Office Use Only		$	
	Date Filed	*Fee*	*Application Number*

JOHNSON COUNTY, IOWA

APPLICATION FOR: CONDITIONAL USE PERMIT

Application is hereby made for approval of a (state the official use as listed in the Johnson County UDO, and *briefly* describe the proposed use [e.g. Home Industry for Antique shop, Special Events for Corn Maze, etc.]):

Solar Arrays

On property located at (street address if available or layman's description):

Lying West of Hwy 1 SW 1862' to 2650' South of it intersection with 500th St. SW

Parcel Number(s): 1313177005

The property consists of 6.40 **total acres, and is currently zoned** A

***Note**: This Conditional Use Permit is subject to any conditions outlined in chapter 8:1.23 of the Unified Development Ordinance and any other conditions deemed appropriate by the board of Adjustment to protect public health, safety, and welfare.*

The undersigned affirms that the information provided herein is true and correct. If applicant is not the owner, applicant affirms that the owner(s) of the property described on this application consent to this application being submitted, and said owners hereby give their consent for the office of Johnson County Planning, Development, and Sustainability to conduct a site visit and photograph the subject property.

Mark & Rosemary Slabaugh
Name of Owner

Farmers Electric Coop
Name of Applicant (if different)

1959 Yoder Ave. SW Kalona, IA. 52247
Applicant Street Address (including City, State, Zip)

319-683-2510
Applicant Phone

theisdorffer@feckalona.org
Applicant Email

Tim Theisdorffer
Applicant Signature

See back page for Application Submittal Requirements and Checklist

Applications should be emailed to planning@johnsoncountyiowa.gov and delivered to the Planning, Development and Sustainability Office (913 South Dubuque Street, Iowa City, IA 52240)

Updated 6.1.23 MS

The following items must be submitted for the application to be complete. Incomplete applications will be returned and will not be considered until the next submission deadline. Once submitted, county staff will review the materials and request revisions (if necessary). Once all revisions and outside reviews have been received, the application will be placed on the next available Board of Adjustment agenda.

If working with an engineer who can provide CAD or GIS line work, electronic submissions should be submitted in accordance with the PDS department's electronic submission guidelines (see below). Preference is that electronic submission is prior to hard copy submission, but will be accepted until 12:00 p.m. the day after the submittal deadline.

Initial each empty box below *to ensure you included all necessary information in the appropriate form for an application to be considered complete. Some items may require both electronic and physical copies.*

Item Required	Electronic Copy (PDF unless otherwise noted)	Hard copy
Application Fee (varies based on application. Fee: $ 1000)		
This application form with all information completed		(2)
Brief cover letter explaining the proposed use including but not limited to the number of employees, parking facilities, days and hours of operation, estimate of maximum number of customers expected on site an any one time, provisions for water and wastewater, types of equipment to be used, signage, etc		
Site plan identifying the access, structure(s) for the proposed use, parking areas, signage location, and addressing any Supplemental Conditions required by Chapter 8:1.23		
If working with an engineer: CAD line work of the site plan, following the guidance below		
Proof of application to the Johnson County Health Department for a Public Health Zoning Application		
For requests to establish Utility Scale Solar (use area of 20 acres or less): • Completed "Application Checklist for Utility-Scale Solar Systems (Supplemental Conditions)", accompanied by all information outlined on said checklist. • Electronic Submission of all materials is required.		
For requests for Commercial Communications Towers, include the following: • Sensitive Areas Analysis in compliance with the Sensitive Areas Ordinance, or an approved Sensitive Areas waiver. • Stormwater Management Plan (including soil erosion and sediment control) in compliance with the Stormwater Management regulations, or an approved waiver		

Electronic Submission Requirements for CAD line work:

- Must be in AutoCAD 2017 or older and .dwg format (.dxf is also acceptable, no .zip files will be accepted).
- Submissions must use Coordinate System: NAD_1983_StatePlane_Iowa_South_FIPS_1402_Feet
- If applicable, submission should include information for Sensitive Areas Analysis/Mapping and Stormwater/Soil Erosion Control infrastructure on the site. This includes any limits of disturbance or other impact areas.
- Submission should NOT include legends, legal descriptions, location maps, signature blocks, etc.

FOR OFFICE USE ONLY:
ZONING NUMBER: _____

Johnson County Public Health
855 S. Dubuque Street * Iowa City, Iowa 52240 * 319/356-6040 * Fax: 319/356-6044

Johnson County Public Health
Zoning Application

Applicant Name: Tim Heisdorffer Farmers Electric Coop	Phone Number: (319) 683-2510		
Address: 1959 Yoder Ave. SW	City: Kalona	State: IA	Zip: 52247

NOTE: THIS APPLICATION NEED NOT BE SUBMITTED FOR FINAL PLATS.

TYPE OF ZONING REQUEST:	APPLICATION FEE:
☐ Zoning reclassification from _____ to _____	$75.00 Application Fee
☐ Combined preliminary and final plat	$50.00 + $20.00 per Lot Application Fee*
☐ Preliminary plat using private onsite/centralized waste water systems	$50.00 + $20.00 per Lot Application Fee*
☒ Conditional Use Permit	$25.00 Application Fee
	***Outlots Exempt**

Application Fee _____ **+ Number of lots** _____ **Minus Number of Outlots =** _____ x $20.00 **Fee Per Lot**
= Enclosed Fee $25

PLEASE RETURN THIS APPLICATION AND APPROPRIATE APPLICATION FEE TO:

JOHNSON COUNTY PUBLIC HEALTH
855 S. DUBUQUE STREET
IOWA CITY, IA 52240

The application and fee must be received by the department NO LESS THAN 24 HOURS prior to the Johnson County Zoning commission public hearing and/or the Johnson County Zoning Board of Adjustment.

No refund shall be made of any required fee accompanying a required application once filed with the administrative officer.

Signature of Applicant: I Scott Metts of behalf Tim Heisdorffer Farmers Electric Coop **Date:** 7/20/23

JOHNSON COUNTY, IOWA

APPLICATION CHECKLIST FOR UTILITY-SCALE SOLAR SYSTEMS (SUPPLEMENTAL CONDITIONS)

Farmers Electric Solar Site — *Name of Project*

Tim Heisdorffer — *Name of Applicant Primary Contact*

The following items must be submitted for the Conditional Use Permit or rezoning application to be complete. Incomplete applications will be returned and will not be considered until the next submission deadline. Electronic submissions should be submitted prior to hard copy delivery when possible. In all cases, electronic submission is due by 12 p.m. (noon) local time the day after the posted submission deadline. ***Initial each item below*** *to confirm that you are aware of the submittal requirements for an application to be considered complete.* For all items, if you have questions, the contact is Johnson County Planning, Development and Sustainability, unless otherwise marked.

FOR EACH REQUIREMENT, PLEASE ENSURE YOUR SUBMITTED DOCUMENTS ARE IN COMPLIANCE WITH THE CITED CHAPTER OR SUBSECTION OF THE UNIFIED DEVELOPMENT ORDINANCE (UDO). Please also ensure you are using the **current** UDO regulations.

✓ Clearly indicate **setbacks** for all structures (including arrays) from all external parcel boundaries of the project.

✓ Provide a description of the **Security Fencing** (8:1.23.BB.2)

✓ Indicate compliance with **Panel Clearance Height** (8:1.23.BB.3)

✓ Provide a list of all **public roads** to be used within Johnson County to transport equipment, parts and materials for construction, operation or maintenance of the solar energy system and related components. (The approving authority will determine whether a Public Roads Damage Avoidance and Mitigation Plan will be required as part of the review and approval process.) (8:1.23.BB.4)

✓ One (1) copy of or inclusion in the application of the **Ground Cover Standards** (8:1.23.BB.5)

✓ One (1) copy of or inclusion in the application of any **Landscaping Buffer Plans** (8:1.23.BB.6). (Determination of screening requirements will be made by the approving authority as part of the review and approval process.)

✓ One (1) copy of the **Agricultural Impact Mitigation Plan** (8:1.23.BB.6A)

✓ Complete description of **Glare Minimization** (8:1.23.BB.7)

✓ A general **Site Plan** (8:1.23.BB.8)

✓ One (1) copy of the **Operations and Maintenance including Emergency Operations Procedures** (8:1.23.BB.9)

✓ One (1) copy of the **Decommissioning and Site Reclamation Plan** (8:1.23.BB.10)

- ✓ One (1) copy of the ***Draft*** (unsigned) **Performance Agreement** – including estimated, itemized cost of decommissioning – to accompany the Decommissioning and Site Reclamation Plan. (The County can provide template or you may provide your own.)

✓ One (1) copy of the completed **Sensitive Areas Analysis** in compliance with the Sensitive Areas Ordinance (Chapter 8:3), or an approved waiver.

✓ One (1) copy of the **Stormwater Management Plan** (including soil erosion and sediment control) in compliance with the Stormwater Management regulations (Chapter 8:3), or an approved waiver.

NOTE: If the project also proposes or includes onsite battery energy storage, additional supplemental information will be required that relates specifically to that use (subsection 8:1.23.D1). A separate Conditional Use Permit application is required if the solar project seeks a conditional use permit approval on a property zoned A-Agricultural.

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

8/11/2023

Farmers Electric Solar Farm

Johnson County, Washington Township

Section 13, NE Quad

3.5 acres, 988.31 KW DC

Ground-mount, Fixed mount

Adjacent to: 5063 HWY 1, Kalona, IA 52247

1. Letter Of Intent Explaining Proposed Use

Farmers Electric Cooperative (FEC) is seeking approval of a conditional use permit to construct and operate a ground-mounted, fixed-mount photovoltaic solar electricity generating system on the west side of Highway 1, approximately 1,900 south of 500th St. SW in Johnson County.

The project is designed to have a generating capacity of 998 KW DC, or about 850 KW AC. It will power about 220 homes annually. The electricity produced will be placed on the local electric distribution system and used by residents of Johnson, Iowa, and Washington Counties. Panels will be a minimum of 18 inches above the ground, reaching a height of about 9 feet. This passive facility will not produce any discernible noise and will co-exist with the surrounding area. If required, FEC proposes to install a landscape buffer along the east side of the site that runs along Highway 1.

The solar installation will be 3.5 acres on a 6.4 acre parcel. FEC will install an 8-foot wire woven fence with no barb wire, as required by county regulations, around the entire perimeter. Any existing fence will be removed. The bottom 42" of wire mesh has openings of 7" X 6". 'Warning/No Trespassing' signs will be mounted every 250'.

The construction and operation of the facility will not require any public facilities or services. The project is accessible from Highway 1. The Iowa DOT has granted an entrance permit across from the existing house, permit # 2023-52-0-2, attached to this application. No grading – other than a driveway – will be required on this site. Once construction is completed, there will be minimal traffic at the site, with physical visits at least once a month by FEC personnel. The solar panels being used have an anti-reflective coating.

A review by Hart-Frederick has indicated this property has been used for crops since at least the late 1800's, and no history of structures exist. A gravel driveway, with less than 3,000 square feet of gravel in the property is planned. FEC is working with the Bee And Butterfly Habitat Fund to seed the acreage with pollinator habitat. This cover will improve soil and retention. FEC will report to the county on an annual basis for the first 5 years on habitat maintenance, then a reduced amount at the Zoning Administrator's discretion. At the end of its 30 – 40 year expected life, this site could be repowered, or returned to its previous agricultural use. If the permit is approved, FEC will work with Johnson County to ensure all standards and regulations are followed.

Once construction is complete and the site is energized, FEC will be able to monitor from off-site, but there will still be tasks needed to be performed on-site; maintenance of landscaping, ground cover, and normal maintenance of the system. If the system ceases to be in operation for one year, FEC will have one year to decommission the site and notify the Zoning Administrator when the system is fully decommissioned.

Farmers Electric has been recognized nationally for our existing solar infrastructure, specifically renewable generated watts per member and percentage of members that have renewables. This site will enable FEC to increase its renewable generation from 15% of annual sales of kilowatthours to approximately 23%; at the same time reducing our dependance on our wholesale suppliers by purchasing less out-of-state energy and lowering our demand. We appreciate your time and consideration.

Tim Heisdorffer
General Manager
Farmers Electric Cooperative
(O) (319) 683-2510
(C) (319) 325-7513

2. Operation And Maintenance Plan

The solar facility will be monitored from our Frytown office. Routine inspections and maintenance will occur as needed. Life of the installation is 30 – 40 years.

Item	Service Description	Frequency
1.	Remote monitoring.	Daily
2.	Responding to inverter/system faults. Replacing blown fuses on inverters, shorts, grounding issues, communication issues with inverters. Replacing failed inverters.	As needed
3.	Following safety protocols to shut down system for repairs And replacement of equipment. Verify the system can be safely re-energized.	As needed
4.	Maintain and monitor transformer, metering, disconnects, and breakers.	As needed
	Preventive Maintenance	
1.	Visually inspect entire solar site. Record and correct issues.	Annually
2.	Visually and with infrared camera, inspect solar panels and connections.	Annually
3 .	Following high-wind events, visually inspect all panels, rails, and racking to insure properly affixed.	As needed
4.	Visual inspection of all wiring and grounding.	Annually
5.	Visual inspection of all conduit and points of connection.	Annually
6.	Verify AC and DC disconnections are free of damage, corrosion, and operate as they should.	Annually
7.	Inspect interior of inverters and air filters for dirt and moisture, correct any issues.	Annually
8.	Maintain the grounds. Monitor and correct any erosion. Maintain gravel and driveway. Control weeds. Water tree line. Maintain ground cover in accordance with the vegetation and agricultural mitigation plans.	As needed
9.	Maintain reports covering performance results compared to estimates, maintenance performed, and inspections performed.	Annually

Annual Reports

1. Power generated. Monthly kilowatthour readings reported once per year by January 15th to Johnson County.

2. Vegetative management reports annually by December 31st detailing any ground maintenance activities performed during the year for the first 5 years, then less frequently at the discretion of the zoning administrator.

3. Decommissioning and Site Reclamation Plan

The estimated life of the solar farm is 30 to 40 years, after which it can be re-powered or returned to agricultural use. Owner will be responsible for all decommissioning costs. Within 12 months after the project has not generated electricity for a continuous 1 year period, the owner will remove all above-grade infrastructure. Below grade infrastructure will be removed to a dept of 36 inches. Most equipment will be recyclable materials such as steel, aluminum, glass, and copper. Items will be recycled if feasible. Non-recyclable materials will be disposed off-site following rules and regulations. Driveway, fencing, and landscaping will remain for future use by the landowner.

1. Solar Panels
All panels will be disconnected from the electrical system and unfastened from the racking. Panels will be recycled off-site, sold to a third party, or donated for use elsewhere.

2. Racking System
The supporting racking and driven posts will be disassembled and holes backfilled. They will be taken off-site and recycled, sold to a third party, or donated for use elsewhere.

3. Electrical And Other Equipment
All electrical equipment including inverters, poles, above-grade wiring, transformers, and disconnects will be dismantled and removed. Wiring and conduit up to 36 inches deep will be removed to restore for agricultural use. Deeper materials will be abandoned in place. Inspections throughout the decommissioning process will help avoid oil leaks. Equipment will be recycled, sold to a third party, or donated.

4. Concrete Pads
Concrete pads will be broken up and debris will be removed from site.

5. Site Grading
Area disturbed from decommissioning will be graded to comply with stormwater and soil erosion regulations. Disturbed areas may be seeded with grasses or crops to establish vegetation.

4. Stormwater Management Plan

Johnson County requires any site with over 5,000 square feet of impervious area have a stormwater management plan. Total impervious area on this site will be no more than 2,400 square feet, therefore a stormwater management plan is not required. See site plan for area covered.

5. Glare Mitigation

According to Mike in the Iowa City Airport manager's office, the approach zone for the Iowa City airport is 1,000 feet, the distance from the airport to the solar field is 10.2 miles. The panels installed will have an anti-reflective coating. See the glare study report attached later in this application.

6. Ground Cover Plan

The field of the solar site is currently planted in soybeans. This crop will be harvested before the construction process commences. If the Conditional Use Permit is granted at the monthly meeting on September 20th, material will be ordered and will take 6 – 7 weeks to arrive. Ground cover seed mixes will be seeded no later than November. The project will not extend multiple planting seasons, taking approximately 4 months from start to finish.

See attachments below for 2 seed mixtures for ground cover provided by The Bee And Butterfly Habitat Fund specific to the state of Iowa. These mixes have not been treated with insecticides. The first mix listed is a fescue/bluegrass/clover blend that will be under and directly in front of the solar rows. The second is a monarch mix that will be seeded on the buffers around the perimeter of the panels. Placement is shown on page 2 of the site plan.

In the first year, when plants in the monarch mix plot reach a height of about 20" – 28", it will be mowed to a height of 10", this may need to be done 3 – 4 times the first year. By year two, the monarch mix should be established well enough to not need mowing. FEC may need to apply Clethodim by the spring of year two to control grasses that may be trying to overtake the plot.

Top soil will not be removed during development of the site.

Array Fescue - Bluegrass - Clover Bl

IA Monarch Mix 2022.pdf

Following a review of the two types of seed mixes by Dave Wehde with Johnson County Conservation, the following seeds will be withdrawn from the Monarch Mix for reasons detailed on the right of each listing. Elsa Gallagher, biologist and the Habitat Program Director for the Bee And Butterfly Habitat Fund, states there's no problem removing these seeds from the mix.

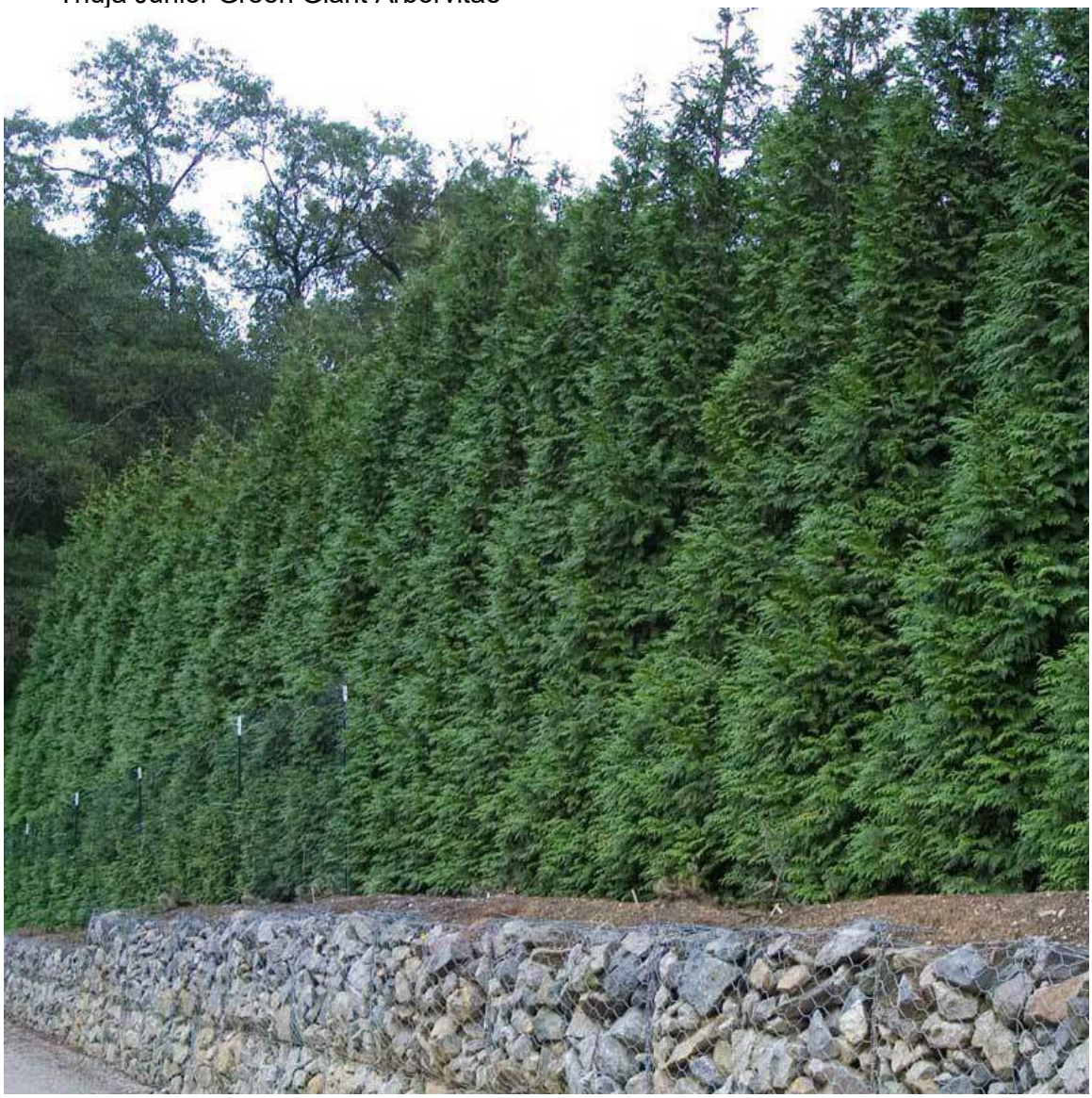
- Blanket Flower (Gaillard ristate) — Not Native to Iowa
- Clasping Coneflower (Rudbeckia amplexicaulis) — Not Native to Iowa
- Deer Vetch (Acmispon americanus) — Native to far Western Iowa

- Plains Coreopsis (Coreopsis tinctoria) — Not Native to Iowa
- Upright Coneflower (Ratibida columnifera) — Native to far Western Iowa

If landscaping is required, Farmers Electric intends to plant Thuja Junior Green Giant Arborvitae trees or similar. These trees grow at a rate of 3' – 5' per year; at the end of year three they'll be approximately 9' tall. At maturity, these trees grow to a height of 20' and width of 5'. See example on the next page. A planting that has a lower height at maturity is necessary to maintain distance from the overhead electric transmission line that runs along the same route. Farmers Electric proposes only planting along the east side of the property that runs along Highway 1. The west and south property lines are next to crop fields, the north property line is adjacent to an AT&T property with no daily personnel.

Farmers Electric will report to the county the ground cover maintenance activities annually for the first 5 years by December 31st of each year, then the frequency reduced with the approval of the Zoning Administrator. Vegetation that does not establish or dies during the life of the project will be replaced. Regular maintenance on ground cover will extend for the life of the facility. FEC will follow guidelines established in a handbook provided by The Bee And Butterfly Fund 'Pollinator Habitat : Establishment & Management Guide'.
polinator_habitat_guide_-_2021.pdf (beeandbutterflyfund.org)

Thuja Junior Green Giant Arborvitae



7. Emergency Operations Procedures

There will one access point to the solar farm, the driveway with a locked sliding gate. Each inverter is equipped with a separate AC and DC disconnect. Each inverter will be fed by a 3-phase AC disconnect switch (non-fused). Each AC disconnect will be fed from a 3-phase breaker from a breaker box positioned between the disconnect switch and the transformer. The transformer will be in the solar farm, being fed from a cabinet positioned outside the solar farm.

If for maintenance or emergency situations, the shutdown procedure is as follows:

1) Place the inverter DC disconnect switch in the 'off' position.
2) Place the inverter AC disconnect switch in the 'off' position.
3) Place handle on the AC disconnect in the 'off' position.
4) Place the breaker in the breaker panel assigned to that inverter in the breaker in the 'off' position.

If an emergency situation requires an immediate shutdown for the entire farm:

1) Shut each breaker off in both breaker panels.
2) Transformer may then be de-energized from the cabinet positioned outside the solar farm.

In all cases, FEC personnel will be the only authorized persons to operate equipment. A sign will be posted at the entrance with Farmers Electric Cooperative's name (the owner and operator), phone number, 911 address, and GPS coordinates.

The emergency contact is the site operator. In any emergency at any time call the number below.

Farmers Electric
1959 Yoder Ave. SW
Kalona, IA 52247
319-683-2510

Annual training in January will be provided to area fire departments and Johnson County Emergency Management for the first 5 years of operation of the site. After 5 years, training will be provided annually if requested by the Emergency Management Agency.

Johnson County Emergency Management
4529 Melrose Ave.
Iowa City, IA 52246

Kalona Fire Department
310 5th St.
Kalona, IA 52247

Hills Fire Station
90 1st St.
Hills, IA 52235

Iowa City Fire Department
410 E. Washington St.
Iowa City, IA 52240

Wellman Fire Department
95 3rd St.
Wellman, IA 52356

8. Agricultural Impact Mitigation Plan

Project Overview:

Material Used;

1000 KVA transformer
2 – Eaton 3-phase breaker panels
13 – Solectria PVI 60 kw inverters
13 – 200A – 480V AC disconnects
1834 – SAAE HT-72-18X- 545W bi-facial solar modules
1 – Terrasmart 30-degree fixed ground mount racking

The ground cover, landscaping, and decommissioning plans all work in conjunction with the agricultural impact mitigation plan and all will be adhered to. There are no sensitive areas identified on site, as found by the sensitive areas report. Once the Conditional Use Permit is granted, materials will be ordered. Material will take approximately 6-7 weeks to arrive on site. Once construction commences, it will take about 120 days until completion, roughly from November 2023 through February 2024.

No grade work is necessary for this site. Any dirt disturbed during trenching for underground electric lines or conduit installation will be backfilled in same. Construction will begin after the current soybean crop has been harvested. The bean stubble and stover will act as ground cover until ground cover seeding is conducted in November. See on next page top soil depth as tested by Hart-Frederick.

The previous owner of the property has never installed tile on this site, nor is he aware of any current tile in place. If tile is discovered during the construction process, it wll be repaired by FEC.

A dumpster will be on site for any packing materials, garbage, or debris created during the construction phase.

9. Topsoil Depth and Map

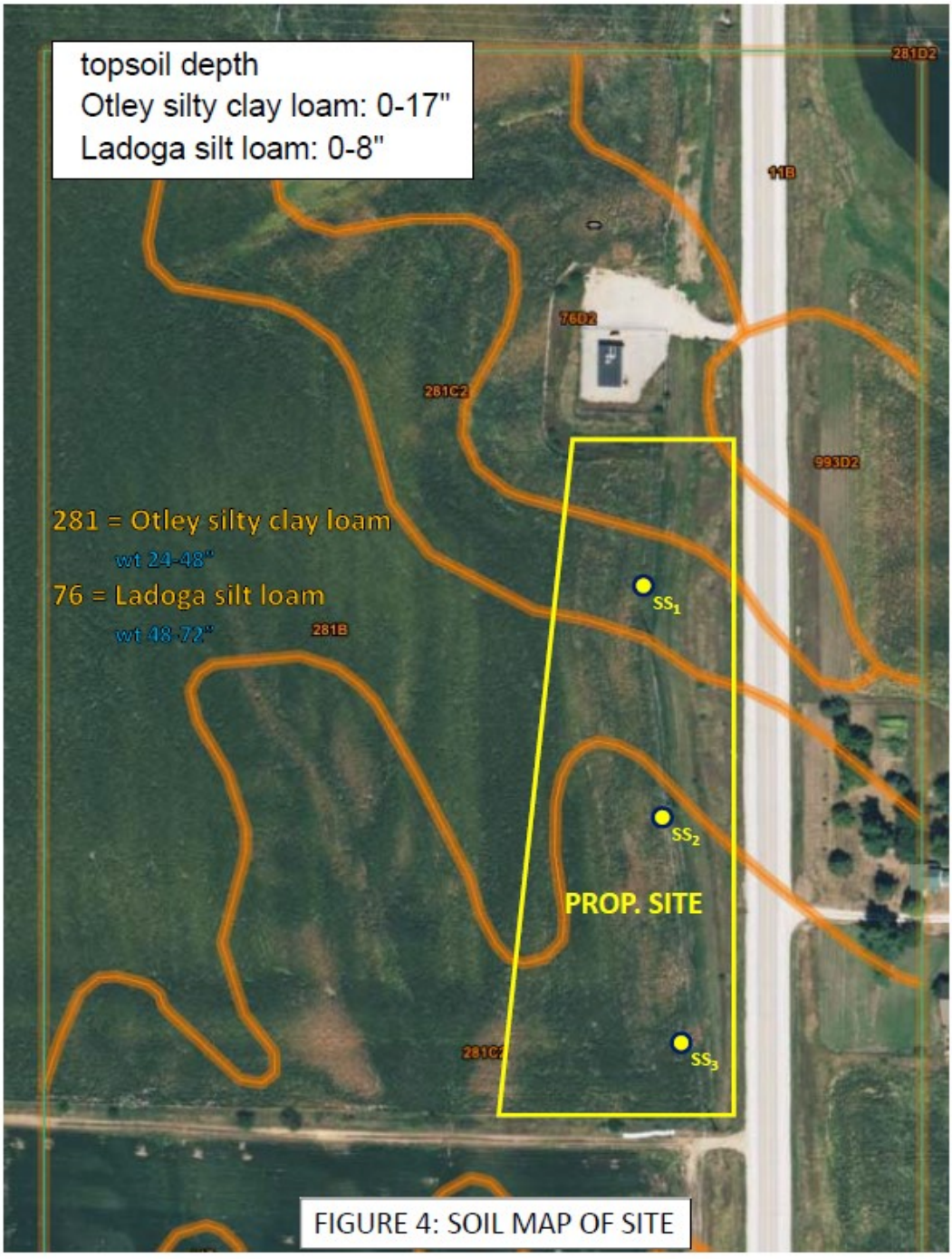


FIGURE 4: SOIL MAP OF SITE

10. Erosion and Sediment Control Plan

No soil will be disturbed during the construction process. As any other similar agricultural row crop field, soybean stubble and stover will cover the field going into winter following harvest, and as stated in the ground cover plan, seeding will take place by the end of November of this year.

If needed, a concrete washout area will be determined before construction. Manufactured washout containment may be in the form of a collection bag, box, or container. Prohibited products include silt fences, hay bales, unlined embankments or any other pratice that allows containment leakage.

11. List of Adjacent Landowners Within 500 Feet

A PDF file is attached on the bottom of this page that contains signed statements from landowners listed below stating they do not object to FEC's intended use of the property as a solar site.

Gerald Hartzler
Mary Lamoreux-Hartzler
5090 HWY 1 SW
Kalona, IA 52247

Mark & Rosemary Slabaugh
2049 500th St. SW
Kalona, IA 52247

Rudy Brenneman
1142 Puxico Rd.
Percy, IL 62272

Marlin Miller
M & M Trust
2275 520th St. SW
Kalona, IA 52247

Daryl D. & Viola M. Slabaugh
2895 500th St. SW
Iowa City, IA 52240

Aquila Brenneman
2330 500th St. SW
Kalona, IA 52247

'Do Not Object' Signatures.pdf

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

7/17/2023

I, Jerry Hartzler and MARY LAMOREUX-HARTZLER living at 5090 HWY 1 SW, Kalona, IA 52247 do not object to Farmers Electric placing a 3.5 acre solar farm at the proposed location on the west side of HWY 1 approximately 1,900' south of the intersection with 500th St. SW.

Jerry Hartzler
Mary Lamoreaux-Hartzler
5090 HWY 1 SW
Kaloona, IA 52247

Mary Lamoreaux-Hartzler

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

7/17/2023

I, Mk Slab, living at 2049 500th St. SW, Kalona, IA 52247 do not object to Farmers Electric placing a 3.5 acre solar farm at the proposed location on the west side of HWY 1 approximately 1,900' south of the intersection with 500th St. SW.

Mark Slabaugh
2049 500th St. SW
Kalona, IA 52247

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

7/17/2023

I, Marlin Miller, living at 2275 520th St. SW, Kalona, IA 52247 do not object to Farmers Electric placing a 3.5 acre solar farm at the proposed location on the west side of HWY 1 approximately 1,900' south of the intersection with 500th St. SW.

Marlin D. Miller
M & M Trust
2275 520th St. SW
Kalona, IA 52247

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

7/17/2023

I, Daryl Slabaugh, living at 2895 500th St. SW, Iowa City, IA 52240 do not object to Farmers Electric placing a 3.5 acre solar farm at the proposed location on the west side of HWY 1 approximately 1,900' south of the intersection with 500th St. SW.

Daryl D. Slabaugh
2895 500th St. SW
Iowa City, IA 52240

Farmers Electric Cooperative
Owned by the people we serve, since 1916

1959 Yoder Ave SW
Kalona, IA 52247
319-683-2510

7/17/2023

I, Rudy Brenneman, living at 1142 Puxico Rd., Percy, IL 62272 do not object to Farmers Electric placing a 3.5 acre solar farm at the proposed location on the west side of HWY 1 approximately 1,900' south of the intersection with 500th St. SW.

Rudy Brenneman
1142 Puxico Rd.
Percy, IL 62272

HART-FREDERICK CONSULTANTS P.C.
www.hart-frederick.com
510 State Street P.O. Box 560 TIFFIN, IOWA 52340-0560 Phone: (319) 545-7215 www.hart-frederick.com

Ⓐ AT&T CORP.
217.80′ X 400.00′
ASSIGNMENT OF EASEMENT
BK. 3873, PGS. 623-625

Ⓑ AT&T CORP.
108.90′ X 200.00′
PARTIAL ASSIGNMENT OF EASEMENT
BK. 3302, PG. 537

Ⓒ ITC MIDWEST LLC
25′ ELECTRIC LINE EASEMENT
BK. 5859, PG. 402

LEGEND

- GOVERNMENT CORNER
- Ⓡ SET 5/8" IRON ROD W/RED CAP #16546
- ● FOUND 5/8" IRON ROD
- ■ FOUND RIGHT OF WAY RAIL
- ◉ FOUND 5/8" IRON ROD #16546
- (R) RECORDED DIMENSIONS
- (M) MEASURED DIMENSIONS
- PROPERTY/BOUNDARY LINES
- CENTER LINES
- RIGHT-OF-WAY LINES
- SECTION LINES
- EASEMENT LINES
- LOT LINES PLATTED OR BY DEED
- CURRENT FIELD LINE
- CURRENT A ZONING SETBACKS
- PROPOSED SOLAR PANELS AND SUPPORT STRUCTURES WITHIN CURRENT SETBACKS
- SPECIAL EXCEPTION SETBACKS
- GRAVEL ACCESS
- GREEN GIANT ARBORVITAE

Daryl D. &
Viola M. Slabaugh

M & M Trust

SOUTHWEST FRAC'L 1/4-NORTHWEST FRAC'L 1/4
SECTION 18, T-78-N, R-7-W

SOUTHEAST 1/4-NORTHEAST 1/4

Mark &
Rosemary Slabaugh

AUDITOR PARCEL 2023012
BK. 66, PG. 326

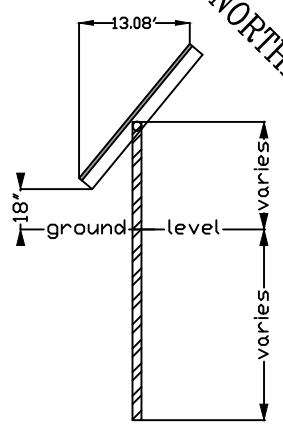
℄ STATE HIGHWAY No. 1

ZONED A-AGRICULTURAL
SETBACK REQUIREMENTS
FRONT = 40′
REAR = 30′
SIDE = 10′

PER SPECIAL EXCEPTION
SETBACK GRANTED
FRONT = 20′
REAR = 30′
SIDE = 10′

MAINTAIN 30′ REAR SETBACK

95.58′
15.08′ TYP.
99.42′
28.17′ TYP.
103.25′
107.08′
114.67′
118.50′
126.17′
30.00′
138.00′
142.00′
148.00′
152.00′
157.00′
162.00′
168.25′
172.08′
28.17′ TYP.
183.58′
15.08′ TYP.

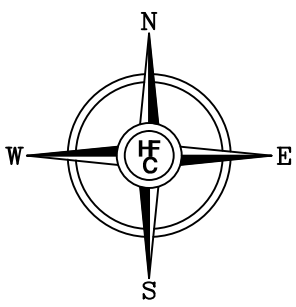


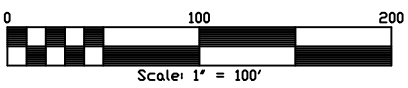
TYPICAL SIDE VIEW

Ⓐ STATE APPROVED DRIVE
PERMIT No. 2023-52-0-2

① MAINTAIN 25′ FRONT
ITC EASEMENT SETBACK

② MAINTAIN 10′ COUNTY
SIDE YARD SETBACK





Gerald L. Hartzler
Mary Lamoreux-Hartzler

RETRACEMENT SURVEY
BK. 63, PG. 377

EAST 1/4 CORNER
SECTION 13-78-8
FOUND CONC. MON.
8′ DEEP
TIES BK. 31, PG. 176

Rudy J. &
Geneva G. Brenneman

M & M Trust

I hereby certify that this land surveying document was prepared and the related survey work was performed by me or under my direct personal supervision and that I am a duly licensed Professional Land Surveyor under the laws of the State of Iowa.

J. Scott Ritter, P.L.S. Date
Iowa License Number: 16546
My license renewal date is December 31, 2024.
Pages covered by this seal: THIS SHEET ONLY

PROFESSIONAL LAND SURVEYOR
J. SCOTT RITTER
16546
IOWA

SITE PLAN (Page 1 of 2)
FARMERS ELECTRIC COOP SOLAR SITE
AUDITOR PARCEL 2023012
SE 1/4-NE 1/4
SECTION 13, T-78-N, R-8-W
JOHNSON COUNTY, IOWA

DATE: 07/19/23	DRN: JSR	APP:
FLD BK: GPS	PROJ. NO: 237060	

HFC
HART-FREDERICK CONSULTANTS P.C.
www.hart-frederick.com
510 State Street P.O. Box 560 TIFFIN, IOWA 52340-0560 Phone: (319) 545-7215 www.hart-frederick.com
HFC

LEGEND

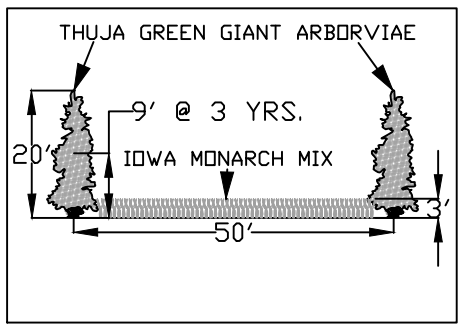
- GOVERNMENT CORNER
- SET 5/8" IRON ROD W/RED CAP #16546
- FOUND 5/8" IRON ROD
- FOUND RIGHT OF WAY RAIL
- FOUND 5/8" IRON ROD #16546
- (R) RECORDED DIMENSIONS
- (M) MEASURED DIMENSIONS
- PROPERTY/BOUNDARY LINES
- CENTER LINES
- RIGHT-OF-WAY LINES
- SECTION LINES
- EASEMENT LINES
- LOT LINES PLATTED OR BY DEED
- CURRENT FIELD LINE
- CURRENT A ZONING SETBACKS
- PROPOSED SOLAR PANELS AND SUPPORT STRUCTURES WITHIN CURRENT SETBACKS
- SPECIAL EXCEPTION SETBACKS
- GRAVEL ACCESS 2691 SQ. FT. ON SITE 900 SQ. FT. IN R.O.W.
- THUJA GREEN GIANT ARBORVITAE 20' TALL X 5' WIDE
- PROPOSED 8' WILDLIFE FRIENDLY FENCE SEE DETAIL BELOW

ASSUMED AREA OF SUPPORT EQUIPMENT

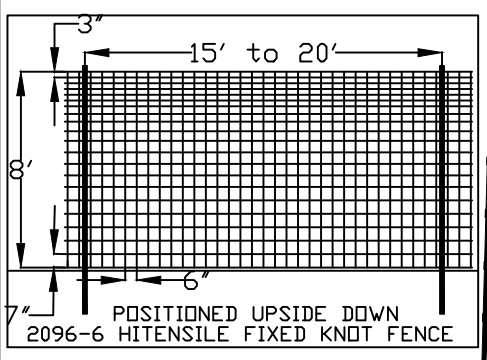
WEATHER STATION POLE 1 sq. ft.
25 kVA TRANSFORMER 17 sq. ft.
1500 kVA TRANSFORMER 71 sq. ft.
AC COMBINER BOX 12 sq. ft.

SITE GROUND COVER TO BE 2022 SOLAR MIXTURE IN FRONT & UNDER ARRAYS NOT SHOWN AS HATCH

SITE GROUND COVER TO BE IOWA MONARCH MIXTURE AROUND PERIMETER



BUFFER DETAIL



FENCE DETAIL

NO TRESPASSING

275'

AUDITOR PARCEL 2023012
BK. 66, PG. 326

℄ STATE HIGHWAY No. 1

RETRACEMENT SURVEY
BK. 63, PG. 377

31'

250'

35'

152'

183'

STATE APPROVED DRIVE
PERMIT No. 2023-52-0-2

75'

89.5'

NO TRESPASSING

250'

263.5'

NO TRESPASSING

N
W
E
S

0 60 120
Scale: 1" = 60'

SITE PLAN (Page 2 of 2)
FARMERS ELECTRIC COOP SOLAR SITE
AUDITOR PARCEL 2023012
SE 1/4-NE 1/4
SECTION 13, T-78-N, R-8-W
JOHNSON COUNTY, IOWA

DATE: 08/23	DRN: JSR	APP:
FLD BK: GPS	PROJ. NO: 237060	

The Bee & Butterfly Habitat Fund
A Unique Conservation Solution.

The Bee & Butterfly Habitat Fund

Iowa Monarch Mix

2022

Species	Scientific Name	PLS lbs per acre	Seeds per sq ft	% of Mixture	Bloom Period	Pollinator Value
Big Bluestem, Pawnee	*Andropogon gerardii*	0.100	0.33	0.94%	--	--
Canada Blue Jointgrass	*Calamagrostis canadensis*	0.007	0.62	1.74%	--	--
Canada Wildrye	*Elymus canadensis*	0.500	1.31	3.70%	--	--
Little Bluestem, VNS	*Schizachyrium scoparium*	0.350	1.93	5.46%	--	--
Plains Oval Sedge	*Carex brevior*	0.040	0.60	1.68%	--	--
Prairie Dropseed	*Sporobolus heterolepis*	0.030	0.18	0.50%	--	--
Prairie Junegrass	*Koeleria pyramidata*	0.020	1.06	3.00%	--	--
Rough Dropseed	*Sporobolus clandestinus*	0.100	1.10	3.11%	--	--
Sideoats Grama, Native Source	*Bouteloua curtipendula*	0.400	1.46	4.13%	--	--
Anise Hyssop	*Agastache foeniculum*	0.030	0.99	2.80%	3	5
Annual or Common Sunflower, Native Source	*Helianthus annuus*	0.030	0.03	0.09%	3	5
Aromatic Aster	*Aster oblongifolius*	0.008	0.95	2.68%	3	5
Ashy Sunflower, Native Source	*Helianthus mollis*	0.030	0.14	0.39%	3	5
Baldwin's Ironweed, Native Source	*Vernonia baldwinii*	0.010	0.16	0.45%	2	5
Blackeyed Susan	*Rudbeckia hirta*	0.030	1.09	3.07%	2	1
Blanketflower	*Gaillardia aristata*	0.200	0.86	2.42%	1	4
Blue Vervain	*Verbena hastata*	0.030	1.04	2.93%	2	5
Butterfly Milkweed	*Asclepias tuberosa*	0.020	0.03	0.09%	2	5
Canada Milkvetch	*Astragalus canadensis*	0.065	0.40	1.14%	2	4
Canada Tick-trefoil	*Desmodium canadense*	0.050	0.10	0.29%	2	5
Clasping Coneflower	*Rudbeckia amplexicaulis or Dracopis amplexicaulis*	0.030	1.10	3.11%	1	2
Common Evening Primrose	*Oenothera biennis*	0.025	0.79	2.23%	2	4
Common Milkweed	*Asclepias syriaca*	0.040	0.08	0.21%	2	5
Culver's Root	*Veronicastrum virginicum*	0.005	1.38	3.89%	3	4
Cup Plant, Native Source	*Silphium perfoliatum*	0.020	0.03	0.08%	2	5
Deer Vetch, Native Source	*Acmispon americanus or Lotus unifoliolatus*	0.020	0.03	0.09%	3	4
Entire-leaved Rosinweed, Native Source	*Silphium integrifolium*	0.020	0.02	0.04%	2	5
False Boneset	*Brickellia eupatorioides*	0.015	0.18	0.51%	3	3
False or Oxeye Sunflower	*Heliopsis helianthoides*	0.100	0.24	0.67%	2	5
Foxglove Beardstongue, Native Source	*Penstemon digitalis*	0.015	0.14	0.39%	1	5
Golden Alexander	*Zizia aurea*	0.060	0.24	0.69%	1	5
Gray Goldenrod	*Solidago nemoralis*	0.006	0.14	0.39%	3	4
Grayhead Coneflower	*Ratibida pinnata*	0.040	0.39	1.11%	2	4
Heath Aster	*Symphyotrichum ericoides*	0.004	0.46	1.31%	3	5
Hoary Vervain, Native Source	*Verbena stricta*	0.035	0.47	1.33%	2	5
Illinois Bundleflower	*Desmanthus illinoensis*	0.180	0.35	0.99%	2	5
Ironweed	*Vernonia fasciculata*	0.025	0.22	0.62%	2	5
Jerusalem Artichoke, Native Source	*Helianthus tuberosus*	0.010	0.03	0.08%	3	5
Lanceleaf Coreopsis	*Coreopsis lanceolata*	0.200	1.01	2.87%	2	4
Late or Giant Goldenrod, Native Source	*Solidago gigantea*	0.006	1.04	2.95%	3	5
Leadplant	*Amorpha canescens*	0.025	0.11	0.32%	2	5
Maximillian Sunflower	*Helianthus maximiliani*	0.050	0.23	0.64%	3	5
Missouri Goldenrod	*Solidago missouriensis*	0.006	0.87	2.46%	2	5
New England Aster	*Symphyotrichum novae-angliae*	0.015	0.36	1.03%	3	5
Pale Purple Coneflower	*Echinacea pallida*	0.090	0.22	0.62%	2	5
Plains Coreopsis	*Coreopsis tinctoria*	0.015	1.11	3.14%	2	2
Plains Sunflower	*Helianthus petiolaris*	0.030	0.08	0.22%	3	5
Prairie Aster	*Symphyotrichum falcatum*	0.050	0.47	1.32%	3	5
Purple Coneflower	*Echinacea purpurea*	0.100	0.27	0.75%	2	5
Purple Prairieclover, Native Source	*Dalea purpurea*	0.050	0.36	1.03%	2	5
Rattlesnake Master	*Eryngium yuccifolium*	0.020	0.08	0.23%	3	4
Rough Gayfeather	*Liatris aspera*	0.015	0.09	0.27%	3	5
Rough Purple Gerardia, Native Source	*Agalinis aspera*	0.005	0.24	0.69%	2	4
Roundhead Lespedeza	*Lespedeza capitata*	0.030	0.12	0.34%	3	4
Sawtooth Sunflower	*Helianthus grosseserratus*	0.010	0.14	0.41%	3	5
Shell-leaf Penstemon	*Penstemon grandiflorus*	0.020	0.10	0.28%	1	5
Showy Partridgepea	*Chamaecrista fasciculata*	0.400	0.60	1.69%	2	5
Showy-wand Goldenrod	*Solidago speciosa*	0.008	0.79	2.22%	3	5
Smooth Blue Aster	*Symphyotrichum laeve*	0.025	0.58	1.64%	3	5
Stiff Goldenrod, Native Source	*Solidago rigida*	0.020	0.31	0.87%	3	5
Stiff Sunflower	*Helianthus pauciflorus*	0.025	0.42	1.20%	2	4
Sullivant's Milkweed, Native Source	*Asclepias sullivantii*	0.010	0.02	0.05%	2	5
Swamp Milkweed, Native Source	*Asclepias incarnata*	0.015	0.05	0.15%	2	5
Sweet Blackeyed Susan	*Rudbeckia subtomentosa*	0.030	0.51	1.43%	2	2
Tall Boneset, Native Source	*Eupatorium altissimum*	0.007	0.13	0.36%	3	4
Tall Coreopsis	*Coreopsis tripteris*	0.015	0.57	1.60%	2	3
Tube Penstemon	*Penstemon tubaeflorus*	0.010	0.29	0.83%	2	5

Species	Scientific Name	PLS lbs per acre	Seeds per sq ft	% of Mixture	Bloom Period	Pollinator Value
Upright Coneflower	*Ratibida columnifera*	0.045	0.76	2.15%	2	2
Virginia Mountain Mint	*Pycnanthemum virginianum*	0.006	0.22	0.62%	2	4
Western Yarrow	*Achillea millefolium*	0.020	1.31	3.70%	1	2
White Prairieclover	*Dalea candida*	0.055	0.38	1.08%	2	5
Wild Bergamot	*Monarda fistulosa*	0.030	0.88	2.48%	2	5
Rice Hulls - Filler for low planting rate mixtures		3.000	0.00	0.00%	--	--
	Grasses Total:	1.547	8.589	24.27%		
	Wildflower/Forb/Legume Total:	2.611	26.801	75.73%		
	Filler Total:	3.000	0.000	0.00%		
	Total Mixture:	**7.158**	**35.389**	**100.00%**		

Bloom Period	Wildflowers Used in Mixture	% PLS Seeding Rate of Mix
1 = April to May	6	10.58%
2 = June to July	34	40.41%
3 = August to October	23	24.74%
Total :	63	

4.41	Pollinator Value (0-5)

The Pollinator value score is determined based on a combination of factors described below. A score greater than 4.0 indicates the mixture is designed for great pollinator value.

The Bee & Butterfly Habitat Fund

Iowa Honeybee Mix

2022

Species	Scientific Name	PLS lbs per acre	Seeds per sq ft	% of Mixture	Bloom Period	Pollinator Value
Alsike Clover	*Trifolium hybridum*	0.450	7.03	17.57%	2	5
Anise Hyssop	*Agastache foeniculum*	0.035	1.16	2.89%	3	5
Blackeyed Susan	*Rudbeckia hirta*	0.030	1.09	2.71%	2	1
Crimson Clover	*Trifolium incarnatum*	2.000	6.88	17.19%	2	5
Ladino or White Clover	*Trifolium repens*	0.450	7.35	18.38%	2	5
Lemon Mint or Lemon Bee Balm	*Monarda citriodora*	0.050	1.65	4.13%	2	3
Missouri Goldenrod	*Solidago missouriensis*	0.007	1.01	2.54%	2	5
Phacelia	*Phacelia spp.*	0.600	3.37	8.44%	2	5
Red Clover	*Trifolium pratense*	0.320	2.00	5.00%	2	4
Sainfoin	*Onobrychis viciifolia*	2.100	1.46	3.64%	2	5
White Dutch Clover	*Trifolium repens*	0.350	7.00	17.51%	2	5
Rice Hulls - Filler for low planting rate mixtures		3.000	0.00	0.00%	--	--
	Grasses Total:	0.000	0.000	0.00%		
	Wildflower/Forb/Legume Total:	6.392	40.004	100.00%		
	Filler Total:	3.000	0.000	0.00%		
	Total Mixture:	**9.392**	**40.004**	**100.00%**		

Bloom Period	Wildflowers Used in Mixture	% PLS Seeding Rate of Mix
1 = April to May	0	0.00%
2 = June to July	10	97.11%
3 = August to October	1	2.89%
Total :	11	

4.36	Pollinator Value (0-5)

The Pollinator value score is determined based on a combination of factors described below. A score greater than 4.0 indicates the mixture is designed for great pollinator value.

The Bee & Butterfly Habitat Fund

2022 Solar Mixture

Species	Scientific Name	Bulk lbs per acre	Seeds per sq ft	% of Mixture	Bloom Period	Pollinator Value
Fine Fescue Blend for Solar Projects	*Festuca spp.*	20.000	229.57	39.25%	--	--
Kentucky Bluegrass	*Poa pratensis*	8.000	255.25	43.64%	--	--
White Dutch Clover	*Trifolium repens*	5.000	100.05	17.11%	2	5
	Grasses Total:	28.000	484.819	82.89%		
	Wildflower/Forb/Legume Total:	5.000	100.052	17.11%		
	Filler Total:	0.000	0.000	0.00%		
	Total Mixture:	**33.000**	**584.871**	**100.00%**		

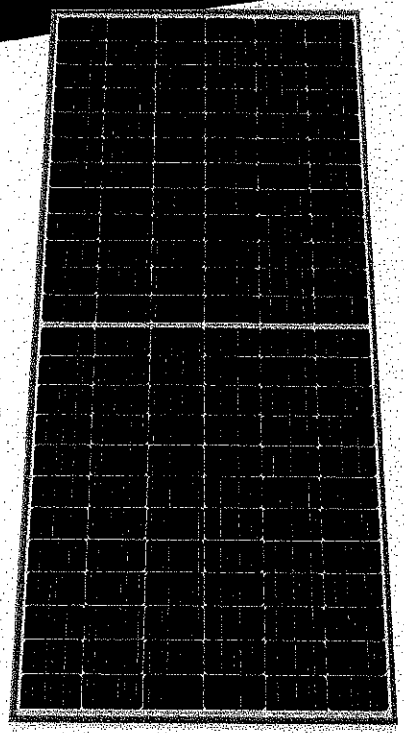
Bloom Period	Wildflowers Used in Mixture	% PLS Seeding Rate of Mix
1 = April to May	0	0.00%
2 = June to July	1	17.11%
3 = August to October	0	0.00%
Total :	1	

5.00	**Pollinator Value**

HELIENE

144HC M10 SL Bifacial Module

144 Half-Cut Monocrystalline 520W – 540W



21%

Utilizes the latest M10 size super high efficiency Monocrystalline PERC cells. Half cut design further reduces cell to module (CTM) losses.

Stability & Looks

Rugged, double webbed frame design withstands wind, snow, and other mechanical stresses. Framed Glass–Backsheet aesthetic is ideal for high visibility installation.

Anti-Reflective

Premium solar glass with anti reflective coating delivers more energy throughout the day

High Reliability

Proven resistance to PID and reliable in high temperature and humidity environments.

Manufactured Using International Quality System Standards: ISO9001

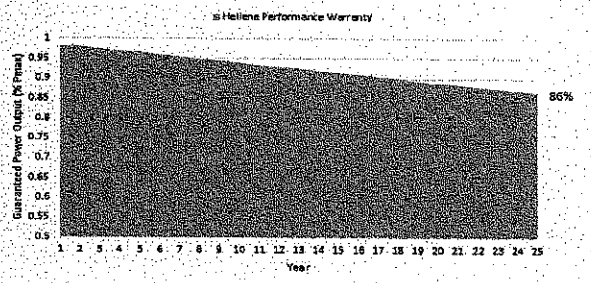
Half-Cut Design with Split Junction Box Technology

Bifacial Technology Enabling Additional Energy Harvest from Rear Side

1500V System Voltage Rating

No Compromise Guarantee

15 Year Workmanship Warranty
25 Year Linear Performance Guarantee



World-class Quality

- Heliene's fully automated manufacturing facilities with state-of-the-art robotics and computer aided inspection systems ensure the highest level of product quality and consistency
- All manufacturing locations are compliant with international quality standards and are ISO 9001 certified
- Heliene modules have received Top Performer rankings in several categories from PV Evolution Labs (PV EL) independent quality evaluations

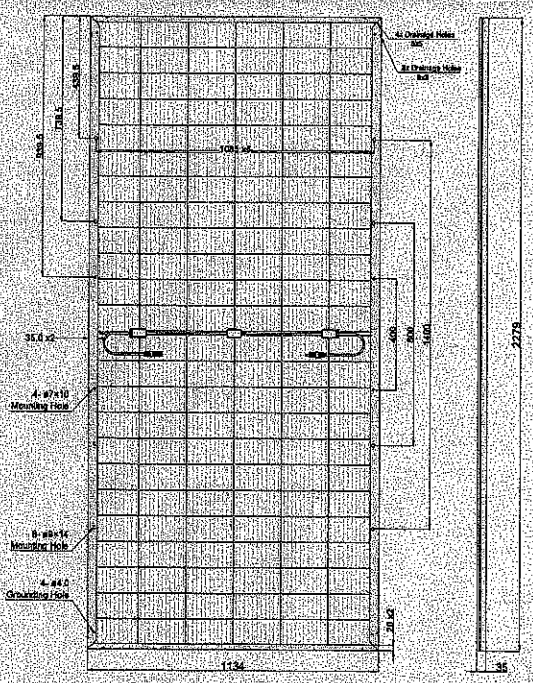
Bankable Reputation

- Established in 2010, Heliene is recognized by Bloomberg New Energy Finance (BNEF) as Tier 1 manufacturer of solar modules and has been approved for use by the U.S. Department of Defense, U.S. Army Corps of Engineers and from numerous top tier utility scale project debt providers
- By investing heavily in research and development, Heliene has been able to stay on the cutting edge of advances in module technology and manufacturing efficiency

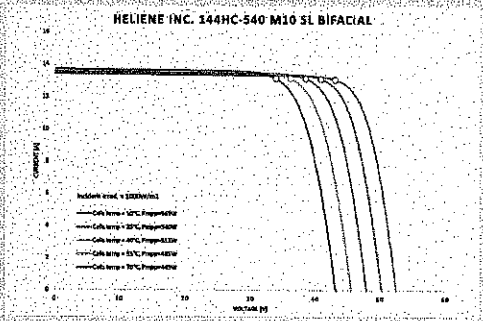
Local Sales, Service, and Support

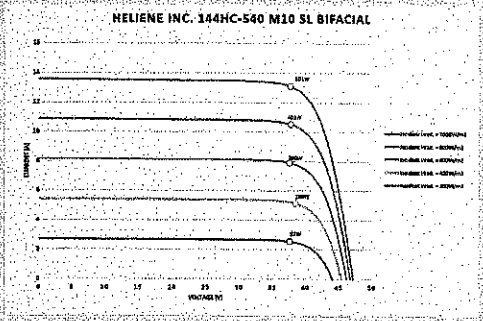
- With sales offices across the U.S. and Canada, Heliene prides itself on unsurpassed customer support for our clients. Heliene has become the brand of choice for many of the leading residential installers, developers and Independent Power Producers due to our innovative technology, product customization capability and just in time last-mile logistics support
- Local sales and customer support means answered phone calls and immediate answers to your technical and logistics questions. We understand your project schedules often change with little warning and endeavor to work with you to solve your project management challenges

Dimensions for 144HC M10 SL Bifacial Series Modules



I-V Curves for 144HC M10 SL Bifacial Series Modules





Certifications

Electrical Data (STC)

Peak Rated Power	P_{mpp} (W)	540	535	530	525	520
Maximum Power Voltage	V_{mpp} (V)	42.32	42.13	41.94	41.75	41.56
Maximum Power Current	I_{mpp} (A)	12.77	12.70	12.64	12.58	12.52
Open Circuit Voltage	V_{oc} (V)	50.22	49.97	49.72	49.23	48.73
Short Circuit Current	Isc (A)	13.50	13.44	13.37	13.32	13.28
Module Efficiency *	Eff (%)	20.9	20.7	20.5	20.3	20.1
Maximum Series Fuse Rating	MF (A)	30	30	30	30	30
Power Output Tolerance			[- 0/+3%]			
Bifaciality Factor			70%			

STC - Standard Test Conditions: Irradiation 1000 W/m2 - Air mass AM 1.5 - Cell temperature 25 °C

Electrical Data (NMOT)

Maximum Power	P_{mpp} (W)	400	395	390	385	380
Maximum Power Voltage	V_{mpp} (V)	39.19	38.58	38.58	37.97	37.96
Maximum Power Current	I_{mpp} (A)	10.21	10.24	10.11	10.14	10.01
Open Circuit Voltage	V_{oc} (V)	47.13	46.89	46.66	46.20	45.73
Short Circuit Current	Isc (A)	10.87	10.82	10.77	10.72	10.70

NMOT - Nominal Module Operating Temperature:
Irradiance at 800W/m2, Ambient Temperature 20°C, Wind speed 1m/s

Mechanical Data

Solar Cells	144 Half Cut, M10, 182mm, PERC Cells
Module Construction	Framed Glass-Backsheet
Dimensions (L x W x D)	2279 x 1134 x 35 mm (89.72 x 44.65 x 1.38 inch)
Weight	29.2 kg (64.3 lbs)
Frame	Double Webbed 15-Micron Anodized Aluminum Alloy
Glass	3.2mm Low-Iron Content, High-Transmission, PV Solar Glass with Anti Reflective Coating
Junction Box	IP-68 rated with 3 bypass diodes
Output Cables	0.3-meter Symmetrical Cables
Connectors	Multi-Contact/ Stäubli MC4

Certifications

UL Certification	UL61215, UL61730

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	+45°C (±2°C)
Temperature Coefficient of P_{max}	-0.36%/°C
Temperature Coefficient of V_{oc}	-0.28%/°C
Temperature Coefficient of I_{sc}	0.034%/°C

Maximum Ratings

Operational Temperature	-40°C to +85°C
Max System Voltage	1500V
Mech. Load Test (Front)	113 psf / 5400Pa
Mech. Load Test (Back)	50 psf / 2400 Pa
Fire Type	Type 1

Warranty

15 Year Workmanship Warranty

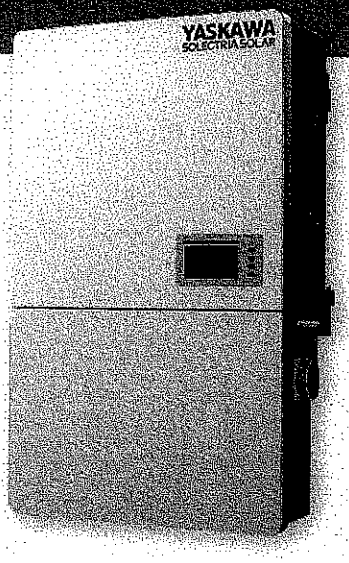
25 Year Linear Power Guarantee

Packaging Configuration

Modules per box:	31 pieces
Modules per 40' Container:	620 pieces
Modules per 53' Trailer:	806 pieces

PVI 50TL-480 / PVI 60TL-480

3-PHASE TRANSFORMERLESS COMMERCIAL STRING INVERTERS



FEATURES

- Wirebox models with built-in SunSpec compliant transmitters for Module-Level Rapid Shutdown for simple, safe NEC compliance
- UL Listed as PV Rapid Shutdown Systems with Tigo Energy and APsmart
- Dual rated listing allows selection of either 50/60 kVA (factory default) or 55/66 kVA (allowing full rated power down to ±0.91 PF)
- Integrated UL-listed Arc-Fault protection
- 15 - 90° mounting angle allows low-profile rooftop installations
- 3 MPPTs with 5 fused inputs each for PV array flexibility
- Industry-leading DC/AC ratios of 1.8 (50TL) and 1.5 (60TL)
- Integrated AC and DC disconnects
- Remote firmware upgrades and diagnostics
- NEMA 4X outdoor rated enclosure, with proven performance
- UL1741SA certified to CA Rule 21, including SA14 FW and SA 15 VW

OPTIONS

- Shade cover
- DC fuse bypass
- Web-based monitoring

Yaskawa Solectria Solar's PVI 50TL-480 and PVI 60TL-480 are transformerless 3-phase inverters, ideal for rooftops, carports and ground-mount PV systems

The PVI 50TL-480 and PVI 60TL-480 come standard with AC and DC disconnects, three MPPTs, and a wiring box with 15 fuse positions.

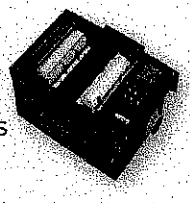
For rooftop PV systems, both Module-Level Rapid shutdown (MLRSD) wirebox models provide PV Rapid Shutdown System (PVRSS) compliance and include a built-in SunSpec compliant powerline communication transmitter.

One wirebox model is Tigo Enhanced for rapid shutdown and the other wirebox model is compatible with APsmart rapid shutdown devices.

Yaskawa Solectria Solar's family of PVI 50/60TL-480 inverters, including standard wireboxes and the rapid-shutdown ready wirebox models, provides flexibility and convenience unmatched in the industry.

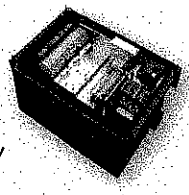
Standard Wirebox

- 20A fuses, both polarities
- No built-in PVRSS transmitter



Module-Level Rapid Shutdown Wireboxes

- 20A fuses; positive polarity only
- Built-in PVRSS transmitter
- 2 models for compatibility with Tigo and APsmart module-level shutdown devices



Tigo® Enhanced

APsmart ALTENERGY POWER

YASKAWA SOLECTRIA SOLAR

Yaskawa Solectria Solar 1-978-683-9700 | Email: inverters@solectria.com | solectria.com
Document No. FL.PVI5060TL.01 | 08/19/2021 |

PVI 50TL-480 / PVI 60TL-480 TECHNICAL DATA

SPECIFICATIONS

Inverter Model		PVI 50TL-480	PVI 60TL-480
DC Input	Maximum PV Power	90 kW (33 kW per MPPT)	90 kW (33 kW per MPPT)
	Maximum Input Voltage	1000 VDC	1000 VDC
	Dc Voltage Ranges, Operating/Max. Power (MPPT)	200-950 VDC / 480-850 VDC	200-950 VDC / 540-850 VDC
	Start-up DC Input Voltage/Power	330 V / 80 W	330 V / 80 W
	Number of MPPT Trackers/Inputs	3 Trackers / 5 Fused-inputs each	3 Trackers / 5 Fused-inputs each
	Maximum Available PV Current (Isc x 1.25)	204 A (68 A per MPPT)	204 A (68 A per MPPT)
	Maximum Operating Input Current (clipping point)	108 A (36 A per MPPT)	114 A (38 A per MPPT)
	DC Surge Protections	Type II MOV, 2800 V_c, 20 kA I_{TM} (8/20 µs)	
AC Output	Rated AC Real Power/Apparent Power/Output Current	50 kW / 50 kVA / 60.2 A	60 kW 60kVA / 72.2 A
	Overhead Mode: Real Power/Apparent Power/Output Current	50 kW / 55 kVA / 66.2 A	60 kW / 66 kVA / 79.4 A
	Nominal Output Voltage/Range	480 VAC / -12% to +10%	480 VAC / -12% to +10%
	Nominal Output Frequency/Range	60 Hz / 57-63 Hz	60 Hz / 57-63 Hz
	Power Factor	Unity, >0.99 (Adjustable 0.8 leading to 0.8 lagging)	Unity, >0.99 (Adjustable 0.8 leading to 0.8 lagging)
	Fault Current Contribution (1 Cycle RMS)	64.1 A	64.1 A
	Total Harmonic Distortion (THD) @ Rated Load	< 3%	< 3%
	Grid Connection Type	3-Ph/PE/N (neutral conductor optional)	3-Ph/PE/N (neutral conductor optional)
	Maximum OCPD Device	110 A	125 A
	AC Surge Protection	Type II MOV, 1240 V_c, 15 kA I_{TM} (8/20 µs)	
Efficiency	Peak Efficiency	98.8%	98.8%
	CEC Efficiency	98.5%	98.5%
	Tare Loss	< 1 W	< 1 W
Environment	Ambient Temperature Range	-22°F to +140°F (-30°C to +60°C); Derating occurs over +113°F (+45°C)	
	Storage Temperature Range	No low temp minimum to +158°F (+70°C)	
	Relative Humidity (non-condensing)	0-100%	
	Operating Altitude	13,123 ft (4,000 m) Derating occurs from 9,842.5 ft (3,000 m)	
Communications	Modbus Protocol	Proprietary / SunSpec	
	SolrenView Web-Based Monitoring Service	Optional	
	Revenue Grade Metering	Optional, External	
	Communication Interface	RS-485 Modbus RTU	
	Remote Firmware Upgrades	Ethernet Network Card required	
	Remote Diagnostics	Ethernet Network Card required	
Safety	Certifications and Standards	UL 1741SA-2016, UL1699B, UL1998, CSA-C22.2 No. 107.1-01, IEEE1547, FCC Part 15 (Subpart B, Class A	
	Selectable Grid Standards	IEEE 1547, CA Rule 21, ISO-NE, HECO	
	Smart Grid Features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAr, Freq-Watt, Volt-Watt	
Warranty	Standard Limited Warranty	10 Years	
Mechanical	Acoustic Noise Rating	< 60 dBA @ 1 m and 25°C	
	AC/DC Disconnect	Standard, fully-integrated, load break rated	
	Mounting Angle*	15° - 90°+ from horizontal	
	Weight	Inverter: 123.5 lbs (56 kg); Wiring Box: 33 lbs (15 kg)	
	Enclosure Rating and Finish	NEMA Type 4X; Polyester Powder Coated Aluminum	
	Dimensions (H x W x D)	Power Head: 22.7" x 23.6" x 10.24" (576 mm x 600 mm x 260 mm) Wirebox: 16.7" x 23.6" x 10.24" (424 mm x 600 mm x 260 mm) Overall: 39.4" x 23.6" x 10.24" (1000 mm x 600 mm x 260 mm)	

Wirebox Specifications			
Wirebox Versions	Fused Inputs	15 Fused Positions (5 Positions per MPPT) 20 A Standard (25, 30 A accepted)**	
	Standard	PVI 50-60TL-BX-S20 (both polarities fused), No MLRSD transmitter needed	
	APsmart Transmitter Built-in	PVI50-60TL-WB-APS (only positive polarity fused)	MLRSD compatibility: APsmart RSD-S and RSD-D ***
	Tigo Transmitter Built-in	PVI50-60TL-WB-TGO (only positive polarity fused)	MLRSD compatibility: Tigo TS4-A-F (ver 6.7+) and TS4-A-2F

* Shade cover accessory required for installation of 75° or less
** Yaskawa Solectria Solar does not supply optional fuses sizes
*** Compatibility testing with APsmart RSD-D in Q3 2021

IT'S PERSONAL

YASKAWA SOLECTRIA SOLAR

Yaskawa Solectria Solar 1-978-683-9700 | Email: inverters@solectria.com | solectria.com
Document No. FL.PVI5060TL.01 | 08/19/2021

HFC CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING, PLANNING & DEVELOPMENT

HART-FREDERICK CONSULTANTS P.C.

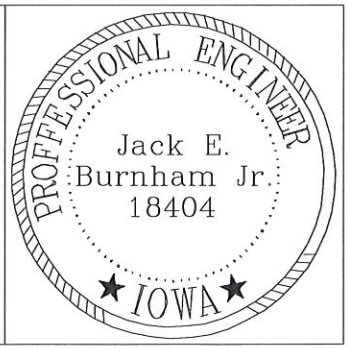
Farmers Electric Cooperative, Solar Array Installation
Parcel No. 1313177005
ESCROW ESTIMATE SUBMITTAL

June 20 2023

I hereby certify that this land surveying document was prepared and the related work was performed by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Jack E. Burnham 9/7/23

Jack E. Burnham Jr., P.E. Date
Iowa License Number: 18404
My license renewal date is December 31, 2024.
Pages covered by this seal:



510 State Street, P.O. Box 560, Tiffin, IA 52340
(319) 545-7215 ▪ www.hart-frederick.com ▪ hfc@hart-frederick.com
HFC Project # 224452.01

HFC CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING, PLANNING & DEVELOPMENT
HART-FREDERICK CONSULTANTS P.C.

For Inclusion in escrow agreement:

In pursuit of conditional use permits for the new solar array HFC has performed a walk-through the site owned by Slabaugh, consulted the proposed plans, and spoke with the applicant to determine how much work will be required to decommission the site in compliance with the County Codes. To issue the conditional use permit this work needs documented and money set in escrow in accordance with the escrow agreement and Codes. The work is estimated to be $27,896 *after 10% contingency*. It can be broken down into categories and summarized as follows.

Decommissioning and reclamation work required:

Power Down, remove solar panels, wiring.

Remove inverters, disconnects breaker panels,

Disassemble racking.

Pull posts and fill holes.

Remove transformer(s) and concrete base(s).

Remove all wiring less than 36" deep.

For item with estimated hourly quantities and unit pricing (including transportation from site) from contractors please see the accompanying TABLE; Farmers Estimated Solar Farm Retirement Costs.

Sensitive Areas Review for:

Farmstead Split

Auditors Parcel Number:

2023012

Washington Township

HFC CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING, PLANNING & DEVELOPMENT

HART-FREDERICK CONSULTANTS P.C.

Prepared for:

Tim Heisdorffer (Farmers Electric)

and

Johnson County Planning, Development & Sustainability

Prepared by:

Charles D. Schmidt

Hart-Frederick Consultants

July, 2023

Charles D. Schmidt

Applicant date

PDS Director date

As directed by the Johnson County Soil and Water Conservation Coordinator, this report addresses the following sensitive areas:

Wetlands
Historical Properties

As a result of our assessment, it has been determined that no wetland or historical properties sensitive areas are present on the site (Figure 1).

Figure 2 shows site photos of the parcel to be split off and adjacent areas.

Background:

The intent of the Sensitive Areas Ordinance is to ensure that the development of land protects and preserves areas defined as "sensitive". In seeking to achieve this and the goals defined in the Johnson County Land Use Plan the purpose of the SAO is to:

1. Protect and preserve areas of environmental concern (sensitive areas) while accommodating development and existing agricultural uses.
2. Implement the environmental goals of the Land Use Plan.
3. Encourage and recognize innovations that demonstrate good land stewardship.
4. Manage and conserve areas of unique or locally significant resources.
5. Prevent injury and damage from natural hazards (floods, erosion).
6. Prevent and minimize degradation of surface and groundwater.
7. Encourage higher density or clustering on non-sensitive areas of property to promote development that provides for open space.
8. Encourage incentives such as conservation easements with waivers on taxes for that portion of the property protected as sensitive areas or created as open space through the use of higher density conservation designs.
9. Provide a mechanism for on-site or off-site mitigation when it is not possible or feasible to avoid disturbance of a sensitive area during development.

Wetlands

Defined:

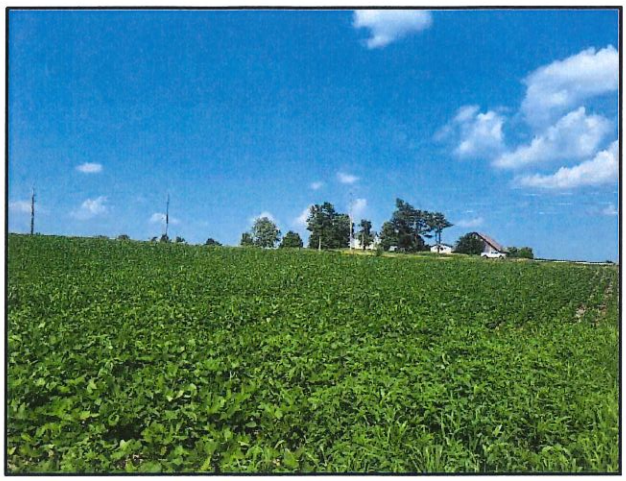
Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The diagnostic characteristics of wetlands are vegetation, hydric soils and hydrology.

Looking N at N-S swale

Analysis:

Offsite analysis

1. Site Description: The proposed site is an auditor's parcel, 3.5 acres more or less split from the existing parcel (Figure 1). Depending on the year and how wet it was, there appears to be a drainage swale that runs north & south through the property. Most years, this swale is cultivated (Figure 3).
2. According to the Web Soil Survey (Figures 4 & 5), there are no hydric soils at the site. The soil type (series) listed is Otley silty clay loam (series # 281). native vegetation is big bluestem, little bluestem, switchgrass, and other grasses of the tall grass prairie (Figure 6). Otley soil is not listed as a hydric soil and is in hydrologic soil group C, which may be sandy clay loam or silt loam with low infiltration rates when thoroughly wetted. Group C soils consist chiefly of soils with a layer that impedes downward movement of water and have moderately fine to fine structure.
3. The National Wetlands Inventory Map shows that there are no designated wetlands located on the site (Figure 7).



Looking E from bottom of swale

Onsite analysis

1. Soil: Soil probes showed no free water down to 20" at the locations analyzed (Figure 4). The soil profile showed no redoximorphic features within 20" of the surface. Soil analysis was consistent with the description given for the Otley soil series.

Typical soil profile

Depth"	color	texture	structure	mottles
0-6	10YR 2/2	silt c loam	mod. fine granular	none
6-11	10YR 2/1	silt c loam	weak fine subangular blocky	none
11-15	10YR 2/2	silt c loam	weak fine subangular blocky	none
15-20	10YR 4/2	silt c loam	mod. fine subangular blocky	none

2. Hydrology: There was no surface water in the drainage swale. At the bottom of the swale near the southern boundary of the property. there was no evidence of ponding or surface water flow.

3. Plants: this season, the field is planted to soybeans. Last years crop (as noted by volunteers) was corn. A few errant weeds grew along the southern and western border fences, including: Queen Anne's lace, reed canarygrass, lambs quarter, giant ragweed, wild carrot, and common cocklebur.

Weeds near south fence

Summary, Wetlands

1. The existing hydrology and soil types are not indicative of wetland formation.
2. The plants at the site are not wetland plants.
3. There are no wetlands on the property.

References:

1. Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.

2. United States Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region. Vicksburg, Mississippi. United States Department of Agriculture, Natural Resources Conservation Service.

4. U.S Fish & Wildlife Service. National Wetlands Inventory https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/

5. Soil Survey of Johnson County, Iowa. United States Department of Agriculture, Natural Resources Conservation Service.

6. United States Department of Agriculture, Natural Resources Conservation Service. State Soil Data Access (SDA) Hydric Soils List. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1316619.html

FIGURES & APPENDIX

1. SITE PLAN

2. SITE PHOTOS

3. HISTORICAL PHOTOS

4. SOIL MAP

5. HYDRIC SOILS MAP

6. ANDREAS ATLAS 1875

7. NATIONAL WETLANDS INVENTORY MAP

APPENDIX

OSA REPORT

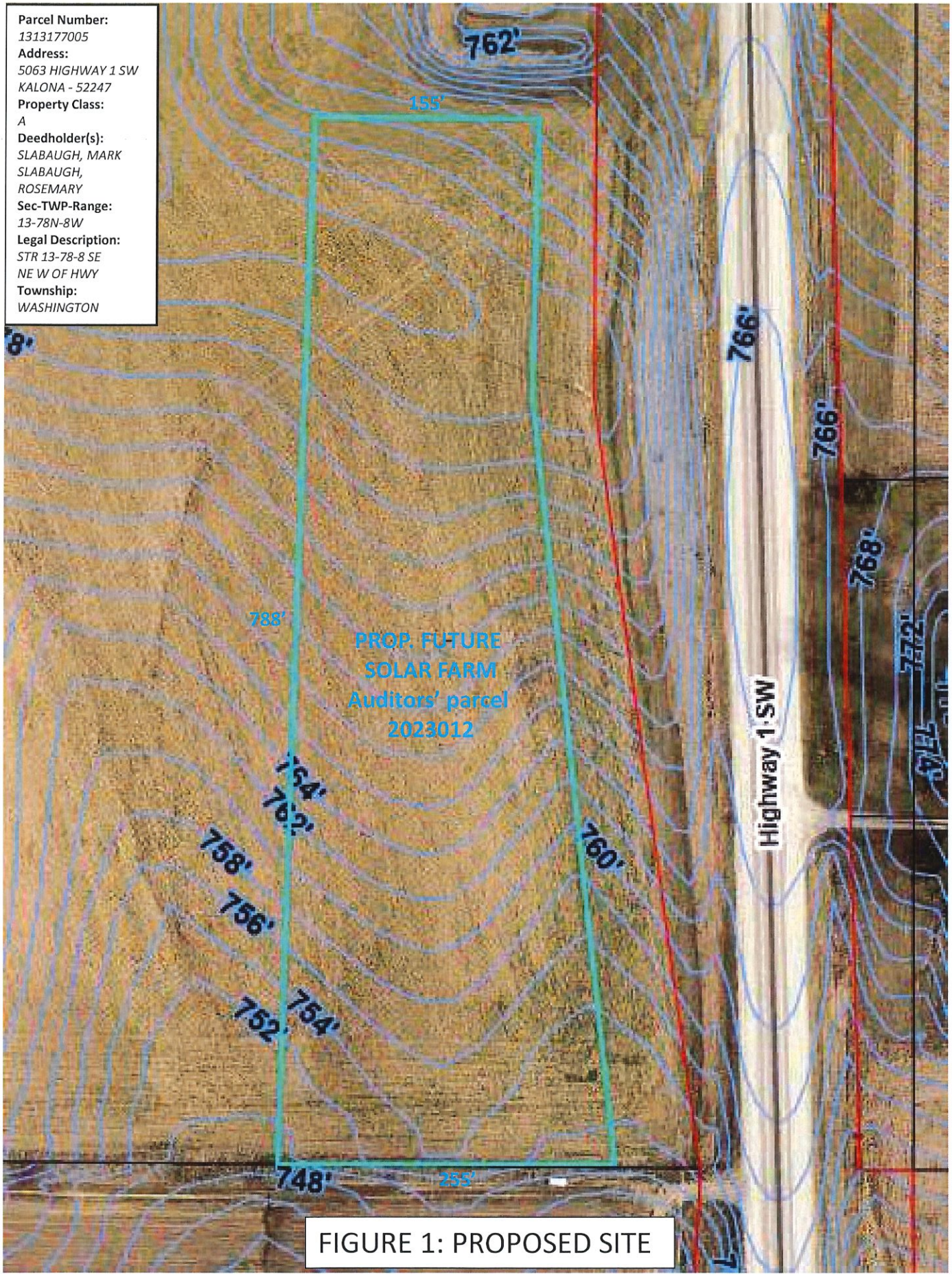


FIGURE 1: PROPOSED SITE

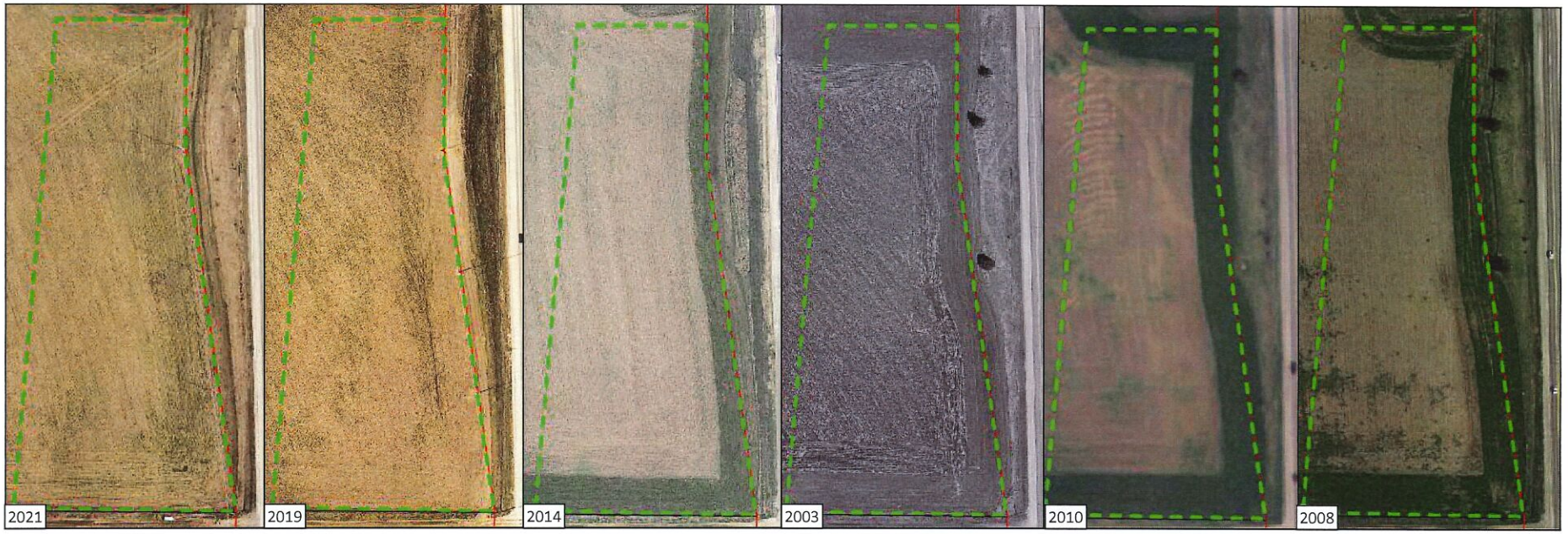
Looking Northeast

Looking East

Plants @ fence-line at south end of swale.

Looking North at swale along east boundary.

FIGURE 2: SITE PHOTOS



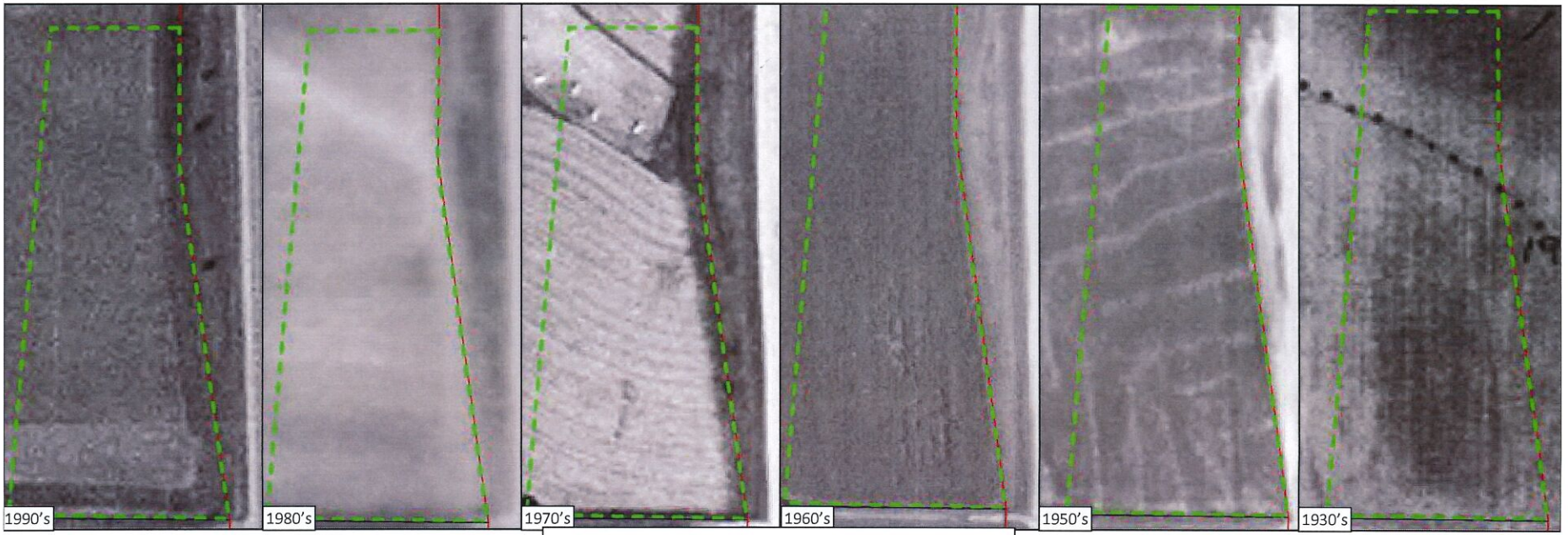


FIGURE 3: HISTORICAL PHOTOS

FIGURE 4: SOIL MAP OF SITE

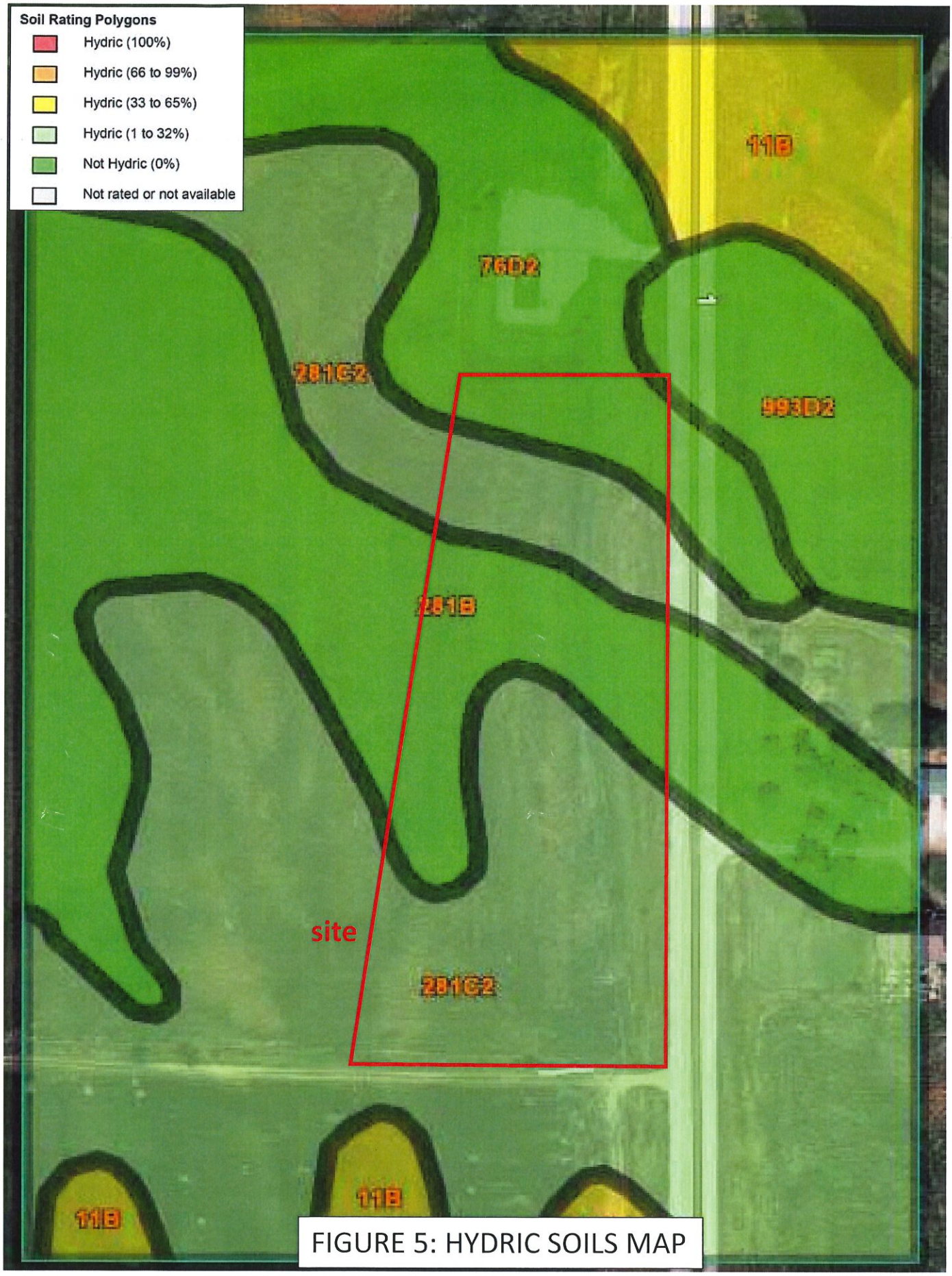


FIGURE 5: HYDRIC SOILS MAP

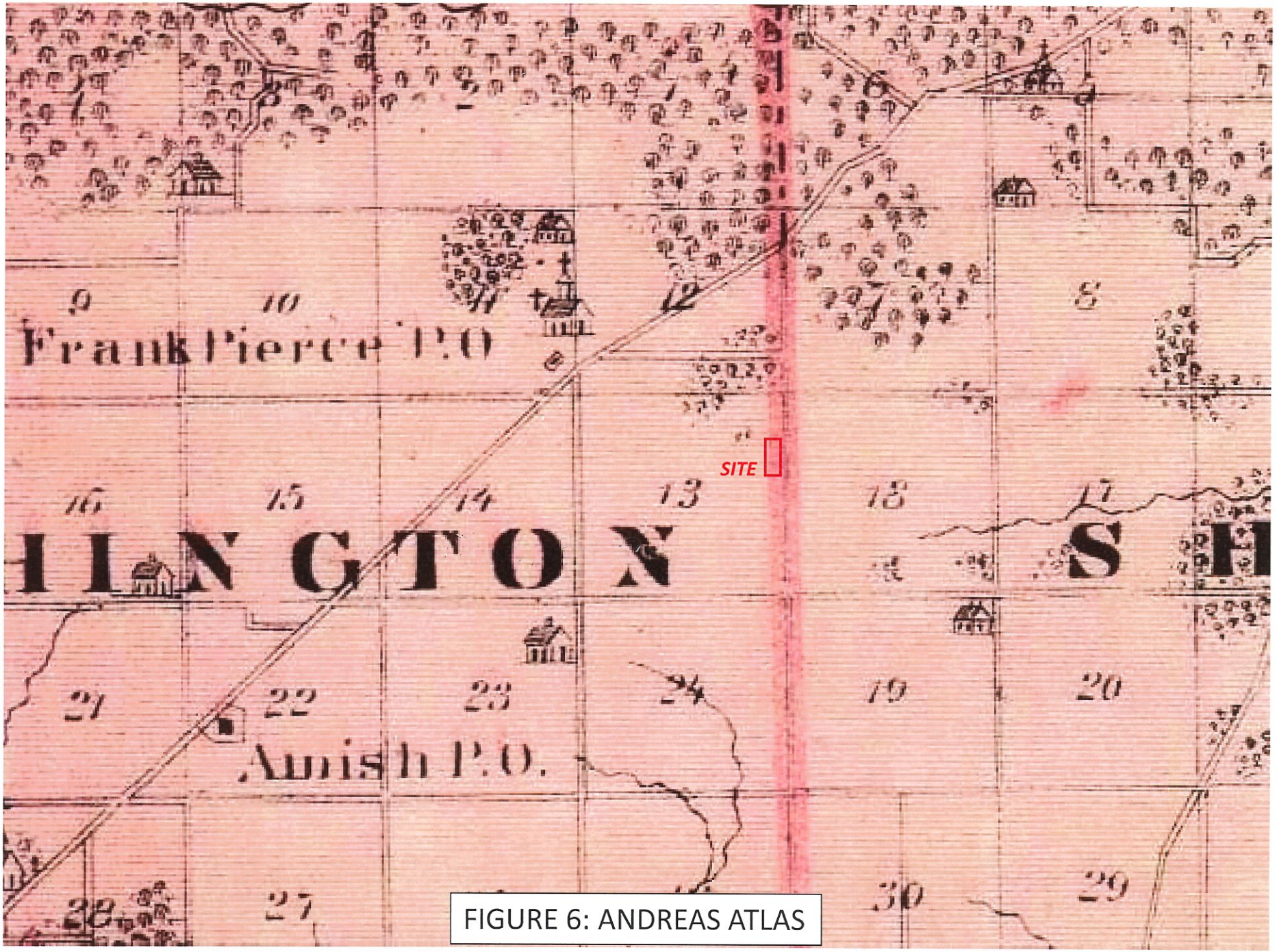


FIGURE 6: ANDREAS ATLAS

FIGURE 7: NWI MAP

THE UNIVERSITY OF IOWA

Office of the State Archaeologist

University of Iowa
700 Clinton Street Building
Iowa City, Iowa 52242
319-384-0732
archaeology.uiowa.edu

Thursday, April 20, 2023

Charles Schmidt
Hart-Frederick Consultants
510 State St.
Tiffin, IA 52340

Ref JH Johnson **Iowa Site File Search No.** 2023132

Dear Charles:

I have conducted a search of the Iowa Site File for archaeological sites recorded within a one-mile radius of the area described in your request for search on 4/20/2023. This area is within 78N-8W Sec 13. Our records indicate that no archaeological site has been reported to the OSA within 100 m of the project location. Two sites have been recorded within one mile of the project area. Other archaeological sites may be present at or near the project location but have not been discovered or reported to the OSA.

State Archaeologist John Doershuk has reviewed the location you indicated. The project area has been previously subjected to intensive Phase I survey resulting in no archaeological sites being documented. No additional archaeological field investigation is warranted prior to the proposed solar farm development. If during the course of ground disturbing activities unanticipated discovery of apparent archaeological materials (including but not limited to stone or pottery artifacts, burned earth and rocks, large charcoal deposits, etc.) occurs then construction activities must cease within 50 ft of the discovery and staff from Johnson County Planning and the Office of the State Archaeologist must be notified and allowed to evaluate and consult about next steps.

Several caveats are in order. First, this scope will likely not fulfill the requirements of Section 106 of the National Historic Preservation Act but is specifically targeted at identifying burial mounds and/or obvious human remains. No field method short of 100 percent excavation using archaeological techniques will eliminate all possibility of human remains at a location. Therefore, should human remains be exposed as part of proposed activities at any stage of the project, the Iowa burial law [Code of Iowa, Sections 263B, 523I.316(6), and 716.5; IAC 685, Ch.11.1] requires that all work in the vicinity of the finding be halted, the remains protected, local law enforcement officials notified, and the Bioarchaeology Program Director at the OSA contacted immediately (319-384-0740 or 319-384-0732).

If applicable, a map including the HILD locations (Historic Indian Location Database) and Notable Locations (database of locations with potential historical or archaeological value) is included with this search. Historic documentation indicates an archaeological site may be present at these locations. Your project should take into consideration these potential areas of archaeological interest.

Please remember that you may contract with any member of the Association of Iowa Archaeologists Consultants List; please direct your chosen consultant to provide John Doershuk (John-Doershuk@uiowa.edu) with an electronic report of their investigation which should adhere to typical AIA survey report guidelines. John will do his utmost to then review and provide you with comments within five business days of complete report submittal.

Sincerely,

Colleen Randolph

Colleen Randolph
Site Records Manager

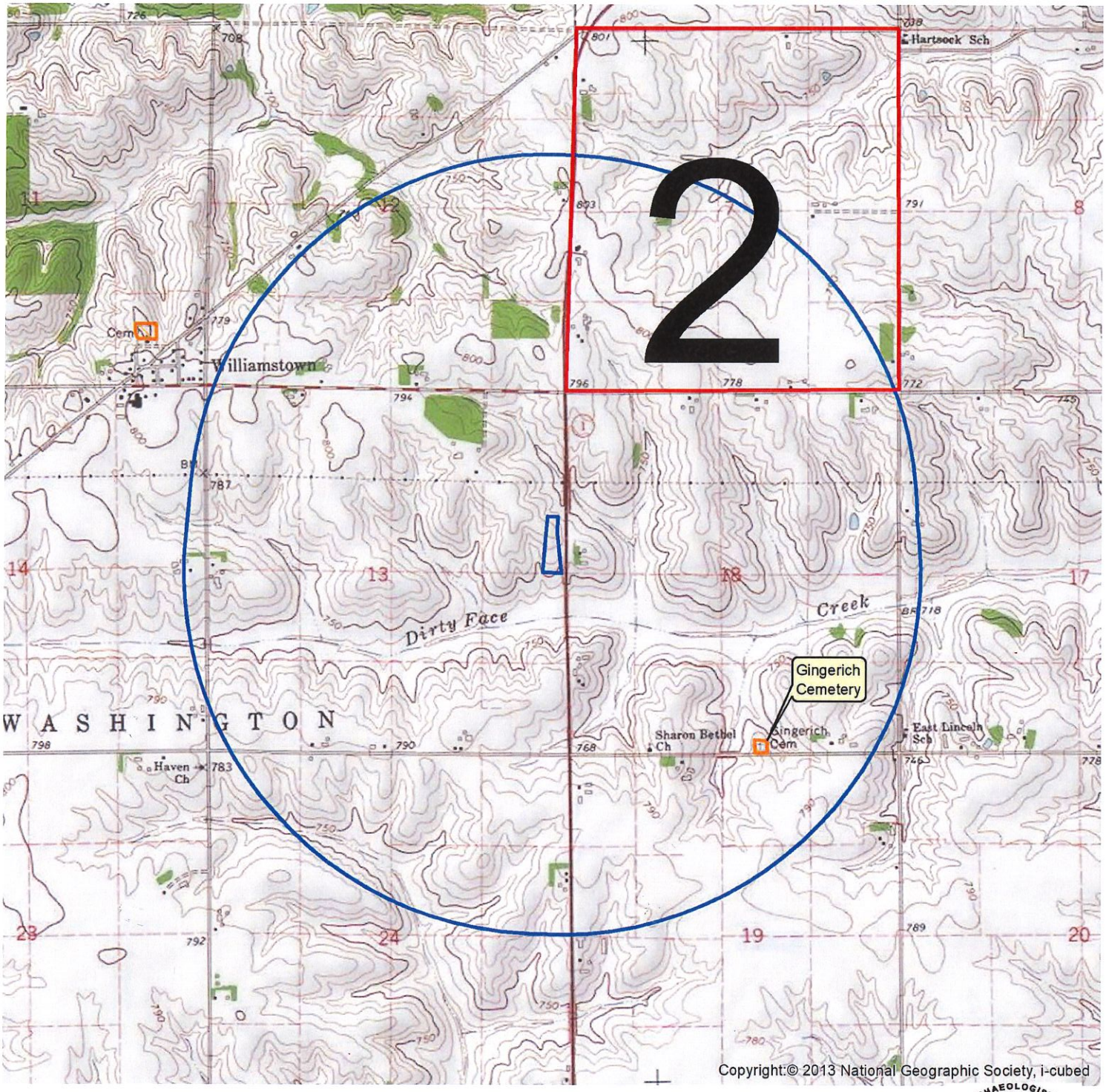
SITE	Cultural Affiliation	Site Type	SITEAREA	DTYPE
13JH1009	Prehistoric	Isolated find	314.1410	dot
13JH1351	Historic Euro-American	Historic farm/residence	389.6896	inverted triangle

Dtype definitions

Polygon:	Boundaries and location known
Triangle:	Location and boundaries not certain
Inverted Triangle:	Location known, boundaries unknown
Dot: (10 m radius)	Location known, area < 20 m in any direction
Circle:	Location and site area known, exact boundaries not known

Notable Locations Database:

Notable	Name	Reference
XX2990	Gingerich Cemetery	Merged from old cemetery shapefiles



OSA Search 2023132
Johnson County
Search Date:4/20/2023 CR

0 0.25 0.5 0.75 1 Miles

0 0.25 0.5 0.75 1 Kilometers

2 Number of sites per section which occur within 1 mile buffer

Notable_Locations

Project area

1-mile buffer

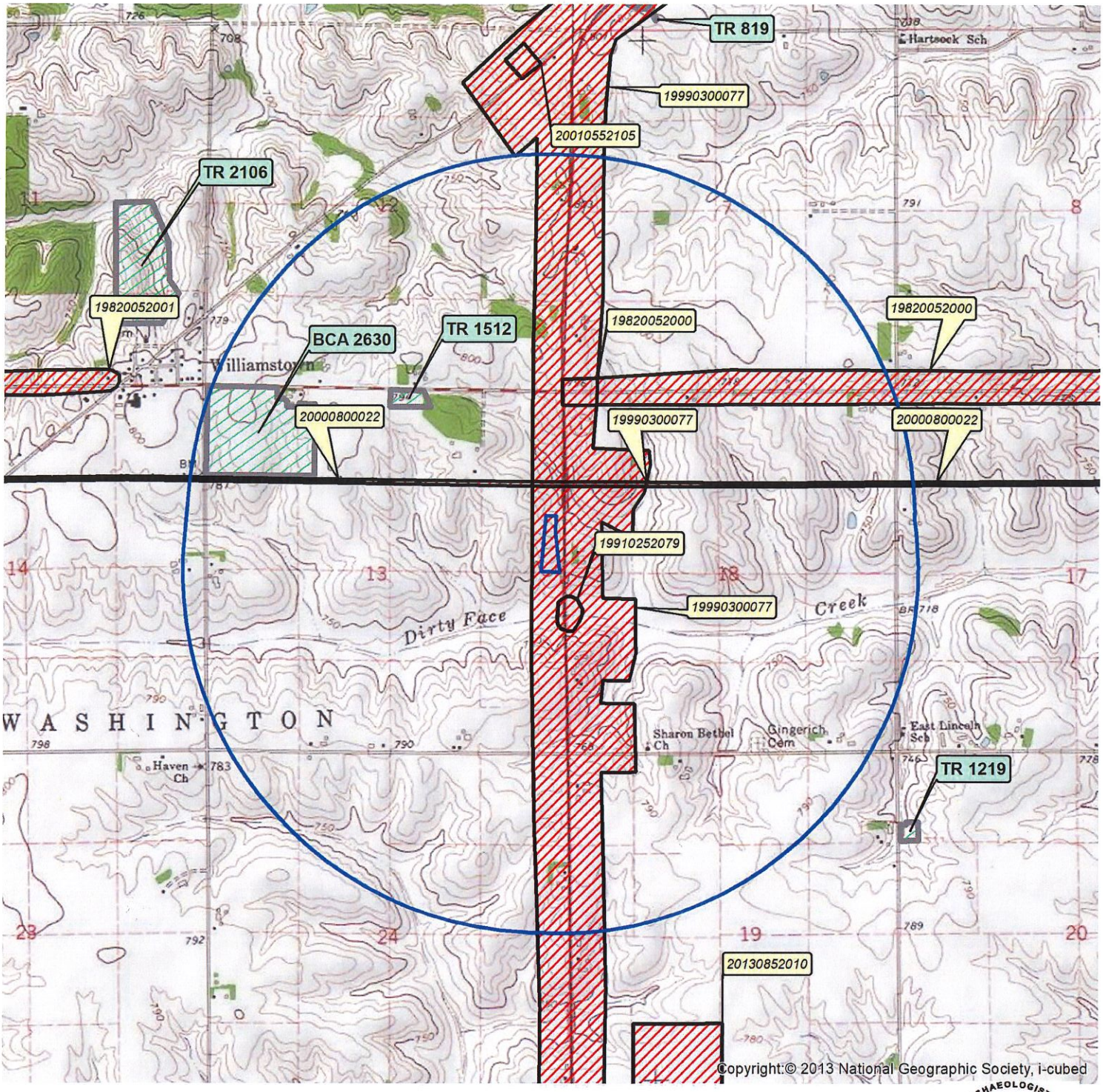
Previously surveyed area, "intense" labeled with SHPO R&C number

N

This map contains confidential site location information. Neither the map nor the associated data may be reproduced or distributed without the consent of the Office of the State Archaeologist.

Precise locations outside of the project area may be withheld pursuant to Iowa Code section 22.7 subsection 20

Data displayed on this map are current as of the date of this search, but are subject to additions and revisions without notice.



OSA Search 2023132
Johnson County
Search Date:4/20/2023 CR

0 0.25 0.5 0.75 1 Miles

0 0.25 0.5 0.75 1 Kilometers

OSA survey report
Project area
1-mile buffer
Previously surveyed area, "intense" labeled with SHPO R&C number

N

This map contains confidential site location information. Neither the map nor the associated data may be reproduced or distributed without the consent of the Office of the State Archaeologist.

Precise locations outside of the project area may be withheld pursuant to Iowa Code section 22.7 subsection 20

Data displayed on this map are current as of the date of this search, but are subject to additions and revisions without notice.

Office of Traffic and Safety
800 Lincoln Way Ames, IA 50010

9/5/2023

Permit Number: 2023-52-0-2
Primary Highway: IA 1 N
County: Johnson (52)
Expiration Date: 09/06/2024

Farmers Electric Cooperative - Kalona
1959 Yoder Ave. SW
Kalona, IA 52247

Subject: Approval of Access Permit

Dear Applicant,

This letter is notification that your request to establish an access connection along primary highway IA 1 N has been approved.

As the applicant of record, you are responsible for compliance with the terms and conditions set forth in this permit. In particular, the prescribed traffic control measures must be adhered, ANSI 107 Class 2 high visibility apparel must be worn by all personnel within the highway right-of-way and unless otherwise specified, work hours shall be between 30 minutes after sunrise and 30 minutes before sunset. Finally, a copy of the **entire** approved permit shall be available at the job site at all times for examination by Department officials.

Prior to commencing work, a 48 hour notice is required. Please contact the DOT representative below:

Johnny Shanahan
Garage Supervisor
2600 Coral Ridge Ave.
Coralville, IA 52241
319-330-9063
johnny.shanahan@iowadot.us

Upon completion of your entrance, final field inspection shall be completed. Please call me to schedule this final inspection at your earliest convenience. If you should have any questions, please do not hesitate to contact me.

Best regards,

Arielle Muench
Engineering Operations Technician
319-730-1533
arielle.muench@iowadot.us

Enclosures

NEW ACCESS PERMIT

Permit to construct entrance from private property to primary highway

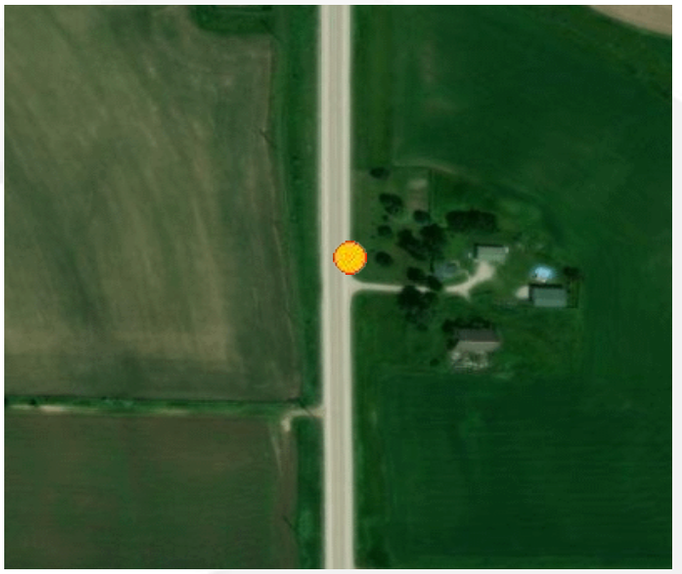
Permit Number : 2023-52-0-2

Date of issue: September 05, 2023

Issued To: Farmers Electric Cooperative - Kalona
1959 Yoder Ave. SW
Kalona ,IA 52247
319-683-2510

Access Use : Utility access

Access Type : Type U



Operational Restrictions : All Directions

LOCATION DATA

Highway: IA 1 N

County: Johnson

District: 6

Section: 13

Reference Post: 73

Township: T78N

Offset: 0.462

Range: R08W

Side of road: West

ENTRANCE DETAIL

Access Width: 15

Radius(feet): (1) 20 (2) 20

Pipe size (inches): 18

Pipe length (feet): 48

Pipe apron required: Yes

Permit void if not constructed by: *September 06, 2024*

Enclosures: Standard Terms and Conditions, EW-501, Farmers Electric Solar Farm Driveway.pdf, BOA-23-28405 FEC Utility Scale Solar CUP (Frytown)(Filed 7.20.23).pdf, TC-202, TC-1, Request Confirmation Email.pdf

Status

SPECIAL REQUIREMENTS / STIPULATIONS

Standard Terms and Conditions

The applicant(s) agrees to construct the entrance as approved, the following stipulations shall govern.

A. GENERAL

1. Words and phrases herein, including acknowledgment hereof, shall be construed as in the singular or plural, and as masculine, feminine, or neuter gender according to the context.
2. Stipulations and requirements contained herein are not intended to waive greater requirement of local zoning ordinances.
3. Owner's attention is directed to the fact that private property may not be used so as to obstruct or encumber the public highway right-of-way,
4. A copy of the approved permit shall be available on the job site at all times for examination by Department officials.
5. Upon completion of the constructing of the entrance in compliance with the terms agreed upon in this document and attachment, no changes in the entrance or its location shall be undertaken without the prior written approval of the Department.
6. The owner shall be responsible for all future maintenance costs associated with maintaining the access in a safe state of repair from the outer shoulder of the primary highway to the right-of-way line.
7. In the future, should this entrance generate sufficient traffic to warrant a need for additional traffic control upon the primary road system, costs for these improvements shall be the responsibility of the owner and shall be constructed in accordance with the Department standards. These may include but would not be limited to the constructing of turn lanes and/or signalization.
8. It is understood that all provisions herein relating to the construction, repair, or maintenance of the access shall be binding on all successors or assigns of the owner.
9. If desired, the applicant may record the approved application.

B. LIABILITY

1. The Owner(s) shall indemnify and save harmless the State of Iowa, its agencies and employees, from any and all causes of action, suits at law or in equity, for losses, damages, claims, or demands, and from any and all liability and expense of whatsoever nature, arising out of or in connection with Owner's use or occupancy of the public highway.
2. If the Owner(s) should fail to comply with any of the conditions and requirements of this agreement, the Department may terminate it, whereupon the Owner(s) shall immediately remove any construction undertaken pursuant to this agreement and restore the access(es) previously existing, and any rights granted the Owner(s) by this agreement shall end.

C. NOTIFICATION, CONSTRUCTION, AND MAINTENANCE

1. Before beginning any work in the highway right-of-way, it is the responsibility of the Owner(s) to:
   a. Contact utility companies which may be located in the area of the proposed work. Contact should be made by calling Iowa One Call at 1-800-292-8989, a minimum of 48 hours in advance of starting construction.
   b. If the work requested in this application should cause a need to relocate or modify an existing utility, any cost associated shall be as negotiated between the applicant and the utility owner.
   c. Contact the Department's Representative as noted in the approval letter, a minimum of 48 hours in advance of intention to start construction.
2. Unless specifically noted in this application, all work performed within the right-of-way shall be restricted to a time frame of 30 minutes after sunrise to 30 minutes before sunset.
3. The access, including drainage structure, grading, and surfacing, and entrance configuration shall be constructed by the Owner at the Owner's expense, in accordance with the exhibit and attachments hereto, and in conformity with the standard specifications of the Department of Transportation.
4. The construction, future repair, or maintenance of said entrance shall be carried on in such a way as not to interfere with, or interrupt traffic on said highway, and the Owner shall take all reasonable precautions to protect and safeguard the lives and property of any person or persons, on account of such construction, repair, or maintenance operation.
5. No filling will be permitted in the right-of-way primary road other than that necessary to construct the proposed entrance or as specifically stated herein.
6. If required a culvert pipe under the entrance shall be constructed as shown in the corresponding attachment.
7. Applicant will take necessary precautions to prevent the tracking of dirt and mud onto the highway during construction. If such tracking occurs, the applicant will remove the material by general acceptable practices as soon as possible but not later than the end of the working day.

D. VISIBILITY REQUIREMENTS

All personnel in the highway right-of-way shall wear orange or strong yellow green ANSI 107 Class 2 apparel when exposed to traffic or construction equipment. Orange or strong yellow green ANSI 107 Class E pants or shin reflectors/gaiters are also required to be worn at night. Shin reflectors/gaiters shall have a minimum of two 2 inch (50mm) bands of retroflective material spaced at least 6 inches (150 mm) apart. Background material shall extend at least 2 inches (50mm) above and below retroflective bands and contiinue through the length of shin reflectors/gaiters. Shin reflectors/gaiters shall completely encircle the leg and be worn on lower leg between knee and ankle.

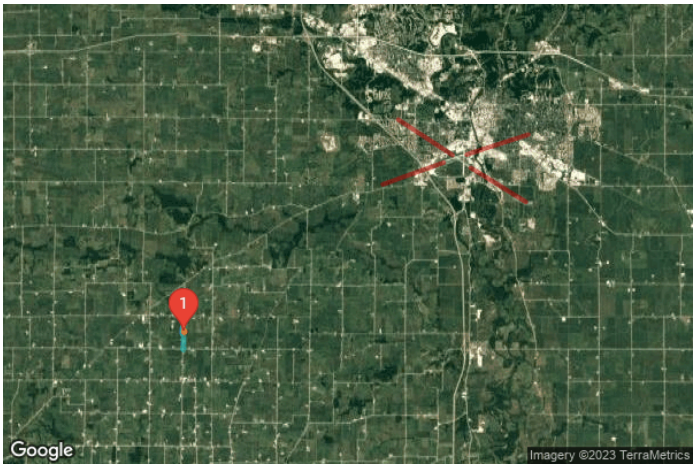
ForgeSolar

FEC Site MS

FEC MS

Created Sep 06, 2023
Updated Sep 06, 2023
Time-step 1 minute
Timezone offset UTC-6
Minimum sun altitude 0.0 deg
Site ID 99538.17362

Project type Basic
Project status: active
Category 500 kW to 1 MW
(1,000 kW / 8 acre limit)



Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

PV Analysis Methodology: **Version 2**
Enhanced subtended angle calculation: **On**

Summary of Results

Glare with low potential for temporary after-image predicted

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	30.0	180.0	798	0	-

Component Data

PV Array(s)

Total PV footprint area: 2.5 acres

Name: PV array 1
Footprint area: 2.5 acres
Axis tracking: Fixed (no rotation)
Tilt: 30.0 deg
Orientation: 180.0 deg

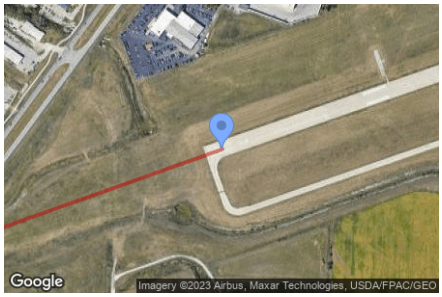
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	41.562110	-91.713262	749.28	6.00	755.28
2	41.562106	-91.714003	748.36	6.00	754.36
3	41.564210	-91.713917	773.17	6.00	779.17
4	41.564204	-91.713510	768.88	6.00	774.88
5	41.563634	-91.713504	777.04	6.00	783.04

2-Mile Flight Path Receptor(s)

Name: FP 1
Description:
Threshold height : 50 ft
Direction: 70.3 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	41.638325	-91.557431	678.14	50.00	728.14
2-mile point	41.628574	-91.593894	778.06	503.51	1281.57



Name: FP 2
Description:
Threshold height : 50 ft
Direction: 252.0 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	41.641889	-91.543768	651.62	50.00	701.62
2-mile point	41.650843	-91.506938	695.97	559.08	1255.05

Name: FP 3
Description:
Threshold height : 50 ft
Direction: 301.8 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	41.635988	-91.541323	645.79	50.00	695.79
2-mile point	41.620744	-91.508414	655.21	594.01	1249.22

Name: FP 4
Description:
Threshold height : 50 ft
Direction: 123.2 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	41.641653	-91.552224	658.13	50.00	708.13
2-mile point	41.657488	-91.584632	750.39	511.17	1261.56

Route Receptor(s)

Name: Route 1
Route type Two-way
View angle: 50.0 deg

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	41.566395	-91.713109	753.40	0.00	753.40
2	41.566397	-91.712913	753.19	0.00	753.19
3	41.554869	-91.712843	760.98	0.00	760.98
4	41.554875	-91.713042	762.44	0.00	762.44
5	41.566395	-91.713109	753.40	0.00	753.40

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	ft	ft	ft
OP 1	41.562909	-91.712334	775.22	0.00	775.22

Obstruction Components

Name: Obstruction 2
Upper edge height: 32.8 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	41.562957	-91.712698	766.11
2	41.562972	-91.712656	766.94
3	41.562949	-91.712620	768.64
4	41.562914	-91.712654	767.79
5	41.562924	-91.712695	766.45
6	41.562957	-91.712698	766.11

Name: Obstruction 3
Upper edge height: 32.8 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	41.563017	-91.712500	772.41
2	41.562967	-91.712400	774.64
3	41.562970	-91.712280	775.82
4	41.563149	-91.712289	772.73
5	41.563017	-91.712500	772.41

Name: Obstruction 4
Upper edge height: 32.8 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	41.562900	-91.712484	773.42
2	41.562835	-91.712499	772.27
3	41.562779	-91.712308	769.98
4	41.562811	-91.712260	770.66
5	41.562839	-91.712293	772.53
6	41.562900	-91.712484	773.42

Name: Obstruction 4
Upper edge height: 32.8 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	41.562761	-91.712464	770.79
2	41.562688	-91.712576	768.15
3	41.562591	-91.712418	766.44
4	41.562677	-91.712308	767.40
5	41.562761	-91.712464	770.79

Summary of PV Glare Analysis

PV configuration and total predicted glare

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced	Data File
	deg	deg	min	min	kWh	
PV array 1	30.0	180.0	798	0	-	-

Distinct glare per month

Excludes overlapping glare from PV array for multiple receptors at matching time(s)

PV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pv-array-1 (green)	0	0	0	0	249	168	381	0	0	0	0	0
pv-array-1 (yellow)	0	0	0	0	0	0	0	0	0	0	0	0

PV & Receptor Analysis Results

Results for each PV array and receptor

PV array 1 low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
FP: FP 1	0	0
FP: FP 2	0	0
FP: FP 3	0	0
FP: FP 4	0	0
OP: OP 1	798	0
Route: Route 1	0	0

PV array 1: FP 1

No glare found

PV array 1: FP 2

No glare found

PV array 1: FP 3

No glare found

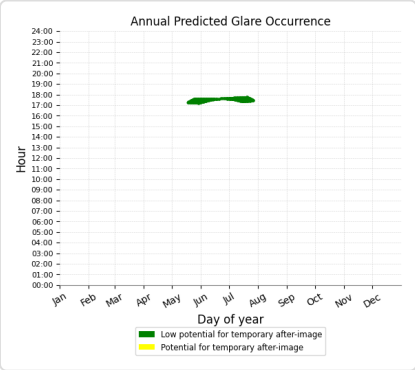
PV array 1: FP 4

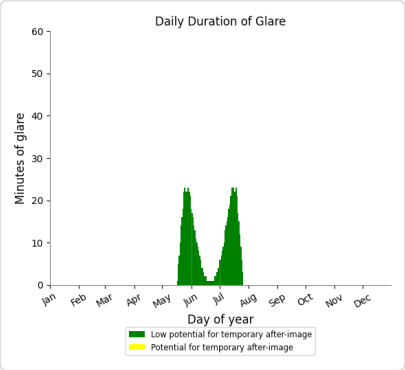
No glare found

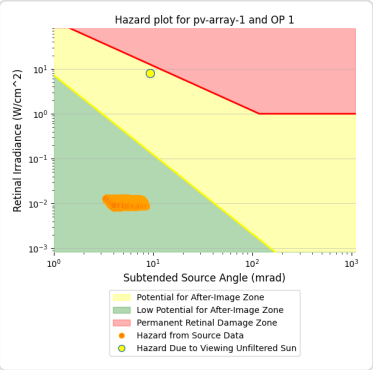
PV array 1: OP 1

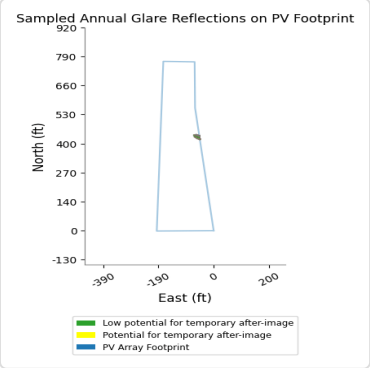
PV array is expected to produce the following glare for this receptor:

- 798 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.







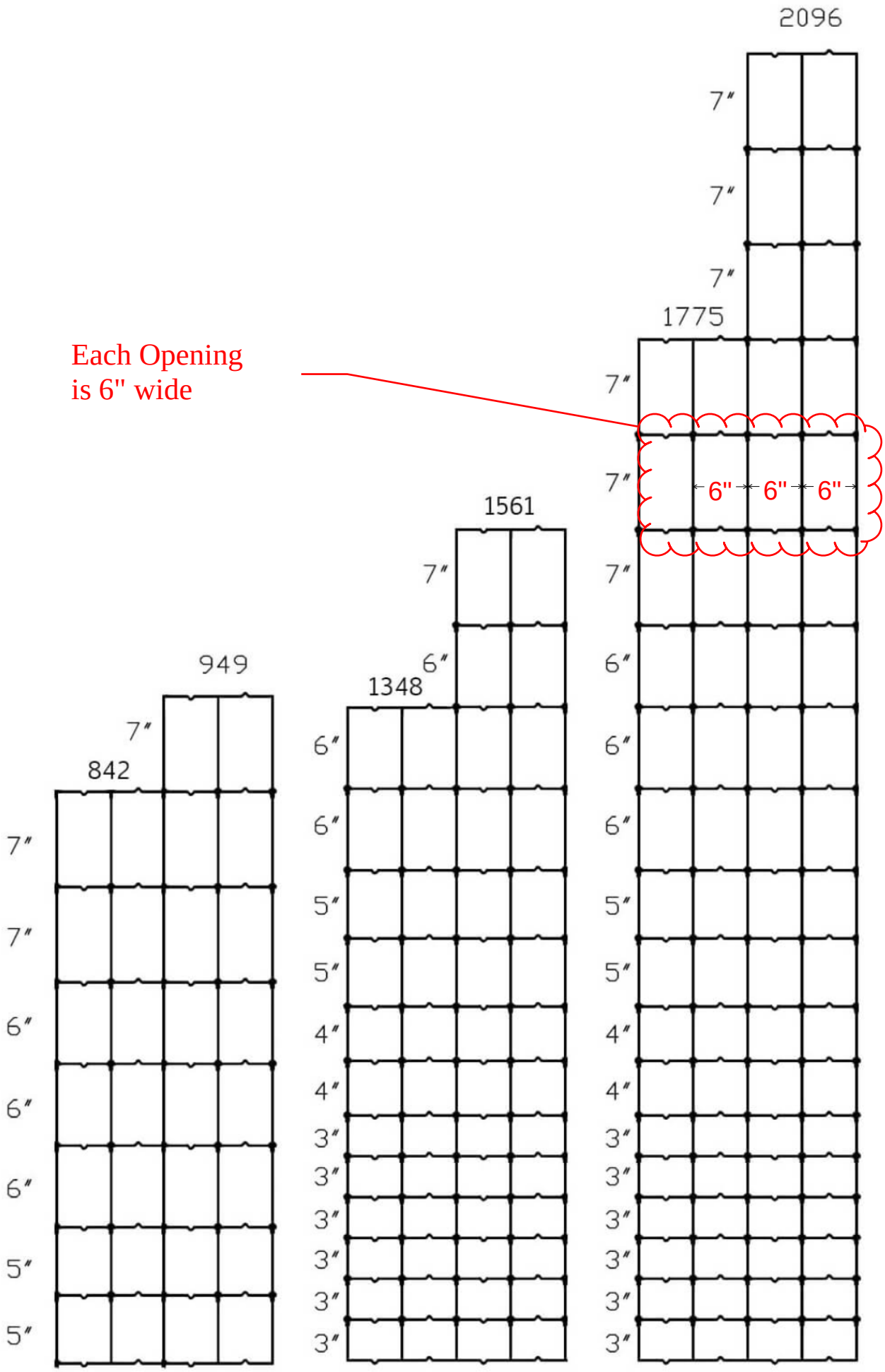


PV array 1: Route 1

No glare found

Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not automatically account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographi obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for larg PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, nc discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.


2096
7″
7″
7″
1775
Each Opening
is 6" wide
7″
7″
6"
6"
6"
1561
7″
7″
6″
6″
1348
6″
6″
5″
5″
4″
4″
3″
3″
3″
3″
3″
3″
949
7″
842
7″
7″
6″
6″
5″
5″