



CITY OF INDIANOLA BOARD OF ADJUSTMENT MEETING

May 3, 2023

6:00 PM

City Council Chambers

Agenda

- 1. Call to Order**
- 2. Roll Call**
- 3. Agenda Approval**
 - A. Approval of the May 3rd agenda.
- 4. Minutes Approval**
 - A. Approval of the meeting minutes from April 5th's meeting.
- 5. New Business**
 - A. Consider request from Rod and Angela McKelvey for a variance for a property located at Lot 62 of the Millbrook Plat 2 Subdivision
 - B. Consider a request from Sandhills Energy LLC, on behalf of Indianola Municipal Utilities, for a Special Use Permit for ground mounted solar energy systems located at 1602 South K Street
- 6. Comments**
- 7. Adjourn**



MEMORANDUM

To: Board of Adjustment
From:
Date: May 3, 2023
Subject: Approval of the May 3rd agenda.

Recommendation:

Attachments: None



CITY OF INDIANOLA BOARD OF ADJUSTMENT MEETING

April 5, 2023

6:00 PM

City Council Chambers

Minutes

1. Call to Order

The meeting was called to order at 6:01.

2. Roll Call

Members present: Rene Soldwisch, Jane Whalen, Lee Bash

Staff members present: Charlie Dissell, Tim Little, Emily Rizvic, Miranda Chadwick

3. Agenda Approval

A. Approval of the agenda.

Lee Bash made a motion to approve the agenda. Jane Whalen seconded the motion. Motion was passed.

4. Minutes Approval

A. Approval of the meeting minutes from February.

Lee Bash made a motion to approve the meeting minutes from February's meeting.

5. Old Buisness

A. Election of officers

It was discussed that the election of officers will take place once the board positions have been filled.

6. New Business

A. Consider appeal from Taylor Smothers under terms of Section 165.02(3)(B)(2) of the Code of Ordinances of Indianola, Iowa regarding determination of multiple violations occurring at 107 ½ West Salem Ave

Lee Bash makes a motion to approve the requirement for a lockbox installation and not condemn the property. In addition, they choose to defer the sprinkler issue till an encompassing look can be taken at all downtown businesses and the use of sprinklers. Rene seconded the motion.

The motion was passed.

B. Consider appeal from Rod and Angela McKelvey under terms of Section 165.02(3)(B)(2) of the Code of Ordinances of Indianola, Iowa regarding determination of a violation occurring at Lot 62 of the Millbrook Plat 2 Subdivision.

Lee Bash made a motion to postpone this agenda item to a later date.

Rene Soldwisch seconded the motion.

Motion was passed.

7. Comments

8. Adjourn

The meeting was adjourned at 7:05.



MEMORANDUM

To: Board of Adjustment

From:

Date: May 3, 2023

Subject: Consider request from Rod and Angela McKelvey for a variance for a property located at Lot 62 of the Millbrook Plat 2 Subdivision

Recommendation:

Attachments:

1. Staff Report
2. Application
3. Original Building Permit Application
4. Narrative
5. Applicant Provided Documents
6. Millbrook Plat 2 Subdivision



COMMUNITY DEVELOPMENT

110 N. First Street, Indianola IA 50125-0299 • www.indianolaiowa.gov
(515) 961-9430 • comdev@indianolaiowa.gov

STAFF REPORT

BOARD OF ADJUSTMENT

Date of Meeting: May 3, 2023

Agenda Item: 5.A Consider request from Rod and Angela McKelvey for a variance for a property located at Lot 62 of the Millbrook Plat 2 Subdivision

Application Type: Variance

Applicant and Property Owner: Rod and Angela McKelvey

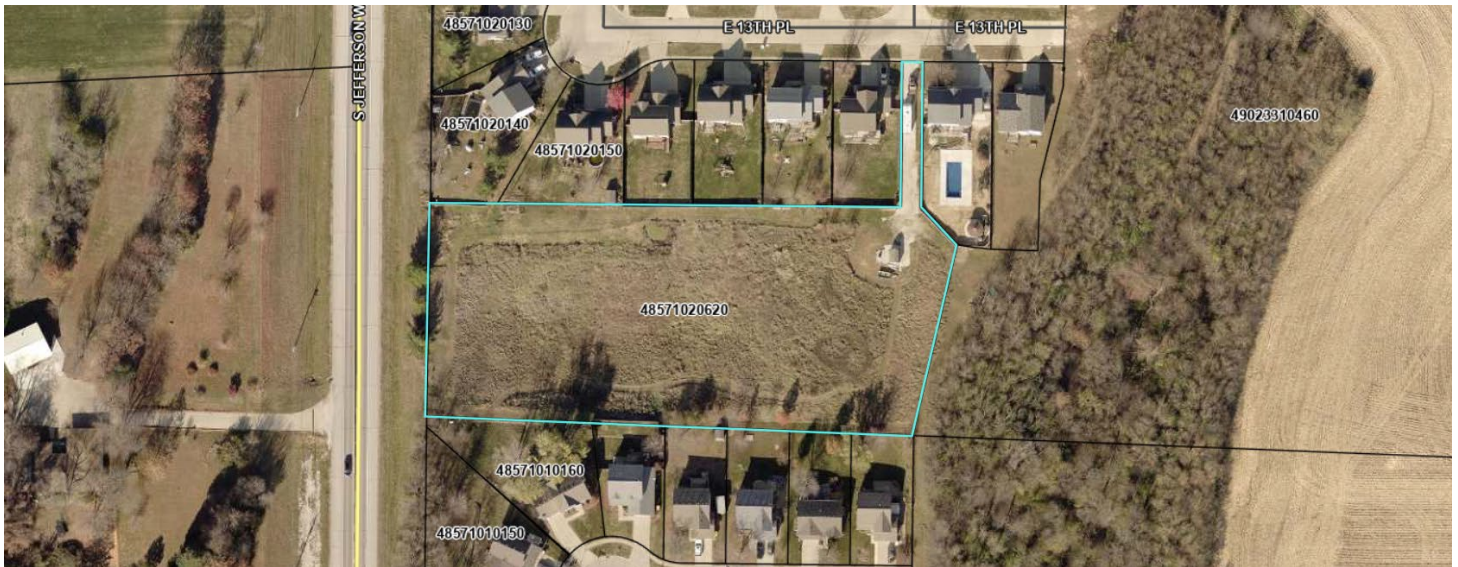
Property Address/Parcel: Lot 2 of the Millbrook Plat 2 Subdivision (Parcel ID #485/7102-0620)

Zoning: R-2, Single-Family Residential Attached Zoning District

Application Summary

Rod and Angela McKelvey is requesting a variance for a property identified as Lot 2 of the Millbrook Plat 2 Subdivision. The request is to allow for a variance to allow the construction of an accessory structure that would be over 1,800 square feet in size and would be located on a vacant lot without a primary structure. Such proposal would not conform to city zoning codes which do not allow for detached accessory structures/garages over such size, nor allows for their location on vacant lots.

AERIAL MAP



APPLICABLE CODE SECTIONS

The following code sections of the Code of Ordinances of Indianola, Iowa apply to this request:

165.02(3)(B) POWERS AND DUTIES OF THE BOARD OF ADJUSTMENT. The Board of Adjustment has the following powers and duties:

3. Variances: Conditions Governing Applications; Procedures. To authorize upon appeal in specific cases such variance from the terms of this chapter as will not be contrary to the public interest where, owing to the special conditions, a literal enforcement of the provisions of this chapter would result in unnecessary hardship. A variance from the terms of this chapter shall not be granted by the Board of Adjustment unless and until:

A. A written application of a variance is submitted demonstrating:

- (1) That special conditions and circumstances exist which are peculiar to the land, structure, or building involved and which are not applicable to other lands, structures, or buildings in the same district;
- (2) That literal interpretation of the provisions of this chapter would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this chapter;
- (3) That the special conditions and circumstances do not result from the actions of the applicant;
- (4) That granting the variance requested will not confer on the applicant any special privilege that is denied by this chapter to other lands, structures, or buildings in the same district. No nonconforming use of neighboring lands, structures, or buildings in the same district, and no permitted use of land, structures or buildings in other districts shall be considered grounds for the issuance of a variance.

B. Notice of public hearing shall be given as in subsection 2(B) above.

C. The public hearing shall be held. Any party may appear in person, or by agent or by attorney.

D. The Board of Adjustment shall make findings that the requirements of paragraph A of this subsection have been met by the applicant for a variance.

E. The Board of Adjustment shall further make a finding that the reasons set forth in the application justify the granting of the variance, and that the variance is the minimum variance that will make possible the reasonable use of the land, building or structure.

F. The Board of Adjustment shall further make a finding that the granting of the variance will be in harmony with the general purpose and intent of this chapter, and will not be injurious to the neighborhood, or otherwise detrimental to the public welfare.

In granting any variance, the Board of Adjustment may prescribe appropriate conditions and safeguards in conformity with this chapter. Violations of such conditions and safeguards, when made a part of the terms under which the variance is granted, shall be deemed a violation of this chapter and punishable under Section 165.23 of this chapter. Under no circumstances shall the Board of Adjustment grant a variance to allow a use not permissible under the terms of this chapter in the district involved, or any use expressly or by implication prohibited by the terms of this chapter in said district.

165.04(2) ACCESSORY BUILDINGS AND STRUCTURES.

B. General Provisions. No accessory structure shall be constructed upon a lot until the construction of the main or principal building has been commenced, and no accessory structure shall be used if the main or principal building has been unused for a period of six (6) months or longer. Accessory buildings shall not be used for dwelling purposes, except for approved accessory dwellings as defined in this chapter.

E. Area and Height Limit. Accessory buildings and structures shall be limited to a maximum of two (2) total buildings, including a garage, of which all total accessory buildings shall not occupy more than ten (10) percent of the total lot area nor exceed a total square footage of 1,800 square feet. However, this regulation shall not prohibit the construction of at least one garage not to exceed six hundred (600) square feet gross building area and at least one accessory storage building not to exceed one hundred twenty (120) square feet gross building area.

ANALYSIS

Subject Property and Surrounding Land Uses

Rod and Angela McKelvey are requesting a variance for their property identified as Lot 62 of the Millbrook Plat 2 Subdivision (Parcel #485/7102-0620). The property is a 2.55-acre flag lot containing a 10'x10' detached shed structure and an unpermitted gravel drive which leads to and surrounds the structure.

The subject property is considered a flag lot, zoned for the R-2 '*Single-family Residential Attached*' zoning district. The parcel contains several easements located on the lot however these easements do not affect the buildability of the parcel for a single-family dwelling.

The property takes access off of E 13th Place, a paved local street that is publically owned. In 2004, the Iowa Department of Transportation (IDOT) estimated the average annual daily traffic (AADT) for E 13th Place was 101 Vehicles. The property also fronts along South Jefferson Way (US HWY 65). The AADT of this portion of roadway in 2021 was 7900 vehicles.

As far as surrounding land uses to the property, to the north exists seven (7) single-family residential dwellings. To the east exists 11.78-acre property currently in row-crop production. To the south exists six (6) single-family residential dwellings. To the west is a single-family residential dwelling that exists on an 8.89-acre lot.

Future Land Use

According to the "Elevate Indianola" Comprehensive Plan, the future land use of this area is designated as Low/Medium Density Residential. This land use designation guides for up to 15 dwelling units per gross acre, single-family detached dwellings, accessory dwelling units, single-family attached (townhomes and row houses), multi-family (condos and apartments), and student housing, civic uses and places of worship and lastly parks, open spaces, and trails.

FINDINGS OF FACT

According to Section 165.02.3.B.(3)b. of Indianola's Zoning Code, in deciding whether to grant a variance request, the Board of Adjustment shall consider all the following legal principles. **All legal principles shall be satisfied in order for the Board of Adjustment to grant a variance.**

- i. **That special conditions and circumstances exist which are peculiar to the land, structure, or building involved and which are not applicable to other lands, structures, or buildings in the same district;**

Staff Comment: This finding of fact asks for the Board to find whether special conditions or circumstances exist which are peculiar to the land and which are not applicable to other lands in the R-2 '*Single Family Residential Attached*' Zoning District.

Reviewing the site, the subject property is located on a flag lot which accesses East 13th Place. A flag lot is characterized by a long, narrow strip that is used for driveway purposes only, and resembles a flag pole. Flag pole lots are still developable but would require the home to be further set back from the street.

The subject property does contain multiple easements located on the site, however these easements are not precluding the property from being developable for a single-family dwelling. If easements or topographic conditions were precluding the property from being developable, then an 1,800+ square foot accessory structure would not be able to locate on the property either due to these same reasons.

Additionally, the lot configuration as a flag lot, site characteristics and the easements located on the property do not restrict the property owner from meeting bulk regulations for accessory structures within the R-2 Zoning District, which clearly states that accessory structures cannot exceed 1,800 square feet in size. In reviewing plans that were submitted and preliminary correspondence, the applicant shows restroom facilities and office space within the building plans. These spaces are not necessary and could decrease the accessory structures size.

If the variance were to be approved, the over-sized proposed accessory structure would not meet neighborhood expectations of enforcement and compliance with City Zoning Code Regulations. Likewise, it would establish a precedent for future development and subsequently alter the character of residential neighborhoods that would not be in harmony with the general purpose and intent of the Zoning Code.

This criterion is not met.

Applicant Comment: The property is unique in several ways: 1.) Two steep slopes, one dropping to the only potential build site and the other dropping away – limits the area to build to a much smaller location than the lot size 2.55 acres would suggest. 2.) There are easements that include drainage/sewage system that crosses through the center of the property (NW to SE). 3.) There is no frontage to this lot. From the road, the only entrance is an 18' wide drive, which cuts between two homes. Summary: If I were to build a house on the property, there would be limited resale potential – very niche buyer's market as few would want to live in the backyards of two neighborhoods and pass narrowly between two

houses to get home. In an area where no other parcel is set up this way. A home would be severely out of place.

- ii. **That literal interpretation of the provisions of this chapter would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this chapter.**

Staff Comment: The applicant is not being deprived of a right that is otherwise commonly enjoyed by other properties within the R-2 Zoning District. First, other properties within this established zoning district are not allowed to build an oversized accessory structure that exceeds the maximum allowable size for all accessory structures (1,800 square feet). If this application was approved, this applicant would have a right that other properties do not have.

Likewise, the strict application of the size requirement does not constitute an unnecessary hardship upon the applicant, but more of an inconvenience, because the property owner can still make a reasonable and economically viable use of the property, if required to conform to zoning code requirements relating to the maximum allowable accessory structure size.

Secondly, an accessory structure of this size and magnitude is not a right that neighboring properties within the Millsbrook Plat 2 Subdivision have. Accessory structures within the neighborhood average a size of approximately 144 square feet. The sum of all accessory structures within the subdivision is approximately 3050 square feet. If approved, the accessory structure would equate to nearly 60% of all accessory structures within this subdivision neighborhood.

Third, the applicant may reduce the size of the accessory structure but is making the choice not to. The proposed application and blueprints of the structure shows that the structure would include additional space that would be used for matters other than storage. The applicant is showing a restroom as well as office space. Additionally, the applicant indicated on February 23rd that the space would partially be used to host organizational meetings.

The purpose and intent of this related code section is to outline standards and regulations for accessory structures that are necessary and customarily associated with and are appropriate, incidental, and subordinate to principal uses. An approval of the variance would adversely affect the order, convenience, and/or general welfare of the neighborhood, as the oversized structure would not meet neighborhood expectations of enforcement and compliance with City Zoning Code Regulations.

The zoning code is also clear in that accessory structures cannot be placed on vacant properties without an established primary use/structure. The property in question is developable for a primary use/structure. This is a right that other property owners with vacant, developable parcels do not have.

This criteria is not met.

Applicant Comment: Deprived of the ability to keep equipment necessary to maintain a property properly. To include maintaining structures of easement. The property requires

more labor than can be expected by an owner to do by hand. Minimal equipment required should be allowed storage upon the property. Compact tractor, brush mower, rototiller, lawn mower, side by side, chainsaws and trailers to move such equipment. Other properties of this size must be maintained, whether private or public. The owner of such properties must have the right/ability to keep equipment to maintain such property.

iii. That the special conditions and circumstances do not result from the actions of the applicant;

Staff Comment: This finding of fact asks whether conditions or hardship experienced by the applicant are self-imposed.

As mentioned in the second finding of fact, the strict application of the size requirement does not constitute an unnecessary hardship upon the applicant, but more of an inconvenience, because the property owner can still make reasonable and economically viable use of the property, if required to conform to zoning code requirements.

Similarly, by not reducing the size of the accessory structure, the applicant is making a choice not to conform to zoning code requirements. The proposed application and previous blueprints of the structure shows that it would include additional space that would be used for matters other than storage. This includes restroom facilities as well as office space. On February 23rd, the applicant indicated that the space would partially be used to host organizational meetings.

Additionally, the property owner may consider alternative options. Those alternatives include (1) finding a storage facility to keep heavy duty equipment; (2) reducing the size of the proposed accessory structure; (3) develop the parcel with a permitted primary use; (4) consider a boundary line adjustment through plat of survey to merge with their abutting property and construct the confines of the structure within said lot.

This criteria is not met.

Applicant Comment: Lot must be mowed and groomed to keep noxious weeds and invasive trees and plants off the property. Sewer tops and area where piping crosses parcel must be kept free of any trees, and grasses must be mowed away from sewer openings to prevent clogage. Trash must be picked up on a regular basis which blows in every time there is a windstorm. All out of our control but must be maintained – Not possible w/o equipment. Prior to adding gravel there was a major erosion problem. This had to be maintained by constantly grading and adding soil to the drive.

iv. That granting the variance request will not confer on the applicant any special privilege that is denied by this chapter to other lands, structures, or buildings in the same district. No nonconforming use of neighboring lands, structures, or buildings in the same district, and no permitted use of land, structures, or buildings in other districts shall be considered grounds for the issuance of a variance.

Staff Comment: This finding of fact asks whether a special privilege would be granted to the applicant that is otherwise denied to other lands, structures, or buildings within the same zoning district. Variances are granted when a hardship for a property owner occurs which simutenously disenfranchises the property owner from a right that other property

owners within the same zoning district commonly has. If this variance were to be granted, it would confer a right or special privilege to this property that other buildable properties within the R-2 Zoning District do not have and would be administratively denied.

In general, undeveloped vacant parcels, no matter the scale, are not allowed to build an accessory structure until a primary use is established. This code applies to all residential, commercial, and industrial zones. The only circumstance where an accessory structure may be placed prior to a primary structure is when the construction of the main/principal building has commenced.

Similarly, granting this variance would set a precedent for future development and subsequently alter the character of residential neighborhoods. Deviation from the zoning code would not be in harmony with the general purpose and intent of the zoning code.

Lastly, as mentioned within the analysis of the second finding of fact, other properties within the immediate area and in the Millbrook Plat 2 Subdivision are meeting accessory structure size requirements. The size proposed by the applicant equates to nearly 60% of all accessory structures within this subdivision neighborhood.

This criteria is not met.

Applicant Comment: Zoning regulations are not meant to be absolute. Variances are allowed when such regulation doesn't make sense or fit the property or situation in question. Taking everything into consideration in this particular variance request, the Board of Adjustment should find that a house/home does not conform to the property and its surroundings. If not allowed to build this secondary structure, you will be denying my right to sufficiently store necessary equipment on site to maintain the property in question. If other properties exist within the district and have been denied such variance, it would be the planning department's responsibility to provide that information at the Board of Adjustment meeting. I would expect any private or public land of this size and layout to require a similar structure. This would not provide any superior rights over neighboring properties. We appreciate your time and consideration. Rod and Angie McKelvey.

SUMMARY OF FINDINGS

The following summary of findings are provided as reasonings to deny the variance request:

- 1) The variance request is not favorable towards one or more findings of fact, outlined in the Zoning Code.
- 2) The variance request requires multiple variances to Zoning Code Regulations in order to allow for the construction of an accessory structure on the property, which may suggest that this would not be the proper location or use for the property.
- 3) The variance is not created by the regulations and arises from an action (desire) of the applicant to construct an over-sized accessory structure, on a vacant property.
- 4) Although the property does contain multiple easements, the lot is designed as a flag lot, and portions of the property contain slope, neither of these factors are precluding the

property from being developable for a single-family dwelling. Otherwise, the applicant would not be able to locate an accessory structure of this size on the property.

- 5) Detached accessory structures in the immediate neighborhood do comply with size requirements – the proposed size of the accessory structure would equate to nearly 60% of all accessory structures within the subdivision.
- 6) The location of the proposed structure would be visible from adjacent streets, including South Jefferson Way (US HWY 65). This visibility would impact local neighborhood aesthetics as well as entering into the city from the south.
- 7) Granting the variance would provide a right and privilege that other properties do not have under the City of Indianola's Zoning Code Regulations.
- 8) Deviation from the Zoning Code Regulations would not be in harmony with the intent and purpose of the zoning code.
- 9) An unnecessary hardship does not exist if the request is denied, as the applicant has other avenues, and the property owner can still make a reasonable and economically viable use of the property.

If the variance were to be granted, the Board of Adjustment should be prepared to summarize, for inclusion in the minutes of the meetings, its reasons to approve, which will serve as the applications decision and order.

COMMENTS FROM THE GENERAL PUBLIC

Notification letters were mailed to surrounding property owners regarding the variance request the week of April 18, 2022. No comments were received at the time of the writing of this report.

ALTERNATIVES

The City of Indianola Board of Adjustment may consider the following alternatives:

- 1) The City of Indianola Board of Adjustment approves the variance request, as submitted.
- 2) The City of Indianola Board of Adjustment approved the variance request, with conditions.
- 3) The City of Indianola Board of Adjustment denies the variance request.**
- 4) The City of Indianola Board of Adjustment remands the variance request back to the applicant and/or staff for further review and/or modifications and directs staff to place this item on a future Board of Adjustment agenda.

RECOMMENDATION

Staff recommends that the Indianola Board of Adjustment move alternative 3, to deny the variance request, as submitted.

BOARD OF ADJUSTMENT APPLICATION

Community Development

110 North 1st Street, Indianola, Iowa 50125-0299
(515) 961-9430 • comdev@indianolaiowa.gov



PROPERTY OWNER

(Last Name) McKelvey
(First Name) Rod
(Address) 501 East 13th Place
(City) Indianola (State) IA (Zip) 50125
(Phone) 515-669-0448 (Email) rodmckelvey@icloud.com

APPLICANT (if not Property Owner)

(Last Name) _____
(First Name) _____
(Address) _____
(City) _____ (State) _____ (Zip) _____
(Phone) _____ (Email) _____

☐

APPEAL

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☐ Completed Application
- ☐ Filing Fee: \$150 per request
- ☐ Written narrative indicating where it is alleged there is error in any order, requirement, decision, or determination made by the Administrative Officer in the enforcement of this Code of Ordinances of Indianola, Iowa.
- ☐ Other Information as required by Director

☐

SPECIAL USE PERMIT

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☐ Property Address: _____
- ☐ Completed Application
- ☐ Filing Fee: \$150 per request
- ☐ Site Plan and Elevations as outlined in 165.06
- ☐ Written narrative indicating the special use permit sought and response to the criteria outlined in Section 165.02(3)(B)(3)(c)(v) of the Code of Ordinances of Indianola, Iowa
- ☐ Other Information as required by Director

☒

VARIANCE

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☒ Property Address: _____
- ☒ Completed Application
- ☒ Filing Fee: \$150 per request
- ☒ Site Plan and Elevations
- ☒ Written narrative indicating justification for proposed variance and response to the criteria outlined in Section 165.02(3)(B)(3)(b) of the Code of Ordinances of Indianola, Iowa
- ☒ Other Information as required by Director

I certify that the information and exhibits submitted are true and correct to the best of my knowledge and that in filing this application I am acting with the knowledge, consent and authority of the owner(s) of the property. Pursuant to said authority, I hereby permit City officials to enter upon the property for the purpose of inspection related to this application.

Signature 
Name (printed) Rod McKelvey

Date 3-23-2023

FOR OFFICE USE ONLY:

Code to 45180

Date Received: _____
Receipt No: _____
Receipt Amount: _____
BOA Agenda Date: _____

Zoning

R-2 Single-Family Residential Attached Zoning District

Building Setbacks (Proposed from lot lines)

Enter N/A if not applicable.

Front

N/A

Rear

N/A

Right Side (viewing from the front)

N/A

Left Side (viewing from the front)

N/A

Use the map below to draw project information (if applicable).

Frequently used sketch tools. Holding the mouse over the tools on the left will describe them:

The "draw a point" tool will place an X on the map;

Will let you "add text" to the map;

Arrow to select items to move or rearrange;

The ruler is a measure tool that will draw a line and show the distance.

Map

 Sketch Layer

 Reference Layer

  Mapproxy

+

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Powered by Esri

Residential Project Information Completed On 2/21/2023 8:38 AM EST by T. Little

Project Description

40' x 50' x 16' garage/ steel building with wood post, 20' x 40' office space with shower and toilet area insulated.



Project Type

New Construction

Accessory Structure

**Demolition of structure requires confirmation that ALL utilities have been disconnected (Gas, Electrical, Sewer and Water).
If there are no plans to rebuild within one year of demolition, the water service must be removed in its entirety and capped at the corporation.

Building Type

Single Family/Detached

If Townhome/Multifamily - # of Dwelling Units

Multifamily project square footage

Single Family, Duplex/Bi-Attached and Townhome project square footage

First Floor

Second Floor

Square Footage of individual spaces

Basement Finished

0

Basement Unfinished

Garage

2000

Deck

Enclosed Deck or Porch

Covered Deck or Porch

Other Square feet

If other area, please describe

Total Individual Areas Square feet

2000

Total Living Area

0

Project Valuation Completed On 2/21/2023 6:25 PM EST by rodmckelvey@icloud.com

Electrical

\$ 8500

Plumbing

\$ 3000

HVAC

\$ 0

Other

\$ 0

Total Valuation

\$11,500.00

Attachments Completed On 2/21/2023 6:26 PM EST by rodmckelvey@icloud.com

Mark which attachments you are including below

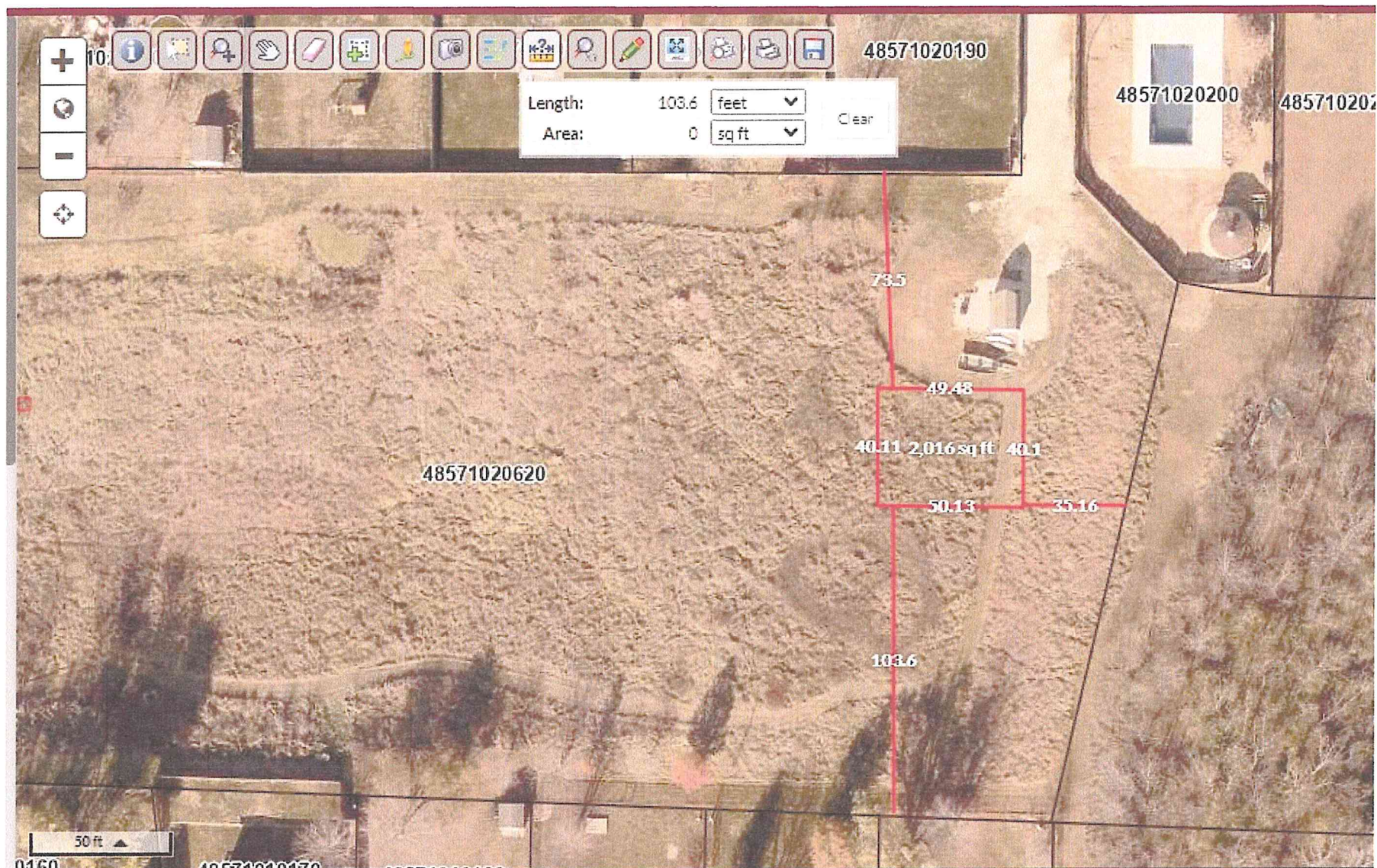
03/23/2023

Since we purchased the property, I have been planting pollinators and prairie grasses along with trees such as White Oak, Sycamore, Red Oak, Willow, Plum, and Apricot. I have also added several Blue Bird and Wren houses. I remove volunteer nuisance trees such as Buck Thorn, Locust, Mulberry and Multiflora Rose bi-yearly. I mow around the entire prairie as a firebreak and three paths across from north to south so the neighbors can cross without having to walk along Hwy 65/69. To keep up this 2.55 acres, it requires a decent sized law mower that I otherwise would not own, a compact tractor with implements, such as brush mower and rototiller, a side by side and chainsaws. Currently, I keep all the equipment in our garage, especially during the winter months. Therefore, our vehicles must sit outside. We wish to build this garage/pole building to store this equipment. I have done a comp search and found several like sized and larger buildings on smaller lots within the City of Indianola. I took a drive around town to view such buildings along with multiple gravel driveways. Many of the properties have three to four accessory structures(garages/sheds), yet our permit was not only rejected, but I received a certified letter with a notice of violation in the mail. This rejection was due to the need for a primary residence prior to a secondary structure. I would argue that due to the unusual location of the lot in question, there should be no primary structure requirement. The lot was at one time offered to the City of Indianola for use as a park or green space, for obvious reasons.

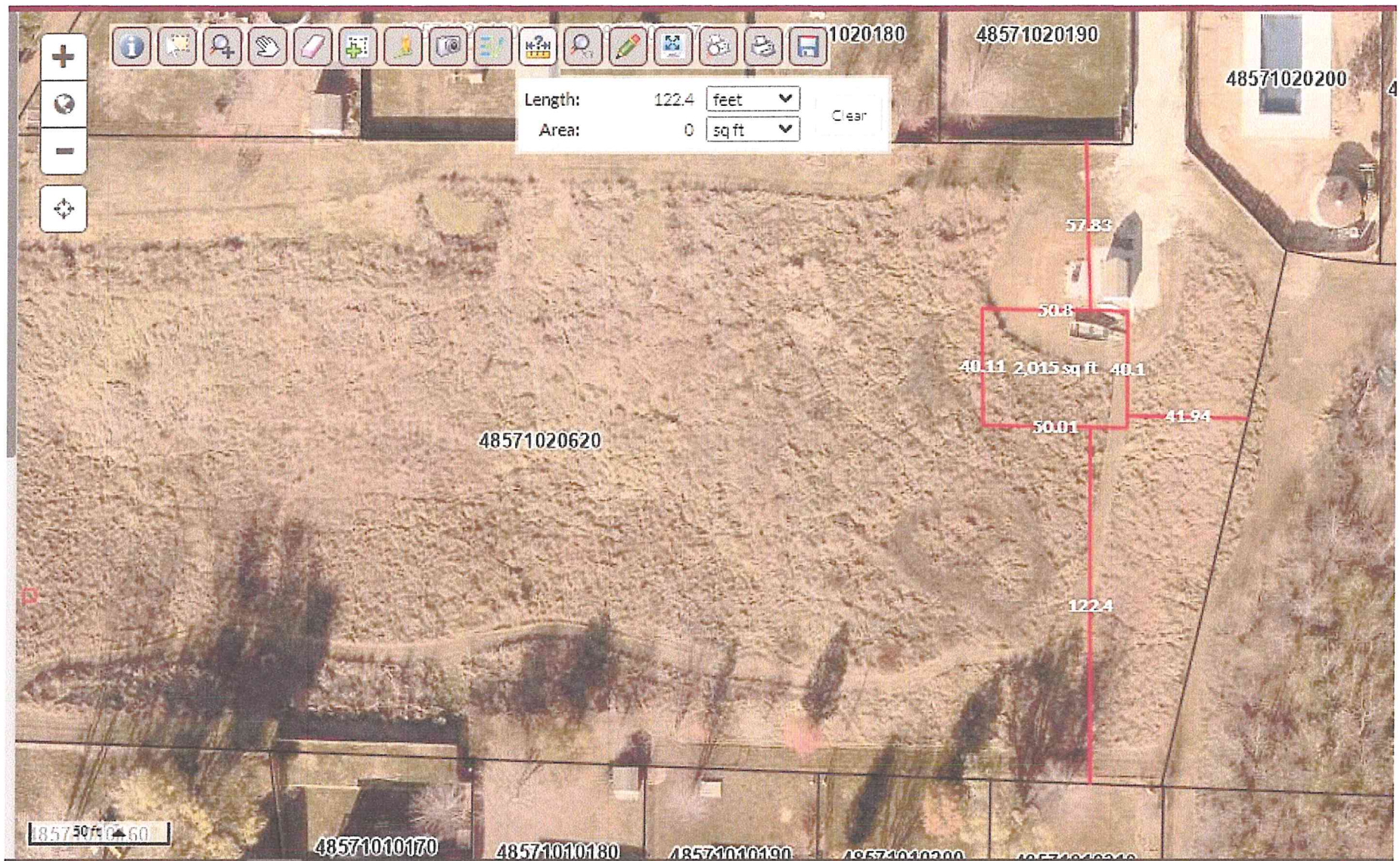
Please allow us to build this structure as it is necessary to maintain this property.

Sincerely,

Rod and Angie McKelvey









Find address or place



Choose Map Layers

Reference Map Layers

Layers

- ☒ World - Transportation and Boundaries ...
- ☒ World - Hydrography ...
- ☐ USA - Watershed Boundary Dataset ...

Iowa Soils and Geology

- ☐ USA - NRCS SSURGO Soils ...
- ☐ Iowa - Major Land Resource Areas ...
- ☐ Iowa - Landform Regions and Features ...
- ☐ Iowa - Bedrock Geology ...

Iowa LiDAR Elevation

Layers

- ☒ Iowa - 2020 LiDAR Contours ...
- ☐ Iowa - 2020 LiDAR Water Breaklines ...
- ☐ Iowa - 2020 LiDAR Color Hillshade ...

Iowa Orthophotos

Layers

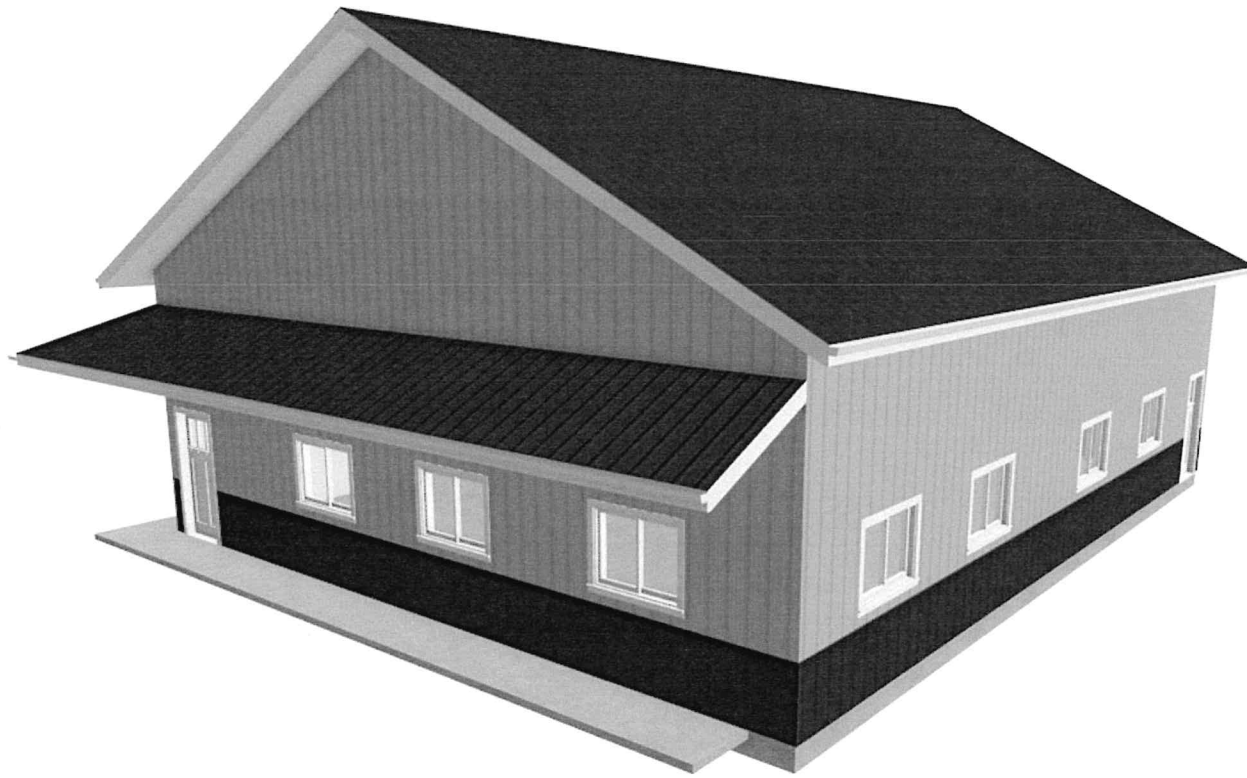
- ☐ Iowa - Photo Dates ...
- ☒ Iowa - 2021 NAIP Orthophotos ...
- ☐ Iowa - 2021 NAIP CIR Orthophotos ...

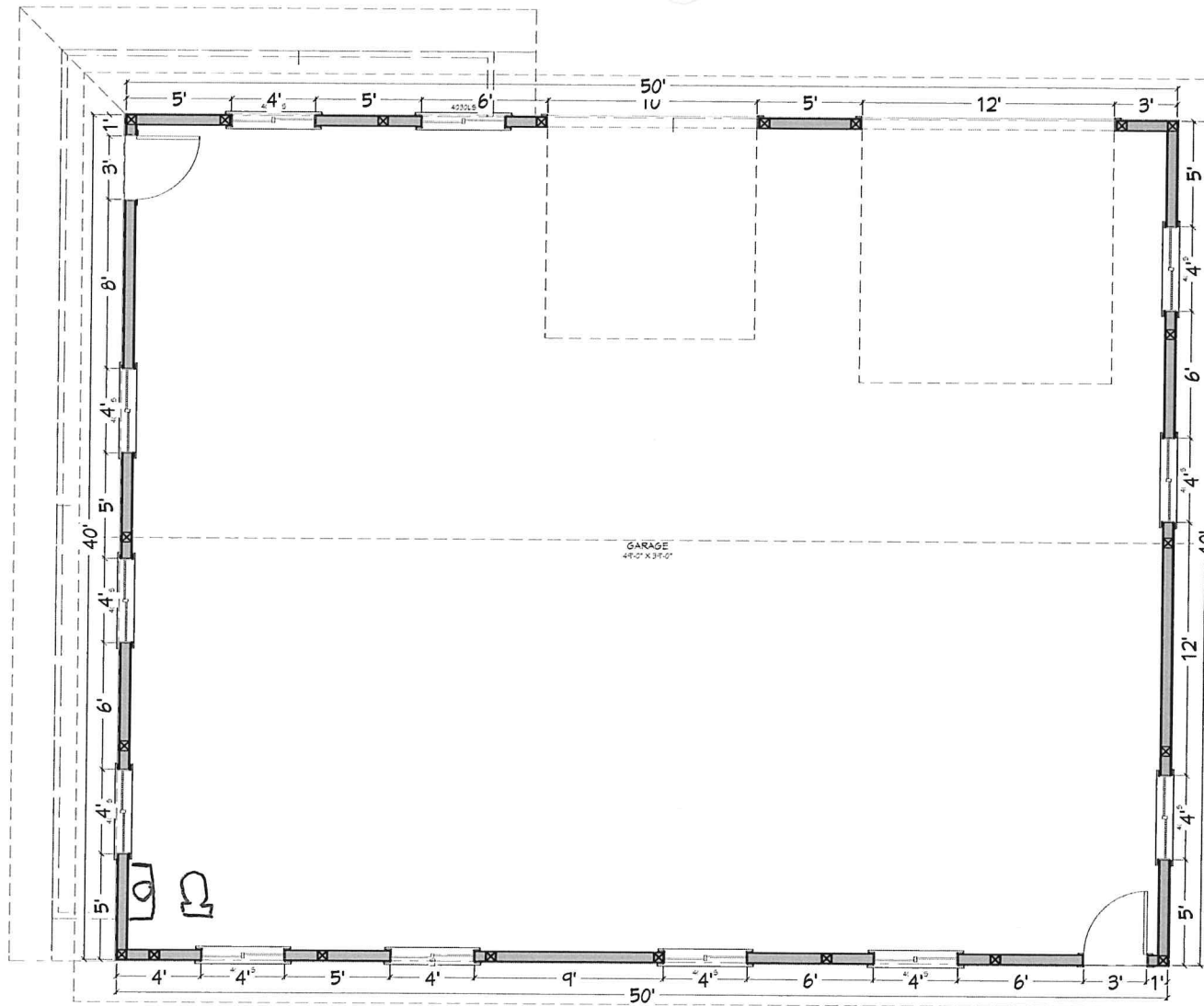
41.345 -93.557 Degrees

Open Community Maps Contributors, Iowa DNR, ©



Net 6" elevation plus concrete

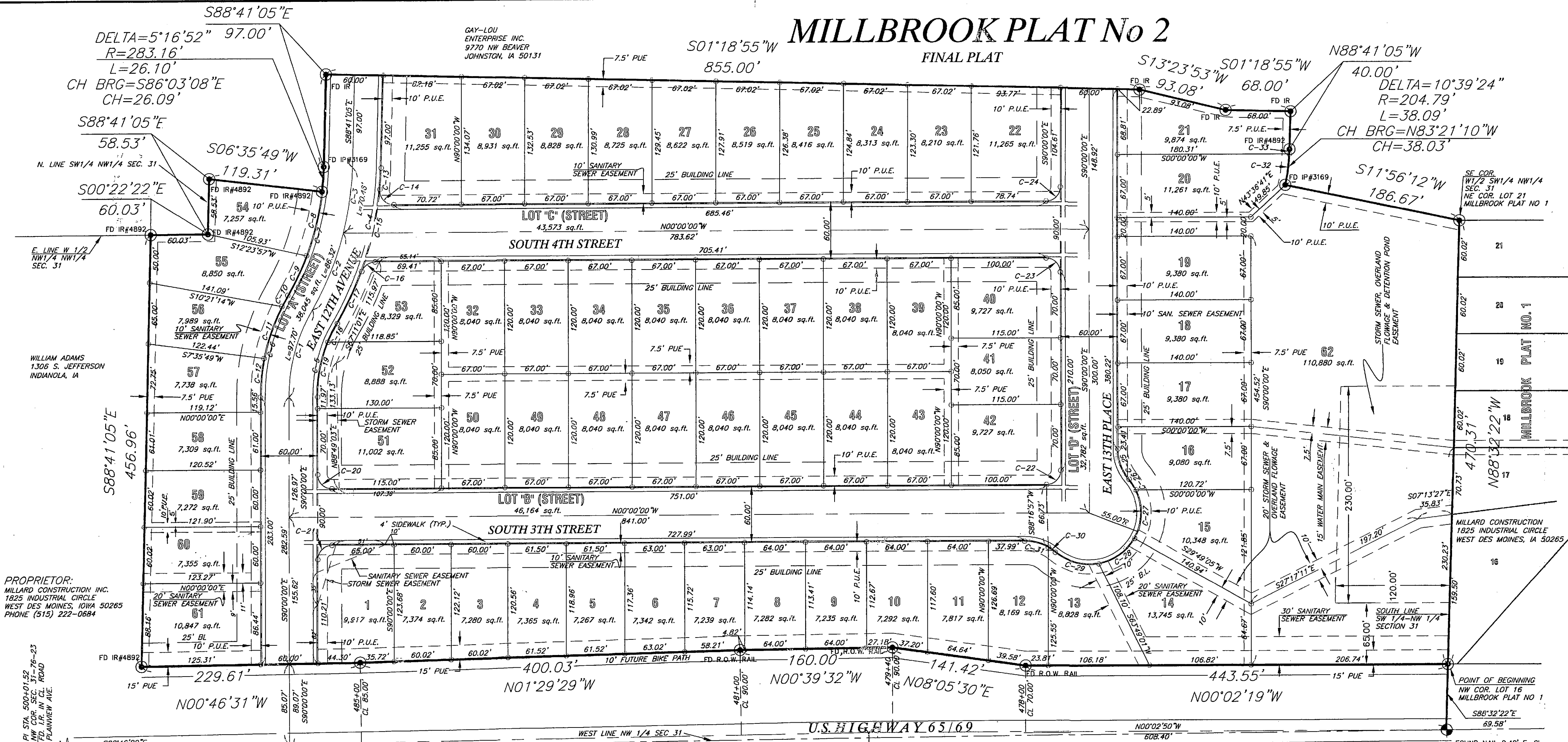






MILLBROOK PLAT No 2

FINAL PLAT



PROPERTY DESCRIPTION
A portion of the S.W. 1/4 of the N.W. 1/4 and the N.W. 1/4 of Section 31, Township 76 North, Range 23 West of the 5th P.M., Indianola, Warren County, Iowa is described as follows:
Commencing at the S.W. corner of the N.W. 1/4 of said Section 31; thence S 88°-41'-05" E, 97.00 feet; thence S 01°-18'-55" W, 855.00 feet; thence S 13°-23'-53" W, 93.08 feet; thence S 01°-18'-55" W, 68.00 feet; thence N 88°-41'-05" W, 40.00 feet; thence Northwestly along a 204.79 foot radius curve concave Northeastly, whose chord has a bearing of N 83°-21'-10" W and a chord length of 38.09 feet, for a distance of 38.09 feet; thence S 11°-56'-12" W, 186.67 feet to the N.E. corner of Lot 21 in said Millbrook Plat No. 1; thence N 00°-02'-19" W, 443.55 feet along the North line of the S.W. 1/4 of said Section 31, and along the North line of Lots 21, 20, 19, 18, 17, and 16 in said Millbrook Plat No. 1, 470.31 feet to the Point of Beginning.
Said tract of land being subject to and together with any and all easements of record.
Said tract of land contains 18.150 acres more or less.

NOTE:
All corners have been marked with iron pipe or are found as noted. Plastic identification caps have been placed on all set iron pipe.
This plat has an error of closure of less than 1.00 feet in 10,000.00 feet. Each lot within this plat has an error of closure of less than 1.00 feet in 5,000.00 feet.
This Plat contains all of Parcel "A" that lies in the SW 1/4 of the NW 1/4 and the NW 1/4 of the NW 1/4 of Section 31/76N23 and contains 18.150 acres total. 17.920 acres lies within the SW 1/4 of the NW 1/4 and 0.630 acres lies within the NW 1/4 of the NW 1/4.

LEGEND
SECTION CORNER - FOUND AS NOTED
PLAT CORNER - FOUND AS NOTED
PROPERTY CORNER - SET IRON PIPE WITH I.D. CAP No. 12971

CURVE #	DELTA	TANGENT	RADIUS	LENGTH	CHORD	CHORD BEARING
C-1	30°00'00"	50.00'	186.60'	97.70'	96.59'	N75°00'00"W
C-2	15°47'35"	43.44'	313.16'	86.32'	86.05'	N67°53'47"W
C-3	12°53'30"	35.39'	313.16'	70.46'	70.31'	N82°14'20"W
C-4	28°41'05"	87.74'	343.16'	171.80'	170.01'	N74°20'33"W
C-5	30°00'00"	41.96'	156.60'	82.00'	81.06'	N75°00'00"W
C-6	30°00'00"	58.04'	216.60'	113.41'	112.12'	N75°00'00"W
C-7	28°41'05"	72.40'	283.16'	141.76'	140.29'	N74°20'33"W
C-8	14°06'13"	35.03'	283.16'	69.70'	69.53'	N76°21'07"W
C-9	09°18'00"	23.03'	283.16'	45.96'	45.91'	N64°39'00"W
C-10	03°27'17"	6.53'	216.60'	13.06'	13.06'	N61°43'39"W
C-11	15°38'13"	29.74'	216.60'	59.11'	58.93'	N71°16'23"W
C-12	10°54'30"	20.68'	216.60'	41.24'	41.18'	N84°32'45"W
C-13	03°47'16"	11.35'	343.16'	22.68'	22.68'	N86°47'27"W
C-14	95°06'11"	16.40'	15.00'	24.90'	22.14'	S47°33'05"W

CURVE #	DELTA	TANGENT	RADIUS	LENGTH	CHORD	CHORD BEARING
C-15	14°47'17"	44.53'	343.16'	88.57'	88.32'	N77°30'11"W
C-16	70°06'32"	10.52'	15.00'	18.35'	17.23'	N35°03'16"W
C-17	10°06'32"	30.35'	343.16'	60.54'	60.47'	N85°03'16"W
C-18	08°15'08"	11.30'	156.60'	22.35'	22.54'	N64°07'34"W
C-19	21°44'52"	30.08'	156.60'	59.44'	58.08'	N79°07'34"W
C-20	90°00'00"	15.00'	15.00'	23.56'	21.21'	S45°00'00"W
C-21	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-22	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-23	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-24	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-25	40°22'03"	18.38'	50.00'	35.23'	34.50'	S69°48'58"W
C-26	14°00'26"	6.76'	55.00'	13.45'	13.41'	N56°38'10"E
C-27	56°10'42"	29.35'	55.00'	53.93'	51.79'	N88°16'16"W
C-28	49°40'23"	25.46'	55.00'	47.68'	46.20'	N35°20'44"W
C-29	50°52'36"	26.16'	55.00'	48.84'	47.25'	S14°55'45"W
C-30	10°21'28"	4.53'	50.00'	9.04'	9.03'	S15°11'19"E
C-31	30°00'35"	13.40'	50.00'	26.19'	25.89'	N15°00'17"E
C-32	09°12'37"	16.50'	204.79'	32.92'	32.88'	N82°37'46"W
C-33	01°26'42"	2.59'	204.79'	5.17'	5.17'	N87°57'28"W

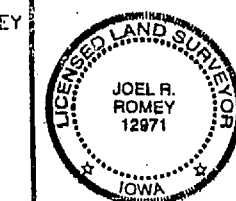
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C-22	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-23	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-24	90°00'00"	15.00'	15.00'	23.56'	21.21'	N45°00'00"W
C-25	40°22'03"	18.38'	50.00'	35.23'	34.50'	S69°48'58"W
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C-29	50°52'36"	26.16'	55.00'	48.84'	47.25'	S14°55'45"W
C-30	10°21'28"	4.53'	50.00'	9.04'	9.03'	S15°11'19"E
C-31	30°00'35"	13.40'	50.00'	26.19'	25.89'	N15°00'17"E
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C-33	01°26'42"	2.59'	204.79'	5.17'	5.17'	N87°57'28"W

Bishop Engineering Company
3501 104th Street
Des Moines, Iowa

APPROVED BY WARREN COUNTY AUDITOR
DATE THIS 19th DAY OF December 20 01
Jaci VanderLinde AUDITOR
DEPUTY
Approved by Planning Commission
Approved by City Council
Mayor

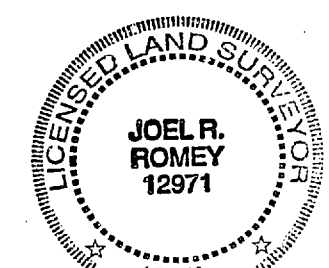
UTILITY SYMBOLS
WATER MAINS
SANITARY SEWERS
STORM SEWERS
TELEPHONE CABLES
ELECTRIC CABLES
FENCE LINES

I HEREBY CERTIFY THAT THIS LAND SURVEY 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 LAND SURVEYOR UNDER THE LAWS OF THE STATE OF IOWA.
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2001.
BY: *Joel R. Roney*
DATE: AUGUST 24, 2000
SCALE: 1" = 50'
FOR: GARY MILLARD
PH. (515) 276-0467



MILLBROOK PLAT No 2
INDIANOLA, IOWA
900478-53-DBB
97-12-P

WARREN COUNTY, IOWA
FILED FOR RECORD
01 DEC 19 PM 12:23
BOOK 2001 PAGE 13528
JUDITH K. LATHROP-REORDER
DEPUTY





MEMORANDUM

To: Board of Adjustment

From:

Date: May 3, 2023

Subject: Consider a request from Sandhills Energy LLC, on behalf of Indianola Municipal Utilities, for a Special Use Permit for ground mounted solar energy systems located at 1602 South K Street

Recommendation:

- Attachments:**
- 1. Staff Report
 - 2. Application
 - 3. Site Plan
 - 4. Narrative and Intent
 - 5. Responses to Findings
 - 6. Glare Study conducted by ForgeSolar



COMMUNITY DEVELOPMENT

110 N. First Street, Indianola IA 50125-0299 • www.indianolaiowa.gov
(515) 961-9430 • comdev@indianolaiowa.gov

STAFF REPORT

BOARD OF ADJUSTMENT

Date of Meeting: May 3, 2023

Agenda Item: 5.B Consider request from Sandhills Energy LLC, on behalf of the Indianola Municipal Utilities, for a Special Use Permit for ground mounted solar energy systems located at 1602 S K St

Application Type: Special Use Permit

Applicant: Sandhills Energy LLC

Property Owner: City of Indianola

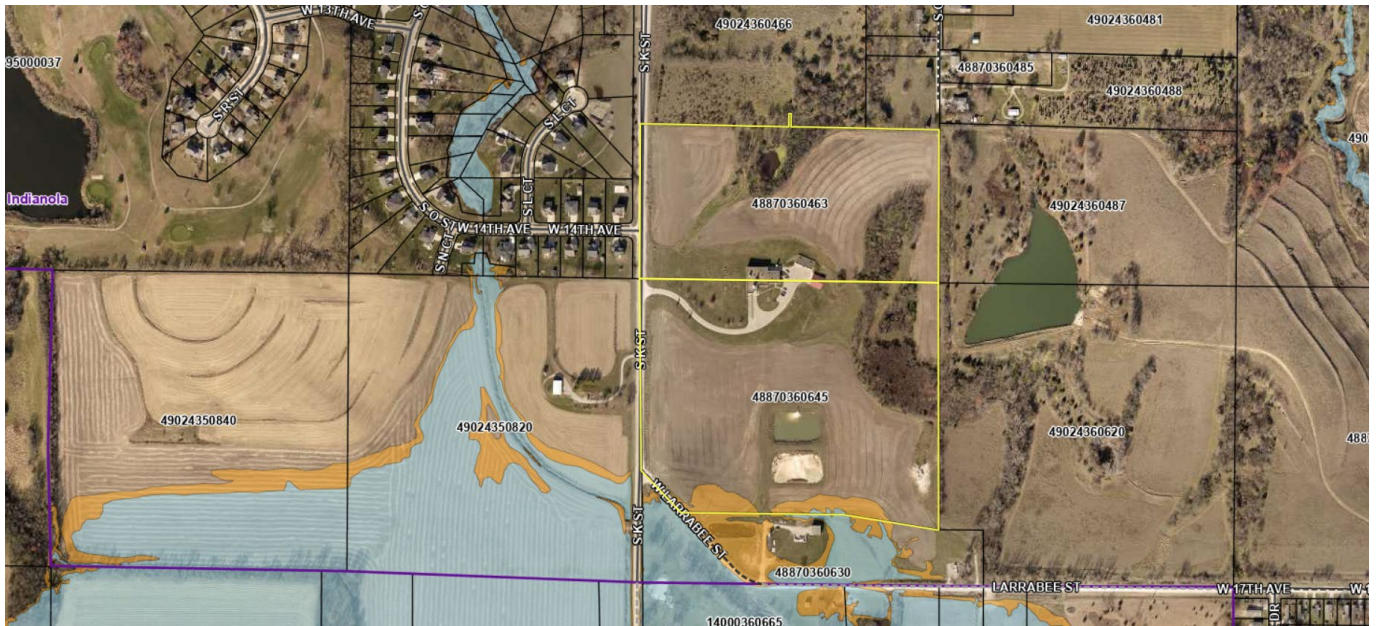
Property Address/Parcel: 1602 S K St (Parcel ID: #488/7036-0563 & #488-7036-0645)

Zoning: A-1, Agricultural/Open Space Zoning District

Application Summary

Sandhills Energy LLC, on the behalf of Indianola Municipal Utilities, is applying for a Special use Permit for ground-mounted solar energy systems located at 1602 S K St.

AERIAL MAP



APPLICABLE CODE SECTIONS

The following code sections of the Code of Ordinances of Indianola, Iowa apply to this request:

165.02 POWERS AND DUTIES OF THE BOARD OF ADJUSTMENT. The Board of Adjustment has the following powers and duties:

C. Special Use Permits - To review and consider approval of a Special Use Permit for a Special Use as identified Permitted and Special Uses Table contained in CHAPTER 165.05 of the Zoning Regulations. The following shall be required:

- i. Special Use Permit Application - A site plan (including number of copies), application form, and any additional information and details as specified and required by the Zoning Administrator as necessary to determine compliance with all applicable codes and requirements shall be submitted to the Zoning Administrator along with the Special Use Permit Application fee as established by resolution of the City Council.
- ii. Special Use Permit Procedure - The Special Use Permit Application shall be reviewed by the Zoning Administrator, or their designee, for completeness. Incomplete applications shall be returned to the applicant with a list of the missing items or details. Applications deemed completed shall be distributed to other city departments and other agencies as necessary for review and comment as to its compliance with all zoning regulations and other pertinent city codes, regulations, and policies.
- iii. Special Use Permit Review by Board of Adjustment - Subsequent to review by the Zoning Administrator and other city departments and agencies, the Zoning Administrator, or their designee, shall submit to all members of the Board a copy of the Special Use Permit Application along with a written recommendation as to the application's conformity with the rules and regulations of the city.

- iv. The Board shall subsequently hold a duly noticed public hearing as prescribed by their rules of procedures, and the noticing requirements contained herein, and review the Application for conformity with the zoning regulations and standards. The Board may approve, approve with conditions, or deny the Special Use Permit Application.

Section 165.05(5)(B) Solar Energy Systems

- (1) Intent. The intent of this section is to establish provisions for using an alternate source of energy apart from the prevailing energy sources of natural gas and electricity, namely solar energy, and to provide standards for the construction and use of solar energy systems. The City finds these regulations are necessary to ensure that Solar Energy Systems are appropriately designed, sited and installed.
- (2) Definitions. The following terms are defined for this section:
 - a. "Building-integrated Solar Energy Systems" means a solar energy system that is an integral part of a principal or accessory building, rather than a separate mechanical device, replacing or substituting for an architectural or structural component of the building. Building-integrated systems include but are not limited to photovoltaic or hot water solar energy systems that are contained within roofing materials, windows, skylights, and awnings.
 - b. "Ground-mounted" means a solar energy system mounted on a rack or pole that rests or is attached to the ground. Ground-mounted systems are accessory to the principal use.
 - c. "Roof-mount" means a solar energy system mounted on a rack that is fastened to or ballasted on a structure roof. Roof-mount systems are accessory to the principal use.
 - d. "Solar Access" means unobstructed access to direct sunlight on a lot or building through the entire year, including access across adjacent parcel air rights, for the purpose of capturing direct sunlight to operate a solar energy system.
 - e. "Solar Carport" means a solar energy system of any size that is installed on a carport structure that is accessory to a parking area, and which may include electric vehicle supply equipment or energy storage facilities.
 - f. "Solar Mounting Devices" means racking, frames, or other devices that allow the mounting of a solar collector onto a roof surface or the ground.
- (3) Restrictions. Except as provided in this article, no solar energy system or solar collection device shall be erected, constructed, altered or maintained on any lot within the city, without first receiving a permit to do so and complying with the regulations herein this chapter.
- (4) General Regulations.
 - a. **Building-integrated solar energy systems and roof-mounted and building-mounted solar energy systems** are a permitted accessory use in all zoning districts where structures of any sort are allowed, subject to certain requirements as set forth below. Solar carports and associated electric vehicle charging equipment are a permitted accessory use on surface parking lots in all districts regardless of the existence of another building.
 - b. **Ground-mounted solar energy systems** shall require approval of a Special Use Permit from the Board of Adjustment.

(5) **Standards.** All solar energy systems or solar collection devices shall meet the following standards and conditions:

- a. **Height** – Solar energy systems must meet the following height requirements:
 - i. Building-mounted or roof-mounted solar energy systems shall not exceed the maximum allowed height in any zoning district. For purposes for height measurement, solar energy systems other than building-integrated systems shall be given an equivalent exception to height standards as building-mounted mechanical devices or equipment.
 - ii. Ground-mounted or pole-mounted solar energy systems shall not exceed 15 feet in height when oriented at maximum tilt.
 - iii. Solar carports in non-residential districts shall not exceed 20 feet in height.
- b. **Setback** - Solar energy systems must meet the accessory structure setback for the zoning district and principal land use associated with the lot on which the system is located, except as allowed below.
 - i. Roof-mounted or Building-mounted Solar Energy Systems - The collector surface and mounting devices for roof-mounted solar energy systems shall not extend beyond the exterior perimeter of the building on which the system is mounted or built, unless the collector and mounting system has been explicitly engineered to safely extend beyond the edge, and setback standards are not violated. Exterior piping for solar hot water systems shall be allowed to extend beyond the perimeter of the building on a side-yard exposure. Solar collectors mounted on the sides of buildings and serving as awnings are considered to be building-integrated systems and are regulated as awnings.
 - ii. Ground-mounted Solar Energy Systems - Ground-mounted solar energy systems may not extend into the side-yard or rear setback when oriented at minimum design tilt, except as otherwise allowed for building mechanical systems.
- c. **Visibility** – Solar energy systems shall be designed to minimize visual impacts from the public street right-of-way.
 - i. Building Integrated Photovoltaic Systems - Building integrated photovoltaic solar energy systems shall be allowed regardless of whether the system is visible from the public right-of-way, provided the building component in which the system is integrated meets all required setback, land use or performance standards for the district in which the building is located.
 - ii. Aesthetic restrictions - Roof-mounted or ground-mounted solar energy systems shall not be restricted for aesthetic reasons if the system is not visible from the closest edge of any public right-of-way other than an alley, or if the system meets the following standards.
 - (a) Roof-mounted systems on pitched roofs that are visible from the nearest edge of the front right-of-way shall have the same finished pitch as the roof and be no more than ten inches above the roof.
 - (b) Roof-mount systems on flat roofs that are visible from the nearest edge of the front right-of-way shall not be more than five feet above the finished roof and are exempt from any rooftop equipment or mechanical system screening.
 - iii. Reflectors - All solar energy systems using a reflector to enhance solar production shall minimize glare from the reflector affecting adjacent or nearby properties.

- d. **Lot Coverage** – Ground-mounted systems total collector area shall not exceed half the building footprint of the principal structure.
 - i. Ground-mounted systems shall be exempt from lot coverage or impervious surface standards if the soil under the collector is maintained in vegetation and not compacted.
 - ii. Ground-mounted systems shall not count toward accessory structure limitations.
- e. All solar energy system components shall be located as to be accessible for required routine maintenance without trespassing on adjoining property or disassembling any major portion of the structure or building.
- f. All solar energy system components must be obtained from manufacturers who regularly engage in production of solar energy apparatus. The design and drawings of any system or apparatus shall be completed and sealed by a licensed design professional.

ANALYSIS

Subject Property

Sandhills Energy, on behalf of Indianola Municipal Utilities (IMU), is requesting approval of a special use permit (SUP), that would allow a solar energy system to be located at 1602 S K Street. The property is currently owned by the City of Indianola and contains the Indianola Water Plant.

To the north of the property exists two properties zoned for the A-1 Agricultural zoning district. The first property is a vacant 15-acre lot and the second is approximately 2.5-acres and contains a detached accessory structure. To the east are two vacant parcels, the first 21-acres and the second is 37.87-acres in size. To the south is additional land owned by the City of Indianola which contains the Indianola Dog Park. To the west are several properties used for residential purposes including: 1.) a 39.00-acre parcel containing a single-family dwelling, 2.) two single-family residential dwellings located in the Deer Creek Plat 1 Subdivision; and 3.) two single-family residential dwellings located in the Deer Creek Plat 2 Subdivision.

Future Land Use

According to the “Elevate Indianola” Comprehensive Plan, the future land use of this area is designated as Public/Semi-Public. This land use designation guides for governmental offices, museums and performing arts, libraries and community centers, schools and institutions, as well as parks, open space, and trails.

Ground solar array systems are allowed through Special Use Permit (SUP) in the A-1 Agricultural/Open Space Zoning District as an electrical power distribution station. The proposed utility-scale system would allow for 10,464 module solar panels at the property.

FINDINGS OF FACT

165.02(3)(B)(3)(c)(v), in order to approve a Special Use Permit, the Board shall make the following findings:

1. **The proposed use, site improvements, and site plan comply with the minimum requirements of the zoning district in which it is proposed to be located**

The applicant has provided a site plan with their application which shows the existing site features at the property. The proposed use and improvements meet the minimum requirements of the A-1 zoning district, including bulk regulations and minimum setback distances.

This criterion is met.

2. The property is of adequate size to accommodate the proposed use and site improvements including setbacks, open space, stormwater management, and off-street parking

The property at 1602 S K Street is approximately 49.20-acres in size. The site is of adequate size to accommodate the proposed use and site improvements, including setbacks, open space, stormwater management, and off-street parking necessary for its use.

This criterion is met.

3. The proposed use and site improvements will not unduly impact the health, safety, and general welfare of persons residing or working in adjoining property or surrounding areas

Based on the proposed use, staff does not anticipate that the health, safety, and welfare of citizens would be impacted. The site plan shows that solar arrays will be setback at least 106' from the property line along South K Street and 41' away from the front property line along West Larabee Street.

Additionally, no additional impervious surface area is shown as the applicant is showing that disrupted ground from the proposed project would be re-seeded with pollinator friendly native seed mix. Staff have communicated with the City Engineer with no anticipated concerns for flooding and additional needs for stormwater management and control.

The applicant has also submitted a Glare Analysis for the site, conducted by ForgeSolar. The analysis shows anticipated "green" glare, which is glare with low potential to cause an afterimage (flash blindness) when observed prior to a typical blink response time and "yellow" glare which has the potential to cause an afterimage (flash blindness) when observed prior to a typical blink response time. The study also notes several obstructions that have the ability to reduce glare conflicts. This includes heavy tree cover located to the east and north of the property. Staff do not have concerns regarding glare produced from the project.

This criterion is met.

4. The proposed use and site improvements shall not unduly increase traffic congestion

Traffic congestion is not anticipated to increase with the proposed use after construction of the solar arrays are completed. Traffic may increase during the construction of the project but will not continue after completed.

This criterion is met.

5. The proposed use and site improvements will not unduly burden public utilities or increase risk to flooding

The proposed ground mounted solar array would unduly not burden public utilities or increase risk to flooding. Staff have communicated with the City Engineer with no anticipated concerns for flooding and additional needs for stormwater management and control.

6. The proposed use and site improvements are compatible with the surrounding neighborhood and shall not diminish or impair established property values in adjoining or surrounding property

The proposed ground mounted solar system is considered a large-scale, solar energy system and is classified as an electrical power distribution station. The proposed system would be setback from the existing residential neighborhoods to the west by over 100-feet.

The City of Indianola Board of Adjustment has the ability to impose additional conditions in order to maintain the nature and character of a neighborhood.

This criterion is met.

7. The issuance of the Special Use Permit will not endanger, jeopardize, or harm the health, safety or welfare of the properties and the community

As previously mentioned, the proposed use and site improvements is not anticipated to endanger or harm the health, safety and welfare of properties or the community, however it is recommended that a decommissioning plan be submitted and filed with the city for the site.

A thorough decommissioning plan is necessary for the site as solar array farms are not adaptable for other uses (i.e., industrial and/or commercial use). Proper decommissioning and removal of equipment will be necessary should the facility no longer be operational. The applicant has indicated that they will restore the land to its original condition. A condition is recommended in order for this criterion to be met (See recommended condition 1 and 2).

The applicant has also submitted a Glare Analysis for the site, conducted by ForgeSolar. The analysis shows anticipated “green” glare, which is glare with low potential to cause an afterimage (flash blindness) when observed prior to a typical blink response time and “yellow” glare which has the potential to cause an afterimage (flash blindness) when observed prior to a typical blink response time. The study also notes several obstructions that have the ability to reduce glare conflicts. This includes heavy tree cover located to the east and north of the property. Staff do not have concerns regarding glare produced from the project.

This criterion is conditionally met.

ALTERNATIVES

The City of Indianola Board of Adjustment may consider the following alternatives:

- 1) The City of Indianola Board of Adjustment approves the special use request, as submitted.
- 2) The City of Indianola Board of Adjustment approved the special use request, with conditions.**
- 3) The City of Indianola Board of Adjustment denies the special use request.

- 4) The City of Indianola Board of Adjustment remands the special use request back to the applicant and/or staff for further review and/or modifications and directs staff to place this item on a future Board of Adjustment agenda.

RECOMMENDATION

Staff recommends that the Indianola Board of Adjustment move alternative 2, to approve the Special Use Permit request with the following conditions:

1. A detailed decommissioning plan must be filed and approved with the City of Indianola, prior to construction.
2. Should the site be decommissioned, the site must be restored to the same or similar conditions, at the direction of the City of Indianola and the filed and approved decommissioning plan. Costs associated with this restoration will be at the expense of Indianola Municipal Utilities.

BOARD OF ADJUSTMENT APPLICATION

Community Development

110 North 1st Street, Indianola, Iowa 50125-0299
(515) 961-9430 • comdev@indianolaiowa.gov



PROPERTY OWNER

(Last Name) _____
(First Name) _____
(Address) _____
(City) _____ (State) _____ (Zip) _____
(Phone) _____ (Email) _____

APPLICANT (if not Property Owner)

(Last Name) _____
(First Name) _____
(Address) _____
(City) _____ (State) _____ (Zip) _____
(Phone) _____ (Email) _____

☐ APPEAL

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☐ Completed Application
- ☐ Filing Fee: \$150 per request
- ☐ Written narrative indicating where it is alleged there is error in any order, requirement, decision, or determination made by the Administrative Officer in the enforcement of this Code of Ordinances of Indianola, Iowa .
- ☐ Other Information as required by Director

☐ SPECIAL USE PERMIT

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☐ Property Address: _____
- ☐ Completed Application
- ☐ Filing Fee: \$150 per request
- ☐ Site Plan and Elevations as outlined in 165.06
- ☐ Written narrative indicating the special use permit sought and response to the criteria outlined in Section 165.02(3)(B)(3)(c)(v) of the Code of Ordinances of Indianola, Iowa
- ☐ Other Information as required by Director

☐ VARIANCE

Submittal Requirements:

*All submittal requirements must be completed.
Incomplete applications will not be considered*

- ☐ Property Address: _____
- ☐ Completed Application
- ☐ Filing Fee: \$150 per request
- ☐ Site Plan and Elevations
- ☐ Written narrative indicating justification for proposed variance and response to the criteria outlined in Section 165.02(3)(B)(3)(b) of the Code of Ordinances of Indianola, Iowa
- ☐ Other Information as required by Director

I certify that the information and exhibits submitted are true and correct to the best of my knowledge and that in filing this application I am acting with the knowledge, consent and authority of the owner(s) of the property. Pursuant to said authority, I hereby permit City officials to enter upon the property for the purpose of inspection related to this application.

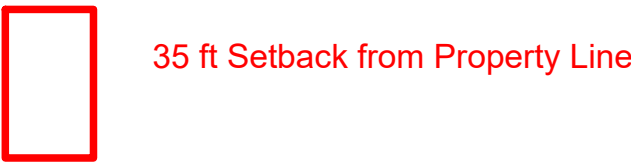
Signature Marco Giannakouros

Name (printed) _____ Date _____

FOR OFFICE USE ONLY:

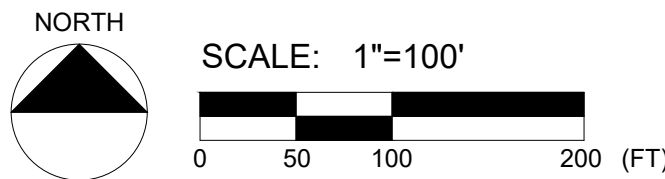
Code to 45180

Date Received: _____
Receipt No: _____
Receipt Amount: _____
BOA Agenda Date: _____



1. THESE DRAWINGS SHOW THE REQUIRED LOCATION OF VALMONT TRACK COMPONENTS FOR THIS PROJECT. THE LAYOUT IS BASED ON EXISTING CONDITION INFORMATION PROVIDED TO VALMONT BY THE CUSTOMER AND HAS NOT BEEN VERIFIED BY VALMONT. VERIFY KEY DIMENSIONS AND EXISTING CONDITIONS IN THE FIELD PRIOR TO BEGINNING INSTALLATION.
2. OBTAIN VALMONT APPROVAL BEFORE MODIFYING THE LAYOUT SHOWN, OR RELOCATING, OMITTING, OR MODIFYING ANY VALMONT COMPONENT.
3. THE VALMONT TRACKER CAN FOLLOW A MAXIMUM ALLOWABLE GRADE OF 7% IN S-DIRECTION. SLOPES GREATER THAN 7% MUST BE GRADED TO 7% MAXIMUM.

PROJECT SPECIFICATIONS	
SYSTEM SIZE MW DC	4.71
MODULE	FIST SOLAR 6 450W
MODULE QTY	10464
MODULES/STRING	24
ROW SPACING	19'-0"
GCR	35%
MODULES PER TRACKER	24, 48, 72
QTY 24 MODULE TABLES	71
QTY 48 MODULE TABLES	16
QTY 72 MODULE TABLES	111



Issue	Date	Drawn By	Checked By
PR-1 PROPOSAL LAYOUT	10/13/22	SS	-
PR-2 UPDATE LAYOUT PER CLIENT CONSTRAINTS ON AVAILABLE AREAS FOR TRACKERS	10/14/22	SS	-
PR-3 ADD 19 72 MODULE TRACKERS, SYSTEM SIZE WAS 4.09MW DC, IS 4.71MW DC	10/21/22	SS	-
PR-4 MOVE 1 STRING TRACKER TO AVOID MANHOLE AND STREAM PIPE LINES	03/20/23	SS	-

Engineer's Stamp

**PRELIMINARY - NOT
FOR CONSTRUCTION**



VALMONT CORPORATION
28800 Ida Street
Valley, NE 68064
(T) 402-963-1000
www.valmont.com

Customer	SANDHILLS
Project	SANDHILLS INDIANOLA
Location	----

Sheet Title

PROPOSAL LAYOUT

PR-4

Sheet Number

REF



Marco Giannakouros
Sandhills Energy, LLC
1403 Harney St. #100
Omaha, NE 68102
Phone: (563) 451-7558
www.sandhillsenergy.com

Emily Rizvic
Associate Planner
City of Indianola
110th North 1st St.
Indianola, IA 50125

Dear Emily,

In response to the additional questions posed by the City of Indianola for the solar ground mount being developed at the Indianola Water Department, please see the attached updated site plan with setbacks clearly defined, and a glare study. We anticipate that 5-8 employees will be onsite during peak construction, and intend to use the existing parking lot at the Water Department facility. There will be no regular traffic to the site post-construction. We estimate that of the 2,143,152 sq feet located at the project site, 1,883,047 sq feet will be open space (approximately 87%). The height of the modules at maximum height/tilt will be 8.75ft.

We do not advise that a buffer park be implemented at this site. As indicated on the attached glare study, we foresee no issues with glare at this site. Because the bulk of solar maintenance must be conducted during daylight hours, issues caused by headlights will not be applicable to this site post-construction. The addition of a buffer park would be a financial burden on the project, which would require an increase in the power purchase rate to the utility.

Vegetation of the site will be coordinated with the Bee and Butterfly Habitat Fund to prepare a pollinator crop ground cover plan designed specifically for the location. The Bee and Butterfly Fund is a non-profit organization that works with private, public, and corporate landowners and managers to establish high quality pollinator habitat to improve the health of honeybees, monarch butterflies, and other pollinators in a 12-state region of the Midwest and Great Plains. Project area ground-cover will be seeded and maintained with native grasses and pollinators after construction. Cover will be managed to maintain effectiveness of pollinators, control weeds and woody plants, and to prevent tall vegetation from shading the PV panels. There are no long term accessways or additional impervious surface being proposed at this time.

Within six months of the ceasing operation, SE Municipal Iowa shall remove all solar facilities from the property, except for electric lines buried at least four feet deep. We will prioritize reuse and recycling over disposal of the materials removed. We will restore the land to its original condition for its original use, unless otherwise directed by the landowner. Subject to landowner preference, restoration will include a return to the same or functionally similar pre-construction drainage patterns including farm drainage tiles, decompaction of soil, and seeding with an appropriate, low-growing vegetative cover, such as clover, to stabilize soil, enhance soil structure, and increase soil fertility.

Thank you for providing these additional concerns from the City of Indianola team, and for your consideration of this response.

Sincerely,

Marco Giannakouros

1. **The proposed use, site improvements, and site plan comply with the minimum requirements of the zoning district in which it is proposed to be located;** The proposed site for this solar ground mount is zoned A-1. Per the city code, A-1 zoning allows for construction for the purpose of utility scale electrical power generation under a special use permit.
2. **The property is of adequate size to accommodate the proposed use and site improvements including setbacks, open space, stormwater management, and off-street parking;** Per the attached site plan, the solar array we have proposed is sized so that setbacks, building design and other zoning regulations required by the city in chapter 165 of the city code will be adhered to.
3. **The proposed use and site improvements will not unduly impact the health, safety, and general welfare of persons residing or working in adjoining property or surrounding area;** We do not anticipate any significant impacts to health and safety. Ground that is disrupted will be re-seeded with a pollinator friendly native seed mix common to the area. Prior to construction, an in-depth plan for decommissioning will be provided, to ensure proper mitigation and disposal of the array at end of life.
4. **The proposed use and site improvements shall not unduly increase traffic congestion;** There should not be a significant increase in traffic to the array once installation has been completed. Solar arrays are relatively low maintenance. During the construction phase, Sandhills will work closely with the City to ensure that operations at the Water Department are not disrupted.
5. **The proposed use and site improvements will not unduly burden public utilities or increase risk to flooding;** We are in close consultation with the City to ensure that the array is designed in a way that will not affect the daily functions, or future plans of the Water Department, and will not cause undue burden to the electrical grid. We do not anticipate the installation of this array will result in increased flooding.
6. **The proposed use and site improvements are compatible with the surrounding neighborhood and shall not diminish or impair established property values in adjoining or surrounding property; and,**
7. **The issuance of the Special Use Permit will not endanger, jeopardize or harm the health, safety or welfare of the properties and the community.**

The construction of this utility scale solar project is with the intent to provide energy to the surrounding community, which is in line with the current municipal services provided at the Water Department located at this parcel. We anticipate that the installation of this array will be a net positive in terms of health and safety for the surrounding community. Any power generated by the solar array is power that will not emit carbon and other potential air pollutants that are common with more traditional means of energy generation.

FORGESOLAR GLARE ANALYSIS

Project: **Indianola IA**

MEAN Municipal Solar - Indianola, IA 3.4 MWac 4.09 MWdc

Site configuration: **Split site with ARC**

Created 03 Apr, 2023

Updated 04 Apr, 2023

Time-step 1 minute

Timezone offset UTC-6

Site ID 87622.15478

Category 1 MW to 5 MW

DNI peaks at 1,000.0 W/m²

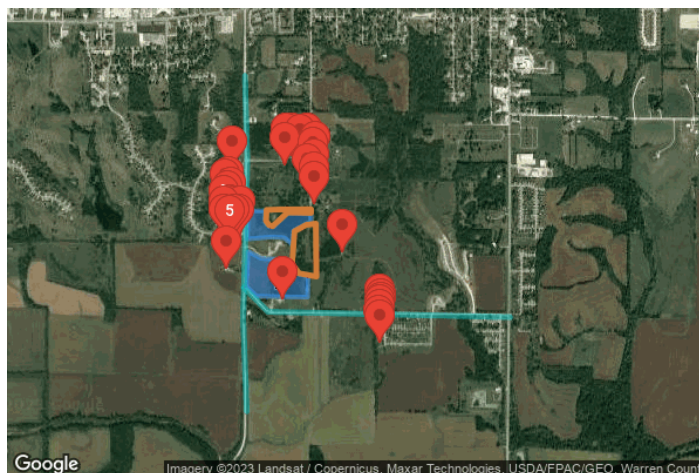
Ocular transmission coefficient 0.5

Pupil diameter 0.002 m

Eye focal length 0.017 m

Sun subtended angle 9.3 mrad

PV analysis methodology V2



Summary of Results No glare predicted

PV Array	Tilt °	Orient °	Annual Green Glare		Annual Yellow Glare		Energy kWh
			min	hr	min	hr	
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	6,202,000.0
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	6,201,000.0

Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1

Axis tracking: Single-axis rotation

Backtracking: None

Tracking axis orientation: 180.0°

Tracking axis tilt: 0.0°

Tracking axis panel offset: 0.0°

Max tracking angle: 55.0°

Rated power: 2045.0 kW

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.345740	-93.577414	893.03	0.00	893.03
2	41.344201	-93.577457	860.40	0.00	860.40
3	41.344322	-93.575590	881.94	0.00	881.94
4	41.344282	-93.574775	901.22	0.00	901.22
5	41.343879	-93.574099	889.59	0.00	889.59
6	41.344652	-93.574088	919.12	0.00	919.12
7	41.345023	-93.573187	933.44	0.00	933.44
8	41.345127	-93.572790	938.07	0.00	938.07
9	41.345570	-93.572800	947.95	0.00	947.95
10	41.345651	-93.574474	909.53	0.00	909.53
11	41.344878	-93.575558	894.61	0.00	894.61
12	41.344894	-93.575869	884.01	0.00	884.01
13	41.345127	-93.576126	879.79	0.00	879.79
14	41.345756	-93.576148	903.77	0.00	903.77

Name: PV array 2

Axis tracking: Single-axis rotation

Backtracking: None

Tracking axis orientation: 180.0°

Tracking axis tilt: 0.0°

Tracking axis panel offset: 0.0°

Max tracking angle: 55.0°

Rated power: 2045.0 kW

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.343524	-93.577403	848.09	0.00	848.09
2	41.341607	-93.577521	825.18	0.00	825.18
3	41.341068	-93.576792	820.88	0.00	820.88
4	41.341019	-93.573036	828.21	0.00	828.21
5	41.342171	-93.573004	853.87	0.00	853.87
6	41.342308	-93.573787	845.30	0.00	845.30
7	41.342759	-93.574174	851.93	0.00	851.93
8	41.343081	-93.574367	850.80	0.00	850.80
9	41.343130	-93.576427	858.22	0.00	858.22

Route Receptors

Name: Route 1

Path type: Two-way

Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.353148	-93.577630	913.85	0.00	913.85
2	41.348477	-93.577459	915.15	0.00	915.15
3	41.339810	-93.577759	819.74	0.00	819.74
4	41.334751	-93.577502	820.89	0.00	820.89

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.341550	-93.577716	824.56	0.00	824.56
2	41.340212	-93.575935	819.63	0.00	819.63
3	41.339922	-93.558211	844.03	0.00	844.03

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	41.344265	-93.577984	863.69	0.00
OP 2	2	41.344732	-93.577979	865.11	0.00
OP 3	3	41.344248	-93.578355	858.56	0.00
OP 4	4	41.344748	-93.578408	857.10	0.00
OP 5	5	41.344216	-93.578735	856.36	0.00
OP 6	6	41.344776	-93.578730	850.59	0.00
OP 7	7	41.344244	-93.579116	848.89	0.00
OP 8	8	41.344720	-93.579106	846.77	0.00
OP 9	9	41.345275	-93.579143	845.33	0.00
OP 10	10	41.345552	-93.578906	850.53	0.00
OP 11	11	41.345778	-93.578616	853.71	0.00
OP 12	12	41.346181	-93.579067	853.40	0.00
OP 13	13	41.346317	-93.578766	855.94	0.00
OP 14	14	41.346092	-93.572501	950.42	0.00
OP 15	15	41.346567	-93.572501	950.87	0.00
OP 16	16	41.348009	-93.578552	909.07	0.00
OP 17	17	41.348187	-93.574705	961.70	0.00
OP 18	18	41.348690	-93.574560	963.07	0.00
OP 19	19	41.348698	-93.574163	964.72	0.00
OP 20	20	41.348658	-93.573536	963.12	0.00
OP 21	21	41.348730	-93.573058	963.97	0.00
OP 22	22	41.348263	-93.572436	950.00	0.00
OP 23	23	41.347929	-93.572629	943.04	0.00
OP 24	24	41.347333	-93.572554	954.39	0.00
OP 25	25	41.347043	-93.573058	962.50	0.00
OP 26	26	41.343414	-93.570435	890.33	0.00
OP 27	27	41.339912	-93.567715	873.49	0.00
OP 28	28	41.339662	-93.567619	872.54	0.00
OP 29	29	41.339469	-93.567662	868.81	0.00
OP 30	30	41.339324	-93.567758	867.04	0.00
OP 31	31	41.339074	-93.567683	863.91	0.00
OP 32	32	41.338752	-93.567769	860.96	0.00
OP 33	33	41.338462	-93.567694	860.94	0.00
OP 34	34	41.342562	-93.578948	844.61	0.00
OP 35	35	41.340841	-93.574812	824.52	0.00

Obstruction Components

Name: Obstruction 1

Top height: 30.0 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	41.344904	-93.575608	893.60
2	41.345658	-93.574498	909.06
3	41.345637	-93.572786	949.26
4	41.345839	-93.572786	948.85
5	41.345823	-93.575023	908.66
6	41.345798	-93.576042	904.81
7	41.345202	-93.576085	882.09
8	41.344961	-93.575860	885.55
9	41.344904	-93.575608	893.60

Name: Obstruction 2

Top height: 30.0 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	41.344982	-93.573142	932.59
2	41.344628	-93.574001	918.67
3	41.342839	-93.574172	854.01
4	41.342324	-93.573679	851.74
5	41.342147	-93.572391	856.20
6	41.345046	-93.572434	933.71
7	41.344982	-93.573142	932.59

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	6,202,000.0
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	6,201,000.0

Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0

PV array 1 and Route 1

Receptor type: Route

No glare found

PV array 1 and Route 2

Receptor type: Route

No glare found

PV array 1 and OP 1

Receptor type: Observation Point

No glare found

PV array 1 and OP 2

Receptor type: Observation Point

No glare found

PV array 1 and OP 3

Receptor type: Observation Point

No glare found

PV array 1 and OP 4

Receptor type: Observation Point

No glare found

PV array 1 and OP 5

Receptor type: Observation Point

No glare found

PV array 1 and OP 6

Receptor type: Observation Point

No glare found

PV array 1 and OP 7

Receptor type: Observation Point

No glare found

PV array 1 and OP 8

Receptor type: Observation Point

No glare found

PV array 1 and OP 9

Receptor type: Observation Point

No glare found

PV array 1 and OP 10

Receptor type: Observation Point

No glare found

PV array 1 and OP 11

Receptor type: Observation Point

No glare found

PV array 1 and OP 12

Receptor type: Observation Point

No glare found

PV array 1 and OP 13

Receptor type: Observation Point

No glare found

PV array 1 and OP 14

Receptor type: Observation Point

No glare found

PV array 1 and OP 15

Receptor type: Observation Point
No glare found

PV array 1 and OP 17

Receptor type: Observation Point
No glare found

PV array 1 and OP 19

Receptor type: Observation Point
No glare found

PV array 1 and OP 21

Receptor type: Observation Point
No glare found

PV array 1 and OP 23

Receptor type: Observation Point
No glare found

PV array 1 and OP 25

Receptor type: Observation Point
No glare found

PV array 1 and OP 27

Receptor type: Observation Point
No glare found

PV array 1 and OP 29

Receptor type: Observation Point
No glare found

PV array 1 and OP 31

Receptor type: Observation Point
No glare found

PV array 1 and OP 33

Receptor type: Observation Point
No glare found

PV array 1 and OP 16

Receptor type: Observation Point
No glare found

PV array 1 and OP 18

Receptor type: Observation Point
No glare found

PV array 1 and OP 20

Receptor type: Observation Point
No glare found

PV array 1 and OP 22

Receptor type: Observation Point
No glare found

PV array 1 and OP 24

Receptor type: Observation Point
No glare found

PV array 1 and OP 26

Receptor type: Observation Point
No glare found

PV array 1 and OP 28

Receptor type: Observation Point
No glare found

PV array 1 and OP 30

Receptor type: Observation Point
No glare found

PV array 1 and OP 32

Receptor type: Observation Point
No glare found

PV array 1 and OP 34

Receptor type: Observation Point
No glare found

PV array 1 and OP 35

Receptor type: Observation Point

No glare found

PV: PV array 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 35	0	0.0	0	0.0

PV array 2 and Route 1

Receptor type: Route
No glare found

PV array 2 and Route 2

Receptor type: Route
No glare found

PV array 2 and OP 1

Receptor type: Observation Point
No glare found

PV array 2 and OP 2

Receptor type: Observation Point
No glare found

PV array 2 and OP 3

Receptor type: Observation Point
No glare found

PV array 2 and OP 4

Receptor type: Observation Point
No glare found

PV array 2 and OP 5

Receptor type: Observation Point
No glare found

PV array 2 and OP 6

Receptor type: Observation Point
No glare found

PV array 2 and OP 7

Receptor type: Observation Point
No glare found

PV array 2 and OP 8

Receptor type: Observation Point
No glare found

PV array 2 and OP 9

Receptor type: Observation Point
No glare found

PV array 2 and OP 10

Receptor type: Observation Point
No glare found

PV array 2 and OP 11

Receptor type: Observation Point
No glare found

PV array 2 and OP 12

Receptor type: Observation Point
No glare found

PV array 2 and OP 13

Receptor type: Observation Point
No glare found

PV array 2 and OP 14

Receptor type: Observation Point
No glare found

PV array 2 and OP 15

Receptor type: Observation Point
No glare found

PV array 2 and OP 16

Receptor type: Observation Point
No glare found

PV array 2 and OP 17

Receptor type: Observation Point
No glare found

PV array 2 and OP 19

Receptor type: Observation Point
No glare found

PV array 2 and OP 21

Receptor type: Observation Point
No glare found

PV array 2 and OP 23

Receptor type: Observation Point
No glare found

PV array 2 and OP 25

Receptor type: Observation Point
No glare found

PV array 2 and OP 27

Receptor type: Observation Point
No glare found

PV array 2 and OP 29

Receptor type: Observation Point
No glare found

PV array 2 and OP 31

Receptor type: Observation Point
No glare found

PV array 2 and OP 33

Receptor type: Observation Point
No glare found

PV array 2 and OP 35

Receptor type: Observation Point
No glare found

PV array 2 and OP 18

Receptor type: Observation Point
No glare found

PV array 2 and OP 20

Receptor type: Observation Point
No glare found

PV array 2 and OP 22

Receptor type: Observation Point
No glare found

PV array 2 and OP 24

Receptor type: Observation Point
No glare found

PV array 2 and OP 26

Receptor type: Observation Point
No glare found

PV array 2 and OP 28

Receptor type: Observation Point
No glare found

PV array 2 and OP 30

Receptor type: Observation Point
No glare found

PV array 2 and OP 32

Receptor type: Observation Point
No glare found

PV array 2 and OP 34

Receptor type: Observation Point
No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.

The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.

Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.

Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.

The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.

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.)

The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.

The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.

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.

Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.

Refer to the Help page at www.forgesolar.com/help/ for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

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