County: *LICKING*

Address: *7727 WATKINS RD*

City:

Location Number:

Latitude: *39.977669*

Township: *HARRISON*

State: *OH*

Location Map Year:

Longitude: *-82.642889*

Section Number:

Lot Number:

Zip Code: *43062*

Location Area:

CONSTRUCTION DETAILS

Borehole Diameter: 1: *5.25 in.*

2:

Borehole Depth: 1: *91 ft.*

2:

Depth to Bedrock:

Casing Diameter: 1: *5.25 in.*

2:

Casing Length: 1: *91 ft.*

2:

Casing Thickness: 1: *0.25 in.*

2:

Casing Height Above Ground: *1.70*

Date of Completion: *12/17/2014*

Driller's Name: *CHARLES ALLEN WELL DRILLING*

Screen Diameter: *4 in.*

Type: *CONTINUOUS WIRE WOUND*

Set Between: *From: 87 ft. To: 91 ft.*

Gravel Pack Material/Size:

Method of Installation:

Grout Material/Size: *Bentonite*

Method of Installation: *Poured (gravity)*

Aquifer Type: *SAND & GRAVEL*

Total Depth: *91 ft.*

Well Use: *DOMESTIC*

Slot Size: *0.44 in.*

Material: *PVC*

Screen Length: *4 ft.*

Vol/Wt Used:

Placed:

Vol/Wt Used: *200#*

Placed *TO: 91 ft. TO: 91 ft.*

WELL TEST DETAILS

Static Water Level: *30 ft.*

Drawdown: *15 ft.*

Test Rate: *10 gpm*

Test Duration: *4 hrs.*

Associated Reports

COMMENTS: *CLEAR*

WELL LOG

Formations	From	To
BLACK SOFT SOIL	0	11
GRAY GRITTY CLAY & GRAVEL	11	53
BROWN-GRAY MUDDY GRAVEL/SAND/CLAY	53	60
BROWN GRITTY GRAVEL & SAND	60	68
GRAY GRITTY CLAY & GRAVEL	68	85
GRAY SILTY SAND & SILT	85	87
GRAY FINE TO COARSE SAND & GRAVEL	87	91
WATER AT	85	91

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Water Well Log and Drilling Report

Ohio Department of Natural Resources
Division of Soil and Water
Phone: 614-265-6740 Fax: 614-265-6767

Well Log Number: **2051731**

[View Image of Original Well Log](#)

ORIGINAL OWNER AND LOCATION

Original Owner Name: *FRED MCLEOD*

County: *LICKING*

Address: *7938 REFUGEE RD*

City:

Location Number:

Latitude: *39.9713*

Township: *HARRISON*

State: *OH*

Location Map Year:

Longitude: *-82.64148*

Section Number:

Lot Number:

Zip Code: *43062*

Location Area:

CONSTRUCTION DETAILS

Borehole Diameter: 1: *8.125 in.*

2:

Borehole Depth: 1: *60 ft.*

2:

Depth to Bedrock:

Casing Diameter: 1: *5 in.*

2:

Casing Length: 1: *60 ft.*

2:

Casing Thickness: 1: *0.265 in.*

2:

Casing Height Above Ground: *1.20*

Date of Completion: *4/23/2015*

Driller's Name: *CANTRELL WELL DRILLING*

Screen Diameter: *5 in.*

Type: *MACHINE SLOTTED*

Set Between: *From: 53 ft. To: 56 ft.*

Gravel Pack Material/Size: *#4 SILICA SAND*

Method of Installation: *Poured (gravity)*

Grout Material/Size: *Bentonite/polymer slurry*

Method of Installation: *Pumped w/Tremie pipe*

Aquifer Type: *SAND & GRAVEL*

Total Depth: *60 ft.*

Well Use: *DOMESTIC*

Slot Size: *0.05 in.*

Material: *PVC*

Screen Length: *3 ft.*

Vol/Wt Used: *400*

Placed: *FROM: 51 ft. TO: 60 ft.*

Vol/Wt Used: *76 GAL / 200 LBS*

Placed *TO: 51 ft.*

WELL TEST DETAILS

Static Water Level: *26 ft.*

Drawdown:

Test Rate: *45 gpm*

Test Duration: *0.5 hrs.*

Associated Reports

COMMENTS: *CLEAR*

WELL LOG

Formations

CLAY & SAND

CLAY

SAND & GRAVEL

CLAY & GRAVEL

SAND & GRAVEL

CLAY & GRAVEL

SAND & GRAVEL

WATER AT

From	To
0	6
6	9
9	18
18	23
23	32
32	50
50	60
50	60

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Water Well Log and Drilling Report

Ohio Department of Natural Resources
Division of Soil and Water
Phone: 614-265-6740 Fax: 614-265-6767

Well Log Number: **2058978**

[View Image of Original Well Log](#)

ORIGINAL OWNER AND LOCATION

Original Owner Name: *MARK BURKMART*

County: *LICKING*

Township: *ETNA*

Section Number:

Address: *7779 REFUGEE RD*

Lot Number:

City:

State: *OH*

Zip Code: *43062*

Location Number:

Location Map Year:

Location Area:

Latitude: *39.969282*

Longitude: *-82.639276*

CONSTRUCTION DETAILS

Borehole Diameter: 1: *8.5 in.*

Borehole Depth: 1: *42 ft.*

Depth to Bedrock:

2:

2:

Casing Diameter: 1: *5 in.*

Casing Length: 1: *36 ft.*

Casing Thickness: 1: *0.265 in.*

2:

2:

2:

Casing Height Above Ground: *1*

Aquifer Type: *SAND & GRAVEL*

Well Use: *DOMESTIC*

Date of Completion: *9/12/2016*

Total Depth: *42 ft.*

Driller's Name: *WARTHMAN DRILLING, INC.*

Screen Diameter: *5 in.*

Slot Size: *0.05 in.*

Screen Length: *5 ft.*

Type: *MACHINE SLOTTED*

Material: *PVC*

Set Between: *From: 42 ft. To: 37 ft.*

Gravel Pack Material/Size:

Vol/Wt Used:

Method of Installation:

Placed:

Grout Material/Size: *Bentonite/polymer slurry*

Vol/Wt Used: *4BGS@23H20 P/B 92GALS*

Method of Installation: *Pumped w/Tremie pipe*

Placed *FROM: 36 ft.*

WELL TEST DETAILS

Static Water Level: *27 ft.*

Test Rate: *15 gpm*

Associated Reports

Drawdown: *4 ft.*

Test Duration: *2 hrs.*

COMMENTS: *CLEAR , LOW STATIC LEVEL*

WELL LOG

Formations	From	To
BROWN CLAY	0	19
GRAY CLAY	19	34
SAND & GRAVEL	34	42
GRAY CLAY	42	43
WATER AT	34	42

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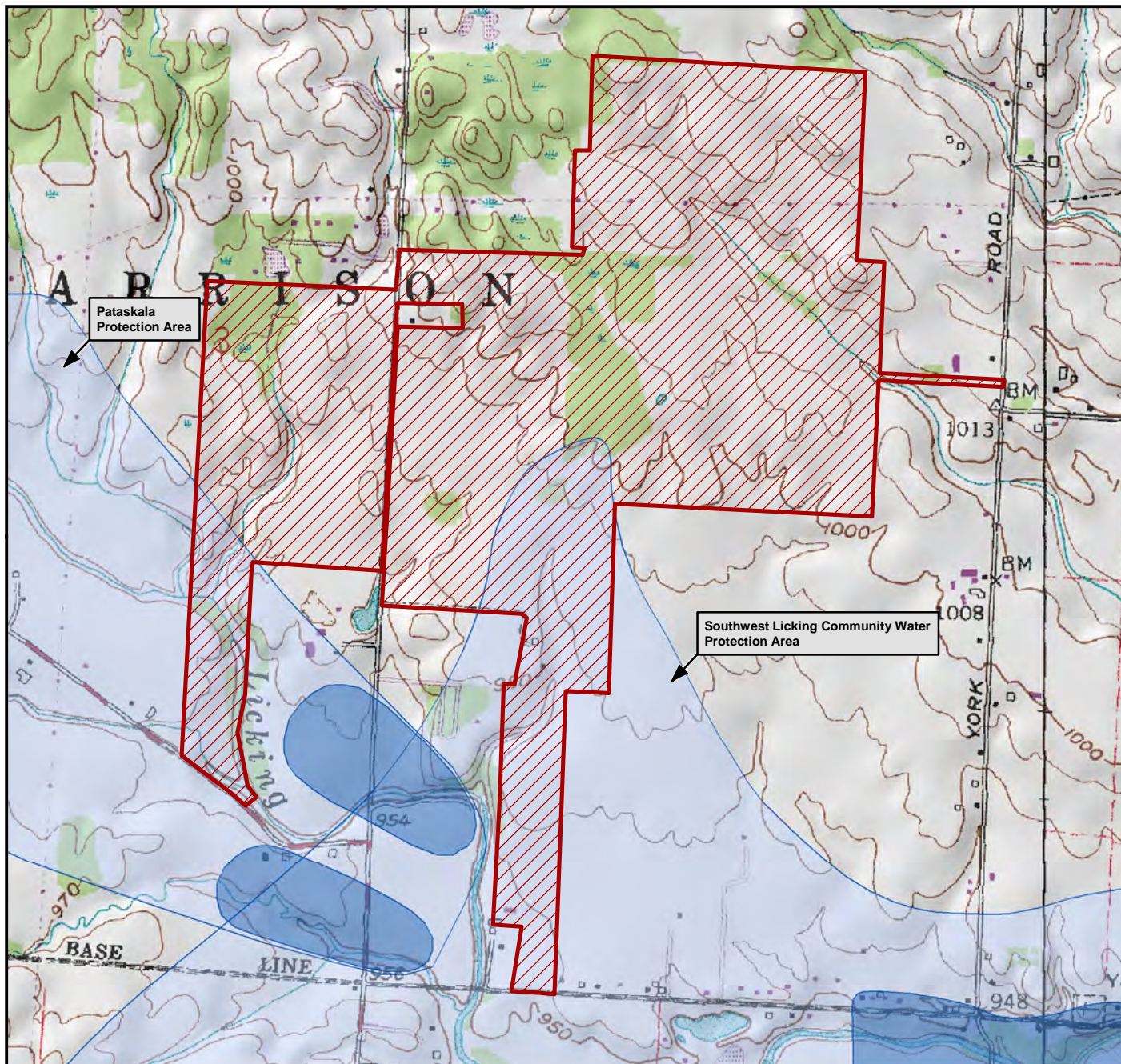
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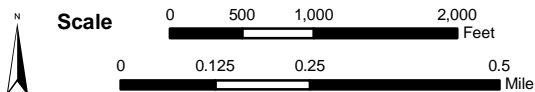
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ATTACHMENT B

Ohio EPA SWPA



Public Water System Intakes and Drinking Water Source Protection Areas and Sole Source Aquifers near the Union Ridge Solar Project Area



USGS 7.5 Minute Quadrangle Topo Maps: Millersport (1973) & Pataskala (1985)

Map created January 19, 2021



Division of Drinking and Ground Waters

EXPLANATION



Project Area



Sole Source Aquifer

The sole source aquifers displayed on this map represent the area as designated by U.S. EPA.

Drinking Water Source Protection Areas - Ground Water Sources



Protection Area (Outer line = 5-year time-of-travel)

Inner Management Zone (Inner line = 1-year time-of-travel)

Drinking Water Source Protection Areas - Surface Water Sources



Corridor Management Zone

Emergency Management Zone



Zone of Critical Concern
(Ohio River systems only)



Critical Assessment Zone
(Lake Erie systems only)



Potential Influence Zone
(Lake Erie systems only)

Label text reflects system type as defined in Chapter 3745-81-01 of the Ohio Administrative Code as noted below.

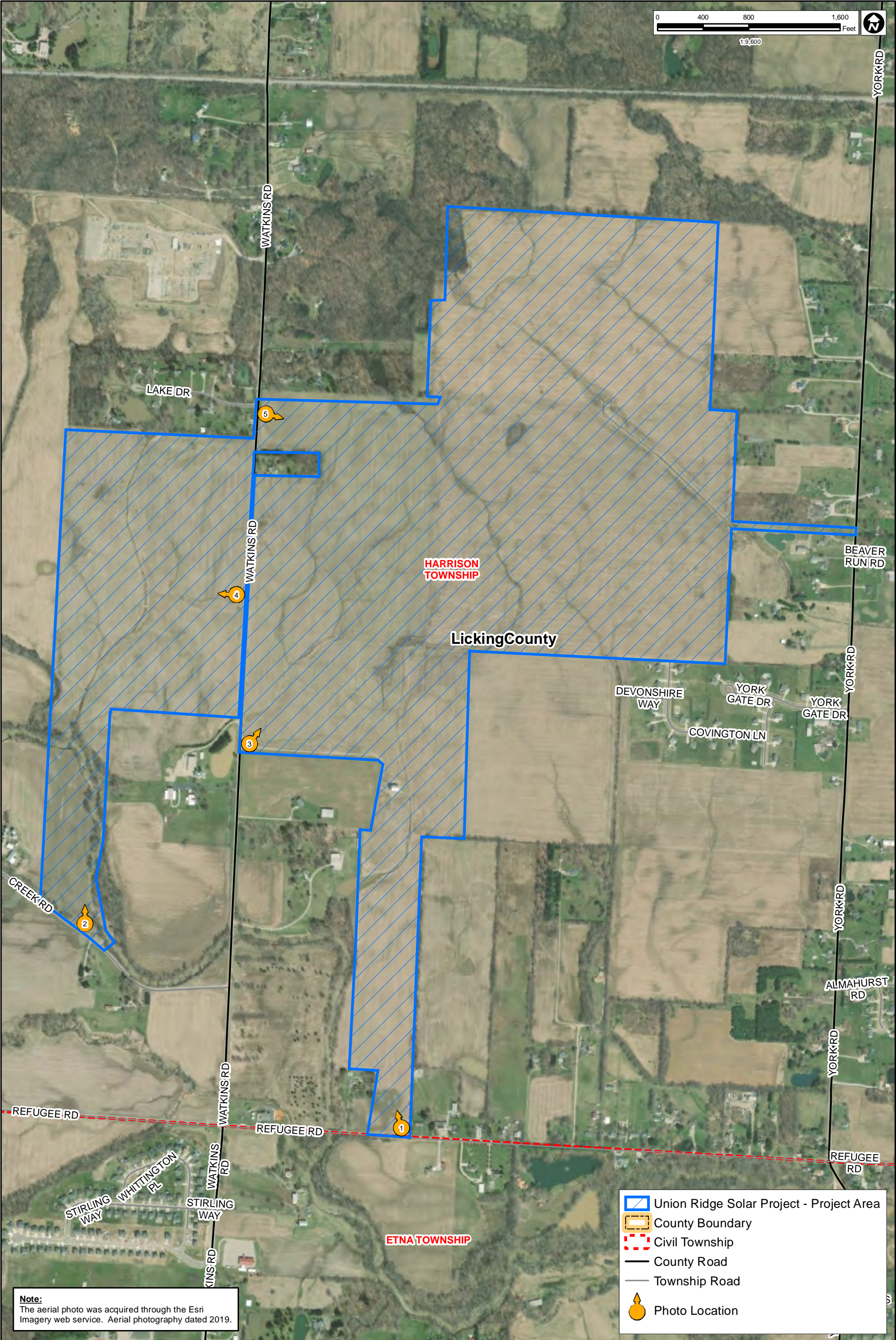
Community Water System

Non-Transient, Non-Community
Water System

Transient, Non-Community
Water System

ATTACHMENT C

Photographs Site Reconnaissance



Note:
The aerial photo was acquired through the Esri Imagery web service. Aerial photography dated 2019.

- Union Ridge Solar Project - Project Area
- County Boundary
- Civil Township
- County Road
- Township Road
- Photo Location

HULL
Environment / Energy / Infrastructure

6397 Emerald Pkwy
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

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January 2021

Union Ridge Solar Project
Geology and Hydrogeology Report

Photo Location Map

Licking County, Ohio

Attachment

C



PHOTO 1: View from Refugee Road SW looking north at Project Area.



PHOTO 2: View from Creek Road SW north at Project Area.



Union Ridge Solar
Geology and Hydrogeology Report

Site Photographs

Licking County, Ohio

Date:
JANUARY 2021

Project Number:
EVD008

File Name:
EVD008.0001.xlsx



PHOTO 3: View from Watkins Road SW looking northeast at Project Area.



PHOTO 4: View from Watkins Road SW looking west at Project Area.



Union Ridge Solar
Geology and Hydrogeology Report

Site Photographs

Licking County, Ohio

Date:

JANUARY 2021

Project Number:

EVD008

File Name:

EVD008.0001.xlsx



PHOTO 5: View near the intersection of Lake Drive SW and Watkins Road SW looking east at Project Area.



Union Ridge Solar
Geology and Hydrogeology Report

Site Photographs

Licking County, Ohio

Date:
JANUARY 2021

Project Number:
EVD008

File Name:
EVD008.0001.xlsx

ATTACHMENT D

General Earthwork Recommendations

GENERAL EARTHWORK RECOMMENDATIONS

Earthwork is most efficiently accomplished using large, heavy-duty equipment, unimpeded by obstacles. Consequently, it is preferable to complete as much of this work as is possible prior to initiating other phases of construction, such as excavation and installation of underground utilities. The following are general recommendations concerning earthwork construction and may not be applicable to site-specific conditions. Furthermore, the contractor is responsible in selecting and implementing the most appropriate construction techniques (e.g., construction means, methods, sequences or procedures, safety precautions/programs) for each site-specific condition.

1. **Stripping, clearing and grubbing**

In areas where fill is to be placed to support structures, drive and parking areas, the following is proposed:

Strip and remove all sod, topsoil, and organic contaminated soils.

Remove all trees and shrubs, designated to be cleared, inclusive of grubbing roots of larger trees.

Remove all trash, debris, rubble, existing random fill, soil softened by standing water, and any other soft soil as determined necessary by the Geotechnical Engineer. The fill placement should begin on firm, relatively unyielding foundation material.

The fill foundation should be stripped and cleared beyond the limits of the structure by a distance equal to not less than the thickness of the fill below the structure foundation plus 10 feet. For drives and parking areas, the fill foundation should be stripped and cleared for a distance of at least 5 feet beyond the limits of the pavement.

2. **Fill Material – Composition**

Material satisfactory for use as fill includes clayey silt and silty (lean) clay soils or sand and gravel, free of topsoil, organic or other decomposable matter, rocks having a major dimension greater than 6 inches, and/or frozen soil.

Soils having a maximum dry density of less than 100 pounds per cubic foot as determined by the moisture-density relationship are not considered suitable for use as fill.

Soils described as SILT (USCS ML, MH or ODOT A-4B) are considered questionably suitable for use as fill material because the stability of these materials is very sensitive to increases in moisture. These soils should not be placed within three feet of the top of the subgrade.

3. **Fill Material – Moisture**

Predominately fine-grained fill materials (lean clayey soils) are recommended to contain moisture contents within 3 percent (above or below) the optimum moisture as determined by the moisture-density relationship (ASTM International D698), or less if found to be needed to obtain stability below the compaction equipment. This provides the best assurance of establishing not only adequate density for ultimate support of construction but also provides stability of the compacted soil under the dynamic loading induced by the heavyweight construction equipment during placement.

Sand and gravel fill material is not as sensitive to moisture content with regards to stability. Therefore, we recommend no specified limitation, provided the specified density and stability can be established.

4. Moisture Adjustment

If the moisture content of the material from the fill source or native subgrade is not appropriate to establish density, moisture adjustment of the material will be required.

If the moisture content of the fill being placed or the native subgrade is too high, appropriate adjustment entails spreading and exposing to the sun and wind for drying and using equipment such as a disc and/or a grader. This may not be feasible during wet seasonal conditions. Wet soils will pump and may cause excessive rutting under heavy equipment traffic. Therefore, improvements to the subgrade may be achieved by undercutting and replacing with suitable fill (possibly in combination with a geotextile or geogrid) or stabilization with lime or cement. The most appropriate subgrade improvement technique should be determined at the time of construction.

If the moisture content of the fill is too low, a water truck with a sprinkler bar may be required. After sprinkling, the soil should be thoroughly mixed with a disc and/or a grader.

5. Equipment

Equipment to compact the fill should be heavy duty with a steel drum roller having a minimum effective unit weight of 10 tons. For example:

Fine-grained materials (clayey silts and lean clays) may be efficiently compacted using a sheepfoot roller comparable to a Caterpillar 815 self-propelled roller.

Coarse-grained materials (sand and gravel) having little or no silt and clay sizes may be efficiently compacted using a heavy, self-propelled, vibratory smooth wheel roller.

Coarse-grained materials having about 10% or more silt and clay sizes may be efficiently compacted using a sheepfoot roller comparable to a Caterpillar 815 self-propelled sheepfoot roller.

6. Lift Thickness

Fill should be placed in horizontal layers, 8-inch loose thickness, compacted uniformly to approximately 6-inch thickness.

If equipment is used which is lighter weight than recommended above, lift thickness should be appropriately thinner.

7. Fill Density

In areas to support access roads and within the pad, the fill and backfill should be compacted to the density requirements as recommended in the Geotechnical Exploration Report.

8. Season of Earthwork

Weather conditions are very important to efficiency in working soils. Generally, earthwork is accomplished most efficiently between May and November. Cold periods may hamper moisture adjustment. If the temperature is below 32 degrees Fahrenheit (°F) for prolonged periods, frozen material on the fill surface must be removed before subsequent lifts may be placed. Also, densification of fill is more difficult when air temperatures are below freezing. Granular material, such as bank run sand and gravel is somewhat less sensitive to weather conditions but is not immune from difficulties that may be presented by precipitation and low temperatures.

9. Trench Backfill

Trench backfill should be controlled compacted fill, placed in accordance with recommendations presented above and as engineered for thermal properties in collection systems.

It is recommended that suitable granular material be used to backfill trenches that traverse beneath buildings, drives, or parking areas.

10. Proof Rolling

Upon completion of stripping, clearing, and grubbing; the areas planned to support pavement or building floor slab shall be proof rolled in accordance with ODOT Item 204 to identify any soft, weak, loose, or excessively wet subgrade conditions. At a minimum, the proof rolling should be completed with a minimum 20-ton loaded tandem axle dump truck. The vehicle should pass in each of two perpendicular directions covering the proposed work area. Any observed unsuitable materials should be undercut and replaced with suitable fill as directed by the Geotechnical Engineer.

11. General

All fill should be placed and compacted under continuous observation and testing by a soils technician under the general guidance of the Geotechnical Engineer.

ATTACHMENT E

Generalized Geotechnical Exploration Work Plan

GENERALIZED GEOTECHNICAL EXPLORATION WORK PLAN

A Geotechnical Engineer shall prepare a proposal for a geotechnical site exploration in general accordance with the suggested scope of work provided below. The Geotechnical Engineer shall be qualified in geotechnical investigations. The geotechnical exploration program suggested below (e.g., boring frequency, location, depth, and sampling and testing procedures) should be adjusted by the Geotechnical Engineer based on their experience and to allow for specific geological, topographic, and drainage conditions of the individual site(s).

PROJECT DESCRIPTION

A geotechnical exploration will be performed at the proposed Project Area in Fulton County, Ohio. The project involves planned construction of solar arrays at various locations at the Arche Energy Project (Site). Upon completion of the geotechnical exploration, suitable foundation systems will be reviewed that will work with the Site conditions as determined by the geotechnical exploration and design preferences provided by the Client. Foundation types that are typical to support the solar arrays included driven steel piles and helical pile supported foundation systems.

The purpose of the geotechnical exploration is to obtain subsurface information and to determine relevant engineering properties of the Site soils. A review of generalized geologic references, including ODNR Well Logs and ODNR Groundwater Resource Maps, suggest the Project Area is underlain by clayey till deposits with shale bedrock depths estimated 150 feet or deeper below existing ground surface in the Project Area.

PROPOSED SCOPE OF WORK

Reconnaissance, Planning and Boring Layout

The following will be conducted as part of this task:

1. A review of pertinent, readily available subsurface and geotechnical information for the Site that is provided to the Geotechnical Engineer will be performed.
2. A site visit will be performed to layout the borings and clear underground utilities at the boring locations. The landowner(s) will be consulted to provide the Geotechnical Engineer with information and the locations of all private utilities at the site. The Geotechnical Engineer will be responsible for locating the borings, which should be located (e.g., survey or GPS) and staked in the field prior to drilling.
3. The Ohio Utility Protection Service (OUPS) and Ohio Oil & Gas Producers Underground Protection Service (OGPUPS) will be notified a minimum of 48-hours prior to the commencement of drilling services.

Drilling and Sampling

After the Geotechnical Engineer has reviewed available subsurface and geotechnical information, they will determine the number of borings to be drilled at the solar array locations. The borings will extend to the proposed depth or competent bedrock, whichever is encountered first.

For all borings, the following can be performed:

1. Split-barrel sampling of soil will be performed in accordance with ASTM International D1586 for each boring in increments of 2.5 feet to the depth of 10 feet and at 5-foot intervals below 10 feet to the depth of the borings. In all the borings, Standard Penetration Test (SPT) data will be developed and representative samples preserved. Shelby tube samples should be obtained where low strength and/or highly compressible cohesive soils are encountered as deemed necessary by the Geotechnical Engineer.

2. It is anticipated that the drilling will be accessible with and performed by a truck-mounted drilling rig. Provisions shall be made by the Geotechnical Engineer based on the time of year the fieldwork will occur in using a track-mounted or ATV drill rig if the borings cannot be accessed with truck-mounted drilling equipment.
3. Water observations in the boreholes will be recorded during and at the completion of drilling.
4. All borings will be backfilled at the completion of drilling with bentonite chips and drill cuttings.

Geotechnical Laboratory Testing

A laboratory testing program will be established by the Geotechnical Engineer based on the observations made during the drilling activities and experience. The following laboratory tests shall be performed on samples retained during the drilling activities:

1. All samples should be classified in the field/laboratory based on the visual-manual procedures (ASTM D2488) in accordance with the Unified Soil Classification System (USCS) and the laboratory test results. Formal boring logs will be prepared based on the field logs and incorporation of laboratory testing results.
2. Laboratory testing may include moisture content, particle-size analyses, and Atterberg limits determination of a limited number of samples considered to be representative of the foundation materials encountered in the borings. Unconfined compression and consolidation tests should be performed if low strength and/or highly compressible cohesive soils are encountered as deemed necessary by the Geotechnical Engineer.
3. Additional laboratory testing for corrosion potential and/or thermal resistivity may be completed based on project design requirements.
4. All laboratory testing will be performed in accordance with the procedures of ASTM International or other specified standards.

Geotechnical Exploration Report

The Geotechnical Engineer will prepare a Geotechnical Exploration Report that will include the findings, conclusions and recommendations concerning proposed geotechnical related design/construction considerations and foundation design recommendations. The report shall also include a boring location plan, a legend of the boring log terminology, boring logs, laboratory testing results, and other pertinent information.

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

3/26/2021 3:36:13 PM

in

Case No(s). 20-1757-EL-BGN

Summary: Application Exhibit O - Geology and Hydrogeology Report electronically filed by
Teresa Orahood on behalf of Dylan F. Borchers