| PLANNING COMMISSION 6:00 P.M. | OCTOBER 15, 2024 |
PIVOT SOLAR 71 LLC SPECIAL USE

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MORGAN COUNTY
PLANNING AND ZONING DEPARTMENT

August 23, 2024

Pivot Solar 71, LLC
1601 Wewatta St #700
Denver, CO 80202
Sent via email: [redacted]

Dear Applicant:

Your Application for a Special Use Permit have been received by our office and will go to review and decision by the Planning Commission and the Board of County Commissioners. The hearing for the Planning Commission will be held on **Tuesday, October 15, 2024 at 6:00 P.M.**

Mineral Right notifications need to be made by September 13, 2024 and proof of mailing provided to our office no later than September 30, 2024 (at least 15 days prior to the above mentioned hearing date).

As per Section 2-450(B), notification sign postings need to occur no later than 10 days prior to each hearing and photographs accompanied by an affidavit to our office no later than 5 days prior to each hearing. One sign facing each public right-of-way adjacent to the property is required. The county will provide one sign it is up to you to post it. When you come to pick up the signs we will go over placement.

Planning Commission sign notice dates: **Posted by October 4, 2024**
Pictures and Affidavit by October 9, 2024

We will have the sign ready to be picked up in our office on **September 30, 2024**.

It is necessary that you and the landowners be present at the hearing to answer any questions the Planning Commission may have. If any of the landowners are unable to attend, a letter stating who will be representing them will be needed. Do not hesitate to contact us at any time if you have questions.

Sincerely,

Nicole Hay
Nicole Hay
Planning Administrator

FILE SUMMARY

MORGAN COUNTY
PLANNING AND ZONING DEPARTMENT

MORGAN COUNTY PLANNING COMMISSION
FILE SUMMARY
October 4, 2024
October 15, 2024 Hearing Date

APPLICANT: Pivot Solar 71, LLC, Bradley Thomas on behalf of Pivot Energy
LANDOWNER: Terry L. & Anna M. Larsen Trusts

This application is for a special use permit to allow for a solar collector facility with a maximum of power output of 1.8 MWac. The permitted area is located in part of the SW1/4 of Section 33, Township 4 North, Range 56 West of the 6th PM, Morgan County, Colorado. The permitted area is zoned Rural Residential and is located in the Brush Rural Fire Protection District.

The applicant, Pivot Solar 71, LLC, proposes a solar collector facility within an approximate 14 acre leased area. This project is immediately adjacent to existing solar projects operated by Pivot Energy and approved in Resolution 2021 BCC 19. The facility will consist of solar panels and inverters mounted on steel posts/beams, concrete pad mounted transformers, and other electrical equipment.

The haul route is I-76 east to County Road 24; County Road 24 south to County Road S; County Road S east to County Road 26; County Road 26 north to the project site access. Due to space constraints at the existing access to the solar facilities, a new access is proposed off of County Road 26. The site will be surrounded by the same game fence as the sites immediately adjacent, which is similar to the type of fence used by Colorado Department of Transportation.

During construction, onsite activity is expected to take place between the hours of 7 a.m. and 6 p.m., Monday through Friday and the crew will be made up of approximately 40 people. During operation, the facility will not be staffed so will have minimal traffic impacts once constructed.

In addition to the permit application, packets for the Planning Commission hearing include referral responses from Xcel Energy and the City of Brush. Xcel has no particular concern provided the developer/contractor continues to work with Xcel designers and Right of Way Division Agent. The City of Brush would like the same consideration for a 500 foot setback from the golf course property line as there is currently with residences to the south as well as landscaped screening.

Matt Harris with Harris Engineering Consultants, Inc., the County's consulting engineer, reviewed the preliminary drainage analysis and associated preliminary site plan. As the applicants represent that natural depressions on the property will be used to collect stormwater runoff, he recommends that infiltration testing be conducted at these locations to demonstrate that the underlying soils have sufficient capacity to infiltrate the captured stormwater per the requirements defined by the State of Colorado. Furthermore, he recommends that excess stormwater runoff that would otherwise drain offsite should either be detained and released in a controlled manner per the provisions of the Morgan County Zoning Regulations or captured and infiltrated in accordance with the requirements referenced above.

In reviewing these applications, the Planning Commission and Board of County Commissioners are required to make a finding that the criteria for granting a Use by Special Review in Section 2-455 of the Morgan County Zoning Regulations have been satisfied. In addition, the County shall consider whether each application for solar collector facility complies with the requirements of the Solar Collector Regulations in Zoning Regulations.

Section 2-455 Special Use Permit Criteria:

(A) The use and its location as proposed are in conformance with the Morgan County Comprehensive Plan. The property is located in the northeast planning area.

Chapter 2 – Plan Summary
2.II.A - Economic Development
Goal – Diversify the economy in Morgan County to broaden business employment opportunities for residents and to further economic growth.
The project would provide economic benefit to Morgan County through increased revenues to the County and school district tax bases through the taxation of the projects. To the extent possible the operator will seek to hire local contractors throughout construction and the life of the project.

2.E.1 Utilities
Goal: To ensure that adequate and financially secure public utilities are provided to all developments in Morgan County.
This project will not require the use of water, sewage or telecommunications onsite and the proposed connection to the utility grid ill result in upgrades made to the areas existing electric distribution grid at Pivot's sole cost.

Chapter 5 - Environment
5.IX
Goal - To preserve the manmade and natural environment in order to enhance the quality of life in Morgan County.
This project will not impact wetlands, floodplain or drainage patterns. This project will encourage use of renewable resources and production of electric power.

(B) All the application documents are complete and present a clear picture of how uses are to be arranged on the site or within Morgan County.

(C) The Site Plan conforms to the district design standards of Section 2-470 and Section 4-820 of the Morgan County Zoning Regulations.

(D) All on and off-site impacts have been satisfactorily mitigated either through agreement, public improvements, site plan requirements or other mitigation measures.
During construction and when necessary water trucks will be used for dust mitigation. Upon completion of the project the site will be reseeded with a native low-growth prairie grass mix. Landscaping maintenance will occur on a regular basis during the growing season.

(E) The special use proposed has been made compatible with the surrounding uses and adequately buffered as determined by the County.
The proposed solar facility is compatible with the co-located solar facilities and has been designed to meet or exceed the 500' setback requirements to the residences to the south. To the north is Interstate 76 and to the east is Petteys Park Golf Course.

(F) The special use poses only the minimum amount of risk to the public health, safety and welfare as set by federal, state or county regulation, whichever is the strictest.
The project will have minimal impacts on surrounding adjacent uses as the facility is unstaffed, generates no emissions, emits no light or discernible noise.

(G) The special use proposed is not planned to be developed on a non-conforming parcel.
The parcel is conforming.

(H) The applicant has adequately documented a public need for the project, all pertinent technical information, and adequate financial resources to implement it, and has paid all fees and review costs levied by the County for application processing and review.
*The energy generated from this project will be injected into Xcel Energy's existing electrical infrastructure and will provide cost savings to participating electrical ratepayers as part of Xcel Energy's Solar*Rewards Community program.*

(I) For any special use requiring a supply of water that the applicant has demonstrated a source of water which is adequate for the proposed use in terms of quantity and reliability and in the case of human consumption, quantity, quality, and reliability.
This project does not require a water supply.

The following conditions are recommended if the Special Use Permit is approved:

1. All necessary land use, environmental, and construction permits, approvals and authorizations will be obtained prior to the start of and during construction as required and may include, but are not limited to, land use permits, right-of-way (ROW) permits, road use agreements, access permits, oversize/overweight permits, grading permits, and stormwater permits.

2. All necessary plans, reports, permits, and certificates will be submitted prior to issuance of any building permit associated with the solar collector facility and may include, but are not limited to, interconnection/crossing agreements, final drainage & erosion control plan, signed and sealed geotechnical report, decommissioning plan, operations and maintenance plan, Liability Insurance Certificate, final locations for any laydown yard, a copy of the APEN issued by the Colorado Department of Public Health and Environment, Unanticipated Discovery plan, and glare analysis.

3. Pivot Solar 71 LLC will comply with proposed decommissioning plan, any modifications/deviations from the proposed plan must be approved by the County. The County must be notified in writing when Pivot Solar 71, LLC commences decommissioning.

4. The solar collector facility shall be enclosed by a security fence and be secured at all times. Emergency services must have access at all times.

5. Prior the commencement of construction, Pivot Solar 71 LLC will enter into a road use agreement for the use of any public road during construction which shall include the following:

    a. A map showing which County roads will be used during construction.

    b. A pre-construction baseline inventory of County roads to be used during construction to document their pre-construction condition, obtained by and paid for by the applicant.

    c. A mitigation plan to address traffic congestion, control, and potential impacts to County roads to be used during construction. The mitigation plan shall also include any dust mitigation activities.

    d. A requirement that the applicant return any County roads to their pre-construction baseline condition.

    e. A requirement to post financial security in an amount not less than one hundred fifteen percent (115%) of the estimated cost to complete all road restoration, in the form of an irrevocable letter of credit or cash escrow. Cost estimates shall be provided by a licensed Colorado engineer. Upon preliminary acceptance of the restored public road, the County shall release all but fifteen percent (15%) of total actual costs of restoration of the public roads, so long as Pivot Solar 71 LLC is not in default of any provision of the public improvements agreement. The County shall inspect the restored roads and Pivot Solar 71 LLC shall pay to the County the cost incurred by the County in conducting such inspections. These costs shall be due and payable upon demand of the County. Pivot Solar 71 LLC shall be responsible for correcting or properly completing the restoration.

f. The residual fifteen percent (15%) retained by the County shall act as security for Pivot Solar 71 LLC's guarantee that the restoration remains free of defect during a two-year warranty period. Pivot Solar 71 LLC may at any time during the preliminary acceptance or warranty period offer to provide a substitute or supplemental form of financial security to that security as originally posted with and/or retained by the County. The County may accept substitute or supplemental forms of security in its sole discretion.

6. The project area shall be reclaimed and/or reseeded as soon as practicable but no later than six months after Pivot Solar 71 LLC, LLC has completed construction, unless the County Planning Administrator grants an extension for demonstrated good cause.

7. Construction occurring with ¼ quarter mile of any residence shall not commence earlier than 7 a.m.

8. Pivot Solar 71 LLC shall prevent the existence of any nuisances by way of its construction activities. All trash, litter, construction waste and any potentially hazardous materials shall be disposed of properly off-site. If the County determines that a nuisance exists and the nuisance is not abated or an abatement plan is not submitted to the satisfaction of the County, the County may, upon thirty (30) days' notice, undertake such abatement and lien the property for the costs of the abatement. Such abatement shall not be deemed to limit any other enforcement rights of the County.

9. Pivot Solar 71 LLC shall comply with all applicable law and regulations related to safety and emergency management during construction and on-going operations.

10. Pivot Solar 71 LLC shall be responsible for the payment of all costs and fees incurred by the County associated with this Permit. The County shall invoice Pivot Solar 71 LLC for costs and fees and payment will be due by Pivot Solar 71 LLC within thirty (30) days of the date of the invoice. Failure to pay may result in enforcement actions by the County.

Nicole Hay,
Morgan County Planning Administrator

CONSULTANTS

Morgan County Road & Bridge

Harris Engineering, Inc.

Gmail Jenafer Santos <jsantos@co.morgan.co.us>

Re: Pivot Solar Project

Bruce Bass <bbass@co.morgan.co.us> Tue, Sep 17, 2024 at 7:22 AM
To: Nicole Hay <nhay@co.morgan.co.us>
Cc: John Goodman <jgoodman@co.morgan.co.us>, Cheryl Brindisi <cbrindisi@co.morgan.co.us>, Jenafer Santos <jsantos@co.morgan.co.us>

Nicole

We have reviewed the traffic impact letter and based on Pivot Energy's expected trips, the use of County Road 24 to County Road S to County Road 26 is an acceptable route. At this time we do not have any apparent conflicts with the use of this route.

Thank You

Bruce Bass
Public Works Director
Morgan County Government
970-542-3560

[Quoted text hidden]

HARRIS
ENGINEERING
CONSULTANTS, INC.

21482 County Road T.5
Fort Morgan, CO 80701
(970) 867-4971 | Office
(970) 542-0425 | Fax

September 05, 2024

Ms. Nicole Hay
Morgan County Planning & Zoning Department
231 Ensign Street
Fort Morgan, CO 80701

Re: Preliminary Drainage Analysis Review
Pivot Energy Morgan PS71 Solar Array

I have reviewed the documentation that you provided for the proposed Pivot Energy Solar array located west of Brush on the south side of Interstate 76, including the *Pivot Energy Array Morgan PS71/Larsen Trust (Phase 4) - Drainage Narrative* [drainage analysis], dated June 14, 2024 and associated preliminary site plans.

Based on my interpretation of the drainage analysis and site plans, the proposed development seeks to preserve the natural topography of the site and, therefore, the existing drainage patterns. Two subbasins are identified on the Erosion Control Plan, designated "P1" and "P2". Basin P1 occupies the west side of the site and drains to the northwest while basin P2 is situated on the east side of the site and generally drains to the east. The proposed development is shown to increase site imperviousness and thus result in the incremental increase of surface runoff from each subbasin.

While an existing natural depression located at the northwest corner of the site has been designated to receive and retain (and infiltrate) runoff from basin P1, it is not clear that there is any mitigation measures planned to accommodate the increase in runoff from basin P2. This should be considered and addressed in the drainage analysis and on the plans.

A second depression was analyzed as P2 and was found to have adequate volume and infiltration capacity.

The existing surface depression will herein be referred to as the infiltration pond. For retention and infiltration ponds to meet the criteria in the *Colorado Floodplain and Stormwater Manual* (CFSCM), they need to be sized to capture all runoff tributary to the pond for the 24-hour 100-year event. Offsite runoff tributary to the pond was not provided in the information received and should be identified and included in the drainage analysis. The correct sizing equation should be the 24-hour 100-year event rainfall of 4.43 inches multiplied by the entire tributary acreage to the pond, plus 1 foot of freeboard.

The Offsite runoff has now been included in the volume required for the infiltration pond at the northwest corner in addition to the volume from P1. The rainfall depth used was 24-hr 100-year event per CFSCM

Furthermore, to meet the requirements of the Colorado Division of Water Resources, pursuant to CRS 37-92-602(8), a stormwater retention and infiltration facility must have the ability to continuously drain or infiltrate at least *97 percent* of all water from a rainfall event equal to or less than a 5-year storm within *72 hours* of the end of a rainfall event and at least *99 percent* of all the water from a rainfall event that is greater than the 5-year storm (i.e., 100-year storm) within *120 hours* of the end of the rainfall event. This should be demonstrated by infiltration calculations based on percolation tests taken at the design pond bottom elevation.

Please feel free to contact me with any questions or concerns, or if I may provide further assistance.

Sincerely,

The water surface shown is for the 24hr 100-year storm event plus a foot of free board. Also the infiltration volume calculated for the 72 hour period used a conservative infiltration rate for sandy clayey soils from NRCS and other resources.

Matthew C. Harris, PE
CO PE #49409

COLORADO LICENSED
MATTHEW C. HARRIS
49409
PROFESSIONAL ENGINEER

09/05/24

HARRIS
ENGINEERING
CONSULTANTS, INC.

21482 County Road T.5
Fort Morgan, CO 80701
(970) 867-4971 | Office
(970) 542-0425 | Fax

September 05, 2024

Ms. Nicole Hay
Morgan County Planning & Zoning Department
231 Ensign Street
Fort Morgan, CO 80701

Re: Preliminary Drainage Analysis Review
Pivot Energy Morgan PS71 Solar Array

I have reviewed the documentation that you provided for the proposed Pivot Energy Solar array located west of Brush on the south side of Interstate 76, including the *Pivot Energy Array Morgan PS71/Larsen Trust (Phase 4) - Drainage Narrative* [drainage analysis], dated June 14, 2024 and associated preliminary site plans.

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Please feel free to contact me with any questions or concerns, or if I may provide further assistance.

Sincerely,

Matthew C. Harris, PE
CO PE #49409

09/05/24

LANDOWNER LETTERS, REFERRALS & RESPONSES

Landowner Letter Sent & Responses Received

Referral Sent & Responses Received

Notification

Sign Posting Pictures & Affidavit

MORGAN COUNTY
PLANNING AND ZONING DEPARTMENT

September 20, 2024

Re: **Pivot Solar 71, LLC**

Dear Neighboring Landowners:

Pivot Solar 71, LLC as applicant and the Terry L Larsen Trust & Anna M Larsen Trust as landowners have submitted an application to our office for a Use by Special Review Permit to construct an approximately 1.8 MWac Solar Energy facility within approximately 14 acres of leased area.

Legal Description: Located in the N½SW¼ of Section 33, Township 4 North, Range 56 West of the 6th PM, Morgan County, Colorado.

This application is scheduled to be heard by the Planning Commission **on Tuesday, October 15th, 2024 at 6:00 P.M.** in the Assembly Room of the Morgan County Administration Building, 231 Ensign St., (Basement Level, elevator entrance) Fort Morgan, Colorado. Landowners within ¼ mile of the subject property are notified of the application and hearing date.

Documents pertaining to the above identified matters are on file in the Planning Administrator's Office located at 231 Ensign St., Fort Morgan, Colorado. If you have any questions pertaining to this application or if you would like to review the file, either contact us at (970) 542-3526 or stop by our office prior to the hearing. You may attend the public hearings and provide comments on the application, or alternatively, if you are not able to attend you may submit written comments to our office no later than **October 4th, 2024.**

Sincerely,

Nicole Hay

Nicole Hay, Planning & Zoning Director

For special assistance for the mentioned hearing, please notify us at least 48 hours before the scheduled agenda item. Please call (970) 542-3526 to request any ADA accommodations.

Morgan County Government ~ 231 Ensign St ~ PO Box 596 ~ Fort Morgan, CO 80701
Telephone (970) 542-3526 ~ nhay@co.morgan.co.us

Morgan County
Planning and Zoning Department
231 Ensign St
Fort Morgan, CO 80701

September 30, 2024

RE: Comments for hearing Pivot Solar 71, LLC

Nicole Hay:

This letter expresses my concerns and recommendations regarding approval for the installation of a solar energy facility as described in you letter to me, dated September 20, 2024.

I have three (3) requirements for consideration as basis for approval of subject facility:

1. The land use must not preclude any existing productive agricultural employment.
2. A monetary bond be posted (of sufficient amount to restore land original condition) to assure completion, design capability and operation within six (6) months of ground breaking.
3. A monetary bond is posted to compensate for failure to operate or maintain the facility for a period of 30 years. This bond should also be sufficient to fund future removal of all equipment, returning the land to its original condition, free from all contaminants.

The two reference bonds must be solely funded by the applicant and guaranteed by the landowners.

Thank you for the opportunity to comment. I look forward to hearing the outcome of your proceedings.

Respectfully,

Hans K Crosthwait
130 Vailco Ln
Austin, TX 78738

LARSEN, TERRY L & ANNA M TRUSTS
18712 CO RD 26
BRUSH, CO 80723

DEAGUERO, GERALD A
916 KRISTA KORT
BRUSH, CO 807231305

ANDERSON, DALLAS V &
TUTTLE, JULIE M
2612 ANN AVE
BRUSH, CO 80723

EHRHARDT, MARK
2700 E BRIDGE ST - STE 101
BRIGHTON, CO 80601

DAVIES, CHRISTIAN M & FAITH L
909 BOB BLVD
BRUSH, CO 80723

EKLUND, J DWAYNE & MARTHA F
P O BOX 605
BRUSH, CO 80723

PLAINS WEST PROPERTIES LLC
1647 WILLOW PASS RD #300
CONCORD, CA 94520

RUIZ, ALEJANDRA & GUILLERMO RUIZ
913 BOB BLVD
BRUSH, CO 80723

FRANK, THOMAS MARK
423 GRANT ST
FORT MORGAN, CO 80701

MONDRAGON, JERIMIA B
821 BOB BLVD
BRUSH, CO 80723

HANSON, JEFFREY & LAURIE
927 KRISTA KORT
BRUSH, CO 80723

WALDRON, GILBERT RYAN & DIANA LYNN
2615 ANN AVE
BRUSH, CO 80723

WEELBORG, THOMAS A & SHANNA
904 BOB BLVD
BRUSH, CO 80723

L&M RENTALS LLC
P O BOX 522
SIDNEY, NE 69162

PEREZ, ELPIDIA
825 BOB BLVD
BRUSH, CO 80723

BULES, KAIDE & KYLE & TANISHA
817 BOB BLVD
BRUSH, CO 80723

FARMERS REALTY COMPANY
P O BOX 324
BRUSH, CO 80723

WALTER, BRADY & HEATHER
436 HARVARD ST
BRUSH, CO 80723

ROBERTS, FRANK DEWANE & CHERYL L
908 KRISTA KORT
BRUSH, CO 80723

FIERROS, INDALECIO IBARRA &
AGUALLO, ELIZETTE MADRIGAL
913 KRISTA KORT

921 KRISTA KORT
BRUSH, CO 80723

VASQUEZ, LAURA Y &
GONZALEZ, JORGE L HUERTA
908 BOB BLVD
BRUSH, CO 80723

WITTMAN, ROBERT A & SHIRLEY A
2780 FM 443
YOAKUM, TX 77995

ZACK, JOAN LONGLEY
2613 RUHL RD
BRUSH, CO 80723

GINTHER, KATHERINE A & JAMES M
18021 CO RD 26
BRUSH, CO 80723

LAVINDER, DAVID L & DIANE H
26137 CO RD S.2
BRUSH, CO 80723

MACHETTA, JOSEPH J TRUST
P O BOX 2242
DENVER, CO 80201

MORTENSEN, BRADLEY & CRISTI
26487 CO RD T
BRUSH, CO 80723

MORTENSEN, PHILIP A & JUDITH G
18633 CO RD 26
BRUSH, CO 80723

ROBERTSON, HEIDI
34595 WELD CO RD 8
KEENESBURG, CO 80643

LOOSE, DAVID
579 CANVASBACK CT
VACAVILLE, CA 95687

AMEN, ALEXANDER M
414 SAMPLES AVE
BRUSH, CO 80723

LOVELAND, DALE R & KARALEE
26221 FAIRWAY DR
BRUSH, CO 80723

HERNANDEZ, JUAN C & SILVIA
26255 FAIRWAY DR
BRUSH, CO 80723

LEDBETTER, JAMMY E & SHERRI E
336 HOWELL AVE
BRUSH, CO 80723

BEYDLER, JACOB R & JULIE R
26319 FAIRWAY DR
BRUSH, CO 80723

BATREZ, MANUEL E &
MELENDEZ, PRICILLA
26211 FAIRWAY DR
BRUSH, CO 80723

FERGUSON, DAVID L & PATRICIA J
26218 FAIRWAY DR
BRUSH, CO 80723

SMITH, MICHAEL W & KENDRA L
26240 FAIRWAY DR
BRUSH, CO 80723

STEINERT, ANDREW W
26266 FAIRWAY DR
BRUSH, CO 80723

FORT MORGAN, CO 80701

LOPEZ, APOLINAR JR
2941 MILL ST
BRUSH, CO 80723

MENDOZA, JUAN RAMON MURILLO &
DIAZ, LETICIA BARRERA DE
2931 MILL ST
BRUSH, CO 80723

CITY OF BRUSH
P O BOX 363
BRUSH, CO 80723

BRUSH SCHOOL DISTRICT RE-2J
527 INDUSTRIAL PARK RD
BRUSH, CO 80723

REFERRAL AGENCIES	RESPONSES RECEIVED
Brush Fire Department	
CDOT	Hi Cheryl, CDOT has no comment on this project. Mike Shepherd Assistant Access Manager / Utility Permits
Century Link	
City of Brush	Hello Cheryl I apologize for our delay on providing you with comments. From the City of Brush!: • County setback requirements are 500 ft from residences, so we want to ensure that is being enforced for the residents to the south of the proposed solar project. • The golf course to the east is City owned, and being a unique and positive asset to the community, any impacts to the experience there are of consideration. As the golf course is zoned Residential Medium-Density, we would like there to be the consideration for same setback from the course, as well as landscaped screening • along the property line from the panels. Thanks! Tyler Purvis City of Brush! Community Development Director / Assistant City Administrator
Colo. Dept. of Natural Resources	
Division of Wildlife	
Kinder Morgan, Inc.	
Morgan County Assessor	
Morgan County Communications Center	
Morgan County Emergency Mgmt.	
Morgan County Quality Water	
Morgan County Road & Bridge	
Morgan County Rural Electric Assoc.	
Morgan County Sheriff	
Morgan Soil Conservation District	
Morgan County Weed & Pest Advisory	
Northeast Colorado Health Department	
Xcel Energy	See attached letter dated September 13, 2024

MORGAN COUNTY
PLANNING AND ZONING DEPARTMENT

TO REFERRAL AGENCIES:

Brush Fire Department	Morgan County Emergency Management
CDOT	Morgan County Quality Water
Century Link	Morgan County Road & Bridge
City of Brush	Morgan County Rural Electric Assoc.
Colo. Dept. of Natural Resources	Morgan County Sheriff
Division of Wildlife	Morgan Soil Conservation District
Kinder Morgan, Inc.	Morgan Weed & Pest Advisory Board
Morgan County Assessor	Northeast Colorado Health Department
Morgan County Communications Center	Xcel Energy

FROM: Cheryl Brindisi, Morgan County Planning & Zoning Administrative Assistant
231 Ensign St, PO Box 596, Fort Morgan, CO 80701
970-542-3526 / 970-542-3509 fax / cbrindisi@co.morgan.co.us
DATE: August 23, 2024
RE: Land Use Application- Special Use Permit

The Special Use Permit application is submitted to you for review and comments. The application will be heard by the Planning Commission and the Board of County Commissioners. **You are encouraged to provide comments to this application by September 16th, 2024 or attend the Planning Commission meeting on Tuesday, October 15th, 2024 at 6:00 P.M.** Failure to comment will be viewed as a favorable review. Please contact the Planning and Zoning Department if you would like to attend the public meeting.

Applicant: Pivot Solar 71, LLC
Landowners: Terry L. Larsen Trust & Anna M. Larsen Trust
Pivot Solar 71, LLC, Solar Energy Facility;
Legal Description: Located in the N½SW¼ of Section 33, Township 4 North, Range 56 West of the 6th PM, Morgan County, Colorado.
Request: Special Use Permits to construct an approximately 1.8 MWac Solar Energy Facility.

Sincerely,

Cheryl Brindisi

Cheryl Brindisi
Morgan County Planning and Zoning Administrative Assistant

Xcel Energy℠
PUBLIC SERVICE COMPANY

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: [redacted]

September 13, 2024

Morgan County Planning and Building Department
231 Ensign / PO Box 596
Fort Morgan, CO 80701

Attn: Cheryl Brindisi, Nicole Hay, Jenafer Santos

Re: Special Use Application - Pivot Solar 71, LLC

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the documents for the **Special Use Application - Pivot Solar 71, LLC.** Please be aware PSCo owns and operates existing and proposed electric distribution facilities within the site area. PSCo requests to continue working with Xcel designers and Right of Way Division Agent for any easements to be acquired by separate PSCo document.

The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details.

As a safety precaution, PSCo would like to remind the developer to call the Utility Notification Center by dialing 811 for utility locates prior to construction.

Violeta Ciocanu (Chokanu)
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: [redacted] – Email: [redacted]

NOTICE OF PUBLIC HEARING
MORGAN COUNTY PLANNING COMMISSION
OCTOBER 15, 2024 AT 6:00 P.M.
VIRTUAL AND IN PERSON IN THE ASSEMBLY ROOM, MORGAN COUNTY ADMINISTRATIVE BUILDING, 231 ENSIGN, FORT MORGAN, COLORADO

Notice is hereby given that on the date and time above (or as soon as possible following the scheduled time) and at the location above, or at such time and place as this hearing may be adjourned, the Morgan County Planning Commission will conduct public hearings on the following proposed **Land Use Applications:**

1.) **Applicant: Pivot 71, LLC**
Landowners: The Terry L Larsen Trust & Anna M Larsen Trust
Legal Description: Located in the N½SW¼ of Section 33, Township 4 North, Range 56 West of the 6th PM, Morgan County, Colorado.
Request: Special Use Permit to construct an approximately 1.8 MWac Solar Energy facility.
Date of Application: August 2, 2024

2.) **Applicant: Roadrunner Energy Farm, LLC**
Landowners: Gold Spur Genetics LLC, Bonnie Frazier, Bruce B. Bass Family LLLP, Michael L. Dixon Family LLLP, Mary Ellen Hellyer and Martha Colburn.
Solar Energy Facility Legal Description: A part of Sections 17, 19, 20 and 29-32, Township 3 North, Range 55 West and a part of Sections 5 and 6, Township 2 North, Range 55 West of the 6th PM, Morgan County, Colorado. A gen-tie line will also go through Section 24, Township 3 North, Range 56 West of the 6th P.M., Morgan County, Colorado, to a point of interconnection.
BESS Legal Description: A part of Section 19, Township 3 North, Range 55 West of the 6th PM, Morgan County, Colorado.
Request: Roadrunner Energy Farm, LLC has submitted a Special Use Permit Application to construct an up to 500 MWac Solar Energy Facility in conjunction with a 2,000 MWh Battery Energy Storage System (BESS).
Date of Application: August 8, 2024

THE COUNTY WILL CONTINUE TO OFFER THE OPTION TO ATTEND MEETINGS REMOTELY. IF YOU HAVE ANY QUESTIONS REGARDING ATTENDING THE MEETING, PLEASE CONTACT THE PLANNING OFFICES AT 970-542-3526.

https://us02web.zoom.us/j/81398839615
Or Telephone:
Dial:
+1 719 359 4580 US
Webinar ID: 813 9883 9615

Documents pertaining to the above identified matters are on file in the Planning Administrator's Office, 231 Ensign St., Fort Morgan, Colorado. Documents will also be available on the Morgan County Website https://morgancounty.colorado.gov

At time of the meeting an opportunity will be given for presentation of evidence in support of or in opposition to the application and zoning amendments.

Nicole Hay
Nicole Hay, Morgan County Planning Administrator

Published: October 3, 2024

For special assistance for the mentioned hearing, please notify us at least 48 hours before the scheduled agenda item. Please call (970) 542-3526 to request any ADA accommodations.

The above sign was posted on (date) October 1, 2024, pursuant to the Morgan County Zoning Resolution by (name of applicant) Pivot Solar 71 LLC.

Project name and number: Pivot Solar 71 LLC

Signature of Applicant/Representative: [signature]

STATE OF COLORADO)
) ss.
COUNTY OF ~~MORGAN~~ Denver)

Signed before me this date: October 2, 2024

My Commission expires: October 10, 2027

BRADLEY THOMAS
NOTARY PUBLIC - STATE OF COLORADO
NOTARY ID 20234038396
MY COMMISSION EXPIRES OCT 10, 2027

NOTARIZED BY: Bradley Thomas [signature]


NOTICE OF PUBLIC HEARING ON LAND USE
APPLICATION BEFORE THE PLANNING COMMISSION
Applicant: Pivot Solar 71, LLC
Landowners: Terry L. Larsen Trust & Anna M. Larsen Trust
Reason: Special Use Application to construct an
Approximately 1.8 MWac Solar Energy Facility.
Location of Hearing: 231 Ensign Street,
Fort Morgan, CO 80701
Date of Hearing: Tuesday, October 15, 2024 at 6:00 PM

ORIGINAL SUBMITTAL

Pivot Energy

Pivot Solar 71 LLC: Public Hearing Application Packet

Printed October 1, 2024

Pivot Energy

Table of Contents

MORGAN COUNTY PLANNING
ZONING & BUILDING DEPT.
231 Ensign, P.O. Box 596
Fort Morgan, Colorado 80701
PHONE (970)542-3526
FAX (970)542-3509
EMAIL: permits_licensing@co.morgan.us

PERMIT # SU2024 - 0007

Date Received 7 / 1 / 24 Received By IS
App Fee $5000 Ck/CC #: 1145 Paid 8 / 2 / 24
Minor Amend Fee: $ ____ CK/CC #: ____ Paid ___/___/___
Recording Fee $ ____ Ck/CC #: ____ Paid ___/___/___
PC Date: ___/___/___ BOCC Date: ___/___/___
100 Year Floodplain? Y / N Taxes Current? Y / N

SPECIAL USE PERMIT APPLICATION

(Also to be used as application for Amendments to Existing Special Use Permits)
Landowner **MUST** Sign Application and Right to Farm Policy

APPLICANT

Name Pivot Solar 71 LLC
Address 1601 Wewatta St #700
Denver, CO 80202
Phon [redacted]
Emai [redacted]

LANDOWNER

Name Larsen, Terry L & Anna M Trusts
Address 18712 Co Rd 26
Brush, CO 80723
Phone [redacted]
Email [redacted]

BRIEF DESCRIPTION OF APPLICATION

Pivot Solar 71 LLC is proposing an approximately 1.8-megawatt AC solar garden on approximately 11 acres of leased land.

PROPERTY LEGAL DESCRIPTION

Address (if available):

S: 33 T: 4N R: 56W N ½ SW ¼ ¼ Property Size 65.48 (sq. ft. or acres)
Parcel #: 1037 - 333 - 00 - 001 Zone District: RR
Subdivision: ____ Lot #(s): ____

Is property located within 1320' (1/4 mile) of a livestock confinement facility? Y/N

SEE REQUIRED ATTACHMENT LIST ON BACK OF THIS PAGE.

INCOMPLETE APPLICATIONS WILL NOT BE ACCEPTED OR PROCESSED.

SPECIAL USE PERMIT REQUIRED ATTACHMENT LIST

Fee: ☐ **Non-Refundable Application Fee**

**Additional fees and charges may be required pursuant to Section 2-160 of Morgan County Zoning Regulations. Applicant will be responsible for any legal fees after the first 5 hours.*

Project Narrative: ☐ **Narrative– Including the following:**

- ☐ Project Description
- ☐ Purpose of request
- ☐ How this proposal complies with the Morgan County Comprehensive Plan
  See:*https://morgancounty.colorado.gov/sites/morgancounty/files/Comprehensive- Plan-2008.pdf*
- ☐ How this project/proposed use meets the criteria for Special Use Permit pursuant to Sec. 2-395 of the Zoning Regulations
- ☐ How the project/proposed use meets any specific criteria related to the project/proposed use. *See Morgan County Zoning Regulations Chapter 4-Supplementary Regulations, including but not limited to: Campgrounds, Livestock Confinement, Kennels, Outdoor Shooting Ranges, Home Occupations, Oil and Gas, Mobile Home Parks, Wireless Service Facilities, Solar, Wind and BESS*
- ☐ How project will relate to or impact existing adjacent uses
- ☐ All off-site impacts and proposed mitigation measures
- ☐ Development or implementation schedule of project
- ☐ Proposed length of time the permit, if applicable
- ☐ Discussion of any public improvements required to complete the project

Environmental Impacts: ☐ Discuss any environmental impacts the Special Use will have on the following and the proposed mitigation measures:

☐ Air Quality	☐ Dust	☐ Existing Vegetation	☐ Land Forms
☐ Noise	☐ Odor	☐ Storm Water Runoff	☐ Water Resources
☐ Wetlands	☐ Wildlife	☐ Visual Amenities	☐ Other _____

Map & Plans: ☐ **Special Use Map** meeting the requirements of Sec. 2-420 and any specific map requirements for the proposed use including but not limited to: *Campgrounds, Livestock Confinement, Kennels, Outdoor Shooting Ranges, Home Occupations, Oil and Gas, Mobile Home Parks, Wireless Service Facilities, Solar, Wind and BESS. Sample Map attached to application for reference*

☐ **Drainage/Run-Off Control Plan** may be required if the Planning Administrator determines that the use or building meets one of the following criteria:

(1) The accessory use or building may have a drainage impact on adjacent properties;
(2) The accessory use or building may have a drainage impact on adjacent right of ways;
(3) The accessory structure is 5000 square feet or larger.

☐ **Decommissioning Plan** [Wind, Solar, BESS]
☐ **Geotechnical Report** [Wind, Solar]
☐ **Maintenance Statement** [Wind, Solar, BESS]
☐ **Water and/or Wind Erosion Control Plan** [Wind, Solar]
☐ **Fire Mitigation Plan** [BESS]
☐ **Specification Sheet** [BESS]
☐ **Emergency Operation Plan** [BESS]

Ownership:
☐ **Current title insurance commitment (last 6 months)**
☐ **Mineral Rights Holders Notification**
☐ **Notice to FFA & Approval Letter** [Wind]
☐ **Notice to Operator of Communication Link (if applicable)** [Wind]
☐ **Proof of current paid taxes**

Utilities/Access: ☐ **Water tap (Engineering Report from Quality Water or proof of access to a well)**

☐ **Sewer (Septic Permit, Will Serve Letter from NCHD or proof of other public system)**

☐ **Electric (Electric bill or letter of commitment from electricity provider)**

☐ **Driveway Permit from CDOT or Morgan County Road & Bridge (If required by staff)**

☐ **Ditch Company- Proof of contact if there is a ditch on or next to subject property**

☐ **Architecture Control Approval (if applicable)**

☐ **Utility Interconnection or Crossing Certification** [Wind, Solar]

☐ **Road Agreement** [Wind, Solar]

☐ **Electrical Diagram** [BESS]

Vested Rights: ☐ **Vesting Rights** (Optional). If applying for vested rights with special use application, the following must be submitted:

- ☐ Period of time Vesting Rights are requested
- ☐ Development schedule including timeline and phases
- ☐ Reason for request
- ☐ Other pertinent factors concerning the development
- ☐ Additional application fee for vesting rights application

Miscellaneous: ☐ **Right to Farm Policy** signed by Landowner(attached)

☐ **Liability Insurance for Solar, Wind and/or BESS projects**

☐ **____# Paper Application sets**

☐ **____Digital Copy of Application** (One sided only)

☐ **Posted Public Notice Verification:**

- ☐ Notarized affidavit with photographs from a distance & close-up

This must be submitted PRIOR to Planning Commission hearing and PRIOR to Morgan County Board of Commissioners hearing

☐ **Additional Information required by staff:**

_____

APPLICANT & LANDOWNERS **MUST** SIGN APPLICATION ON NEXT PAGE

APPLICANT & LANDOWNER'S STATEMENT

I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge.
Application must be signed by landowners as shown on title insurance/commitment.

Applicant Signature	6/14/2024 Date	Landowner Signature	6-19-24 Date
Applicant Signature	Date	Landowner Signature	Date

MORGAN COUNTY, PLANNING, ZONING & BUILDING DEPT.
231 Ensign, P.O. Box 596
Fort Morgan, Colorado 80701
PHONE (970) 542-3526 FAX (970) 542-3509

MORGAN COUNTY RIGHT TO FARM POLICY / NOTICE

Morgan County is one of the most productive agricultural counties in Colorado. Ranching, farming, animal feeding, and all other manner of agricultural activities and operations in Morgan County are integral and necessary elements of the continued vitality of the county's economy, culture, landscape and lifestyle. Morgan County specifically recognizes the importance of agricultural operations as necessary and worthy of recognition and protection.

Landowners, residents and visitors must be prepared to accept as normal the effects of agriculture and rural living. These may include noise from tractors, equipment, and aerial spraying sometimes at night or in the early morning; dust from animal pens, field work, harvesting, and gravel roads; odor from animal confinement operations, silage and manure; smoke from ditch burning; flies and mosquitoes; the use of pesticides and fertilizers, including aerial spraying; and movement of livestock or machinery on public roads. Under the provisions of the State of Colorado's "Right to Farm" law (Section 35-3.5-101 and following, C.R.S.), all normal and non-negligent agricultural operations may not beconsidered nuisances.

Also public services in a rural area are not at the same level as in an urban or suburban setting. Road maintenance may be at a lower level, mail delivery may not be as frequent, utility services may be nonexistent or subject to interruption, law enforcement, fire protection and ambulance service will have considerably longer response times, snow may not be removed from county roads for several days after a major snow storm. First priority for snow removal is that school bus routes are normally cleared first.

Children are exposed to different hazards in a rural setting than they are in an urban or suburban area. Farm and oilfield equipment, ponds, and irrigation ditches, electrical service to pumps and oil field operations, high speed traffic, noxious weeds, livestock, and territorial farm dogs may present real threats to children. It is necessary that children's activities be properly supervised for both the protection of the children and protection of the farmer's livelihood.

All rural residents and property owners are encouraged to learn about their rights and responsibilities and to act as good neighbors and citizens of Morgan County. This includes but is not limited to obligations under Colorado State law and Morgan County Zoning Regulations regarding maintenance of fences, controlling weeds, keeping livestock and pets under control. There may be provisions of which you are unaware. For example, because Colorado is a Fence Law State, owners of property may be required to fence livestock out.

Information regarding these topics may be obtained from the Colorado State University Cooperative Extension Office and the County Planning and Zoning Department, and County Attorney.

RECEIPT AND STATEMENT OF UNDERSTANDING

I hereby certify that I have received, read, and understood the Morgan County Statement of Policy and Notice regarding Right to Farm.

I further state that I am aware that the conditions of living in an unincorporated area are different than living in a town or city and that the responsibilities of rural residents are different from urban or suburban residents. I understand that under Colorado law that a pre-existing, non-negligent agricultural operation may not be considered a public or private nuisance.

To Be Signed by Landowner

Terry L Larson 6-19-24
Signature Date

Terry L. Larson
Printed Name

18712 Rd 26
Address

Brush, CO 80723

Adopted by the Morgan County Board of County Commissioners by Resolution #96BCC41 on July 23, 1996 and amended by Resolution 2008 BCC 34 on September 2, 2008.

1. Project Description

Pivot Solar 71 LLC ("Pivot") is proposing to construct an approximately 1.8-megawatt AC solar energy facility on parcel #103733300001. Pivot currently has approximately 14 acres under lease from the Terry L and Anna M Larsen trusts, located immediately adjacent to the existing solar projects on the property. The total size of the proposed project garden is expected to be approximately 11 acres. The project will deliver electricity to Xcel Energy for 20 years through the utility's "Solar*Rewards" program. The applicant has a lease with the landowners that allows for two extensions of ten years each, for a total lifespan of 41 years prior to decommissioning the project and restoring the parcel to pre-leased conditions.

The panels are expected to be approximately ten feet above grade at their highest point, though final engineering has not yet been completed, and this number is subject to change based on the topography of the site. Pivot will adhere to the maximum height requirements outlined in section 4-825(B)(5) in the Morgan County Zoning Regulations. The site will be surrounded by the same decorative game fence as the sites immediately adjacent, which is similar to the fencing used by the Colorado Department of Transportation (CDOT).

The project lease area will include panels and inverters mounted on steel posts/beams, concrete-pad-mounted transformers, and other electrical equipment. Due to space constraints at the existing access to the solar facilities onsite, access will be taken via a new access along County Road 26 as depicted in the site plan, pending final county approval, and will have a hammerhead emergency turnaround at the entrance. The site will be seeded with a low growth, pollinator-friendly seed mix.

A contracted Operations and Maintenance ("O&M") crew of one to four people will visit the site up to eight times annually for routine inspections, maintenance, and vegetation control and on an as-needed basis to address equipment outages. There will be no permanent staff onsite, which will be remotely monitored. At the end of the project's useful life, Pivot will remove all project materials and return the property to the landowner in the originally leased condition, minus any vegetation and grading. Please reference the decommissioning plan for more information.

2. Purpose of Request

Pivot's proposed project presents an advantageous opportunity for Morgan County and the State of Colorado to generate additional revenue with minimal additional impact. Tax revenues from this project would far exceed any revenues that would be collected from agricultural leases on the same acreage – estimated at approximately $430,000 over the system's life. Importantly, solar projects have minimal draw on the resources funded by their property tax contributions (i.e., no need for potable water, school, social services, etc.).

In addition to their minimal impact on county resources, solar projects (and the proposed project in particular) are very low impact to the surrounding environment. No noise, traffic, fumes, bright lights, or other nuisances are produced during routine operation of the solar farm. In addition, the proposed project is the final phase expansion of an already existing project located on non-producing agricultural land, increasing the economic output of an otherwise underutilized plot of land.

3. Compliance with the Morgan County Comprehensive Plan

The Morgan County Comprehensive Plan's policy goal for economic development is the following: diversify the economy in Morgan County to broaden business employment opportunities for residents and to further economic growth.

- Whenever possible, Pivot and our construction partners will work with local companies to provide labor and materials for the construction and ongoing maintenance of the solar facility.
- The proposed solar facility will bring a diversified source of energy to Morgan County residents, and allows for an "all-of-the-above" energy strategy.

One of the environmental goals of the Morgan County Comprehensive Plan is the following: the county will encourage the preservation of agricultural production lands in balance with pressures for land use changes to higher intensity development

- The land in its current condition lacks agricultural significance and is not in use for crop production purposes. There is currently grazing occurring on the site.
- Pivot regularly utilizes – and will use on this site – sheep grazing for vegetation management, retaining the current use while adding a second, more economically productive use to the land.
- During the proposed solar facility's useful life cycle, a pollinator-friendly, locally appropriate, and low-growth seed mixture will be planted under the array. This will help maintain and likely improve high-quality soils for future agricultural uses following the project's decommissioning.
- Once the solar facility is decommissioned, the owner will retain the land use right of their agricultural parcel to farm in any way they choose.
- Please see the supplemental Decommissioning Plan document for additional information.

The Morgan County Comprehensive Plan's goal for utilities and public services is the following: To ensure that adequate and financially secure public utilities are provided to all developments in Morgan County.

- Once built and operational, the proposed solar facility will provide stable-priced energy to residents without producing any air or noise pollution. Diversifying local energy sources helps reduce volatility in energy prices, improving the financial security of the utilities provided to local residents.
- The proposed project's connection to the utility grid will result in upgrades made to the area's existing electrical distribution grid. Notably, upgrades made will be at Pivot's sole cost, and will not be passed onto ratepayers or local residents.
- The proposed project will generate significant amounts of emission-free energy over its leased term, which is expected to be between 31 and 41 years.

4. How does the project/proposed use meet the criteria for a Special Use Permit?

2-395 Review Criteria The following criteria will be used by the Planning Commission and the Board when reviewing an application for a special use permit:

(A) The use and its location as proposed are in conformance with the Morgan County Comprehensive Plan;

Applicant Response: please see section 3 in this narrative above.

(B) All the application documents are complete and present a clear picture of how uses are to be arranged on the site or within Morgan County;

Applicant Response: please see the included site plan.

(C) The site plan conforms to the district design standards of these Regulations;

Applicant Response: the project conforms to design standards. Please see the included site plan for more detail.

(D) All on and off-site impacts have been satisfactorily mitigated either through agreement, public improvements, site plan requirements or other mitigation measures;

Applicant Response: The proposed solar facility has been designed to minimize impact to surrounding properties. It will be co-located with existing solar facilities and has been designed to be set back at least 500' from all nearby residences.

(E) The special use proposed has been made compatible with the surrounding uses and adequately buffered as determined by the County;

Applicant Response: The proposed solar facility is compatible with the neighboring solar use, and meets buffering requirements set forth in the Morgan County zoning regulations.

(F) The special use poses only the minimum amount of risk to the public health, safety and welfare as set by either federal, state or county regulation, whichever is the strictest;

Applicant Response: The proposed project meets all applicable codes, including the National Electric Code, and does not pose a risk to public heath, safety, or welfare.

(G) The special use proposed is not planned to be developed on a non-conforming parcel;

Applicant Response: the proposed project is not located on a non-conforming parcel.

(H) The applicant has adequately documented a public need for the project, all pertinent technical information, adequate financial resources to implement it, and has paid all fees and review costs levied by the County for application processing and review; and

Applicant Response: See sections 2 and 3 of this narrative for documentation of public need. Technical details can be found in section 1, the site plan, and other supporting documentation in

this application. Pivot Energy has a long track record of successfully implementing projects in the state of Colorado, including the projects directly adjacent to the proposed project.

(I) For any special use requiring a supply of water for human consumption that the applicant has demonstrated a source of water which is adequate for the proposed use in terms of quantity, quality, and reliability. For any special use which does not require a supply of water for human consumption, an adequate source of water for the proposed use in terms of quantity and reliability must be obtained prior to commencement of the use.

Applicant Response: No water source, potable or non-potable, is proposed for the project.

5. How does the project/proposed use meet any specific criteria related to the project/proposed use?

- The applicant has reviewed the Morgan County Solar Collector Facility Regulations and has included all pertinent information within the application submittal packet.
- Overall site drainage patterns will remain the same. Please see the drainage letter for additional information.
- Applicant has included site plan, traffic letter, drainage letter, maintenance statement, decommissioning plan, soils report, and environmental impacts review. These are all supplemental documents.
- Applicant is currently under contract with an outside consultant to provide a geotechnical study for the project area that is compliant with the Morgan County Zoning Regulations, section 4-820(J)
- As stated above, the proposed project does not require a well, septic system, public water, or sewer because no one will work at the site once construction is complete.

6. How will the project relate to or impact existing adjacent uses

- The site is currently vacant. There are no residences located within 500' of the proposed solar facility. The project is bordered to the north by the interstate, to the east by the golf course, and to the west by existing solar.
- Pivot commits to and has already begun working collaboratively and in good faith with adjacent property owners to mitigate the visual impact of the project in their viewshed.
    i. All abutters of the property were sent a letter of introduction to the project, complete with contact information and a frequently asked questions page
    ii. Pivot held a community meeting on Tuesday, 4/30/24 from 5:30-6:30PM at the Pettey's Park Golf Course, which all abutters were invited to.
    iii. One abutter attended the community meeting in an informational capacity, and did not have any direct comments about the project.
    iv. To date, Pivot has not received any feedback about the project.
- The proposed project will have a minimal impact on the land and will not deplete natural resources.
- Any temporary disturbance of plant or animal habitat related to the construction of the project will be mitigated during post-construction site stabilization, including reseeding with locally appropriate low-growth grasses as selected or recommended by the County staff.

- Pivot does not expect to do any major grading or earthwork onsite during construction.
- Once construction has commenced, the site will run without personnel and will not impact local traffic patterns.

7. All off-site impacts and proposed mitigation measures

- The site will not utilize and public utility facilities, such as water or sewer. The site also will not be accessible to the public. Only the maintenance crew and emergency services will have access to the site.
- The site will be surrounded by a decorative, wildlife-friendly game fence which will serve to break up the visual impact of the facility when viewed from adjoining properties. The fence will be approximately 8-feet in height and will have a gate locked to the public.

8. Development or Implementation schedule of project

- During construction, crews will be on-site from approximately 7:00 am - 6:00 pm Monday-Friday. Most vehicles will arrive early in the morning (7:00 to 9:00 am) and will begin departing the construction site around 3:00 pm.
- Once constructed, the site will be unmanned but the solar farm will generate electricity during daylight hours each day of the year.
- Operations and maintenance crews will be on-site up to eight times annually for up to four hours per visit.
- During the construction phase, there will be a crew made up of approximately 40 people on site each day. The construction crew will consist of project managers, laborers, electricians, civil contractors, and any other necessary personnel for the project. Once construction is complete, there will be no one on site, other than the O&M crew during their scheduled trips. The site will not be open to the public.
- The gate around the site will be locked and will only be accessible to those constructing the facility or periodically maintaining the facility. The site will also be accessible to life-safety emergency personnel.
- Please reference the Traffic Impact Memo for details on trip generation

9. Proposed length of time for the permit

- The applicant requests that the permit be granted commensurate with the full term of the system's land lease, which will be 41 years from the date of commercial operation.

10. Discussion of any public improvements required to complete the project

- No public improvements are required for this project. The applicant proposes to utilize access off of the existing Public ROW, and once onsite, no water, sewer, etc., are required. The facility is unmanned.

11. Liability Insurance Statement

- Assuming this project is approved in the land use permitting process, Pivot Solar 71 LLC will carry liability insurance to cover loss or damage to persons and structures during construction and operation of the solar collector facility.

Pivot Energy

April 16, 2024

«Nname»
«NAddressStreet»
«NAddressCity», «NAddressState» «NAddressZip»

RE: Final Phase of Solar Facilities on the Larsen Parcel

Dear Neighbors,

My name is Bradley Thomas and I work at Pivot Energy, a Colorado-based solar developer. We develop thoughtful small scale solar projects to support American energy independence, provide a low-cost energy alternative, and create new jobs and investment stemming from the growing alternative energy economy. I am working with your neighbor, Terry Larsen, to develop the final phase of the solar projects on his parcel. The final phase will be a 1.8-megawatt (MW), 11.3-acre solar facility that will blend in seamlessly with the existing previous phases. You are receiving this letter because you are an abutter to the parcel of land the project will be located on.

As an experienced developer in Colorado, I know how important it is to work with the local community throughout the process. We appreciate you being a great neighbor for the previous phases and wanted to extend an invitation to discuss the final phase in advance of the permitting process. **Before we submit our permit application, we will be hosting a community meeting from 5:30-6:30PM on Tuesday, April 30, located at Pettey's Park Golf Course Banquet Room, 2301 West Mill St, Brush, CO.** We encourage you to stop by for a brief presentation, learn more about the project, and give us your feedback! If you can't make it, my contact information is at the bottom of this letter – please reach out via email or phone; I would be happy to discuss the project in more detail. Please see the following pages for details on the project and a solar frequently asked questions packet.

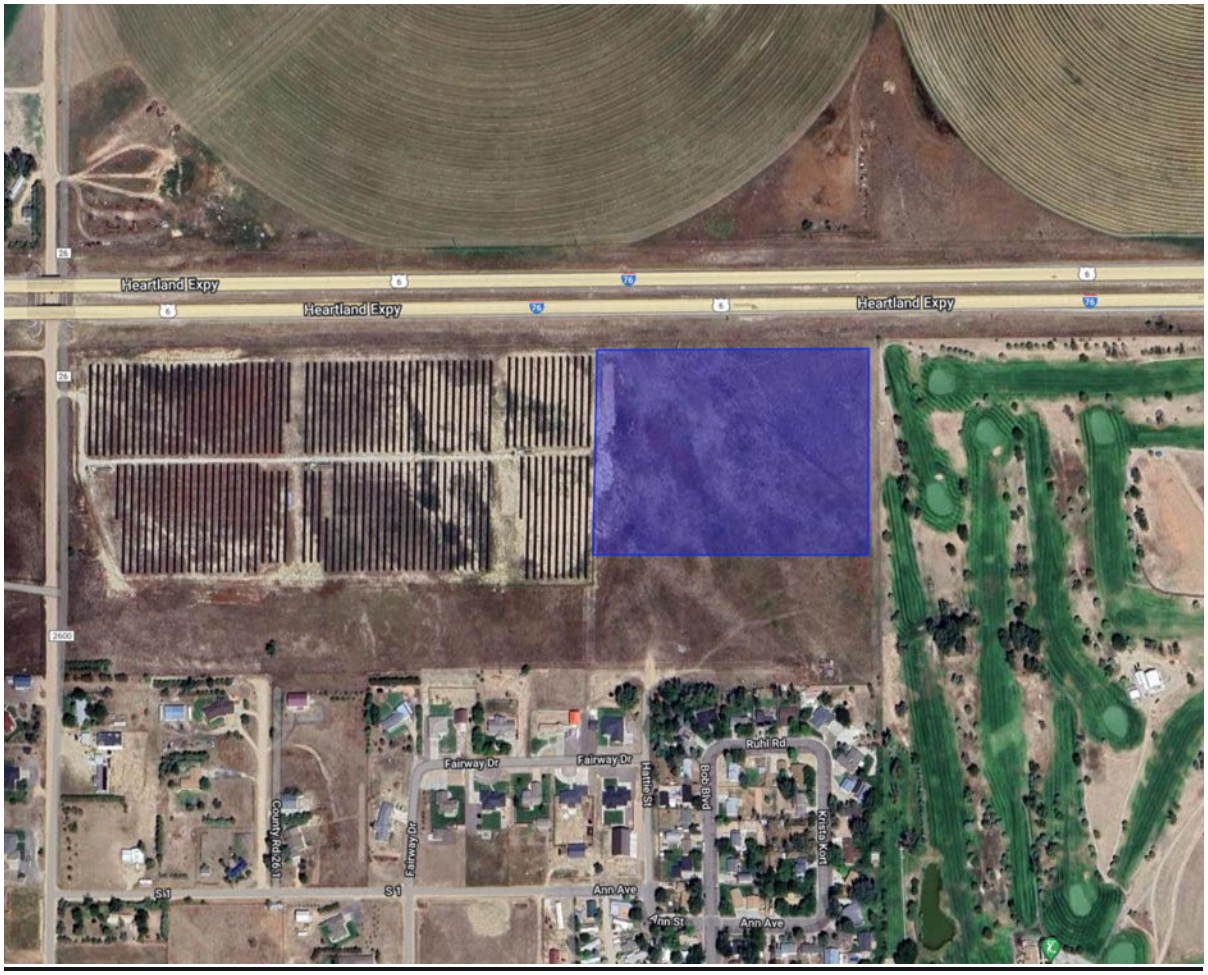
I want to assure you upfront that we will continue to be a good and transparent neighbor, and after a short construction period (approximately 4-6 months) our project will create no noise, and generate no emissions or traffic in the area, as you know based on the first phases.

Pivot works to develop projects that fit with the land and surrounding environment while bringing economic benefit to the local area. We take feedback seriously and appreciate your input.

Sincerely,

Bradley Thomas | Senior Associate, Project Development
[redacted]

Project Details



Proposed array area highlighted in blue

- Project Size: 1.8MW AC, enough to power roughly 483 Colorado homes
- Project Acreage: roughly 11.3
- Final phase of solar development on this parcel
- Arrays will appear contiguous with previous phases

Frequently Asked Questions

- **How will this project benefit my community?** This project will help Morgan County broaden its energy sources to increase resiliency, stabilize energy costs, and preserve the land for future generations.

Over the project's 20-40 year lifespan, property taxes will be paid to the County to support schools, road building, and other important community projects.

Additionally, a community benefits package will provide funding to local workforce development and other local initiatives important to the residents of Morgan County. As critical stakeholders in this project, we would like to solicit input from the local community on which non-profits we should support. If there's a local organization you feel passionate about or would like to support, please submit your recommendations to communityfeedback@pivotenergy.net. We'd love to hear from you!

- **Who is Pivot Energy?** Founded in 2009, Pivot Energy is a national renewable energy provider that develops, finances, builds, owns, and manages solar and energy storage projects. We have developed over 850 unique projects, and have a long track record of delivering high quality projects to the communities we work with. Pivot is a Certified B-Corporation that proudly follows a corporate strategy aimed at providing a positive impact on society. For more information please visit our website (https://www.pivotenergy.net/).

- **How much noise will the equipment produce**? The inverters are the equipment that convert the energy produced by the solar panels (DC energy) into energy that can be connected into the existing electrical grid (AC energy). They make about the same amount of noise as a residential air conditioning unit - between roughly 50 and 60 decibels. The inverters are typically located towards the center of the solar array - this is hundreds (and sometimes thousands) of feet away from the nearest residence and cannot be heard.

- **Will the panels cause a glare or reflection?** We use anti-reflective technology that is designed to absorb as much light (photons) as possible. In fact, absorption, not reflection, is a critical function of a solar PV module. The blue-black material of a solar cell is designed to absorb light, and each module is coated with shatter-resistant, anti-reflective glass.

- **Are there any bright lights used?** No bright lights will be used during the construction or operation phases of the solar farm. For a project of this size, the bulk of the construction takes place within a 4-6 month period, and only during daylight hours. The solar facility only operates during daylight hours and has no lights associated with it.

- **Will the solar garden impact local wildlife habitats?** All applicable agencies will review the required impact studies to verify that the proposed facility will not threaten endangered species or their habitats. Additionally, measures are in place to minimize any impact on the local wildlife.

- **How will this impact the local environment?** We aim to improve the environment and leave the soil in an even better condition than its current state through responsible environmental management techniques and adherence to site management practices specified by Morgan County. At a minimum, we will plant locally appropriate plants/pollinator habitat as ground cover, and we default to agriculturally friendly vegetation management practices, such as animal grazing. This has the additional benefit of improving soil quality over time. The soil will be kept intact beneath the PV panels. The panels will be installed on a low-profile racking system with no

concrete footers. Racking posts are put directly into the ground, and are easily removable, like toothpicks in a birthday cake. Once removed and properly decommissioned, the project leaves no trace, so the land is ready to be planted on again. Solar garden components are primarily inert (steel, aluminum, glass) and will not require extensive clean-up for any use once solar operations cease. All components will be recycled, repurposed, or removed from the property at the end of the project term.

- **How tall will the solar array be**? The solar array will not exceed 15 feet tall at the highest point, and will likely be much shorter, depending on the site's topography. There will be a small weather sensor located near the equipment pad that will be about 10' tall and about the size of a football.

- **How tall will the fence be**? We will install an 8' tall game fence around the solar array to keep larger wildlife such as deer out of the project. This is consistent with National Electric Code requirements for this type of facility.

- **How long does construction take**? The bulk of construction occurs within a 4-6 month period.

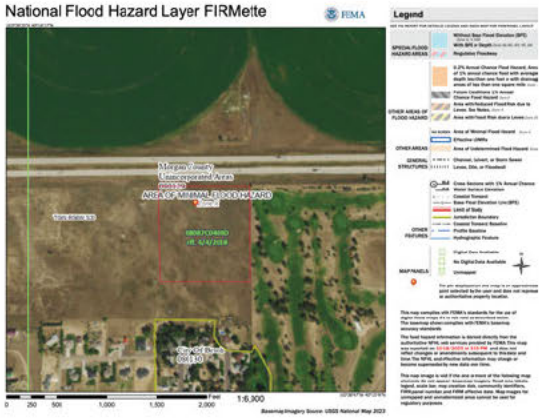
- **How often do you visit the site once it's operational**? Typically, we visit the site between four and eight times annually to perform routine electrical and mechanical testing, and vegetation management. We will use a standard pickup truck during these visits.

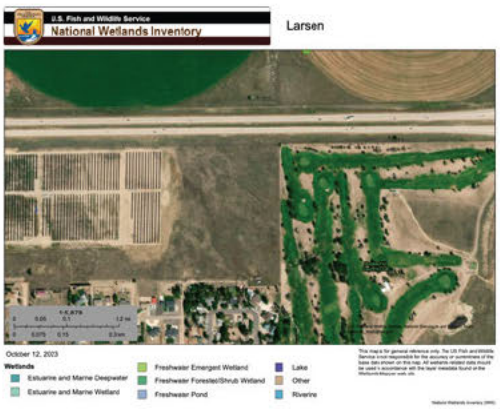
- **Why did you choose this location for the solar array**? Choosing the best site for solar is a complicated process! Several needs must be met to create a viable project: sites must be relatively flat, open, buildable, unshaded, and in the correct zoning district. They also must be in proximity to the right electrical infrastructure – we require electrical distribution lines with the right usage level, in the right utility service territory, connected to the right substation, to have a viable connection to the grid. Our job is to find good landowner partners that own land where all of these electric needs can be met.

- **How close will the solar project be to residences?** Morgan County code generally requires a 500' setback from solar arrays to the nearest house. This project will be designed to be as far back from any residences as possible, and will blend in with the previous phases of solar on the property.

Pivot Solar 71 LLC – Environmental Impacts

1. Air Quality
   - The solar garden will not impact the air quality of the surrounding area.
2. Noise
   - During construction, there will be some noise during the 3-4 weeks when delivery trucks are arriving, and posts are being pounded into the ground to support the system.
   - Once the system is built, any noise will only come from the inverters. The inverters will be in the center of the array. The sound from the inverters is comparable to that of a home air conditioning unit. The sound of the inverters will not be audible from outside the project boundary.
3. Wetlands
   - The area where the project is located is not considered a wetland or floodplain area. Please see the attached maps.





4. Dust
   - Please see supplemental Dust and weed Mitigation Plan
5. Odor
   - No odor will be emitted from the solar garden.
6. Wildlife
   - The solar facility will be surrounded by an 8-foot wildlife-friendly game fence. This fence will be made of wood posts and mesh wiring so that large animals will be kept out and small animals can move between the areas if needed.

7. Existing Vegetation
   - Within the fence line and on any other areas disturbed during construction, applicant will establish locally appropriate, low-growth grasses in keeping with vegetation common for the area to allow the project area to blend in with the surroundings.

8. Storm Water Runoff
   - Please see the supplemental Drainage memo.

9. Visual Amenities
   - The main strategy employed to lessen the visual impact of the proposed installation is to surround the facility with a decorative, wildlife-friendly game fence which will break up the facility's visual impact when viewed from adjoining properties.
   - The applicant will use low-growth grasses in keeping with the vegetation common for the area to

allow the project area to blend in with the surroundings.

10. Land Forms
    - No major impacts to the surrounding landforms will take place. Minor earth movement may take place to smooth the surface to prepare for construction.
    - Once the project is decommissioned, the land will be returned to its original state.
    - Please see the supplemental Decommissioning Plan for more information.

11. Water Resources
    - No water or irrigation will be needed to run the solar garden.

Site maintenance is critical to ensure that an operational solar facility meets all conditions of operation. This document outlines the steps the operator will take to ensure the site is properly maintained during construction and throughout the operational life of the facility.

1) Weed Management

A. If construction occurs during the growing season, Pivot will apply broadleaf herbicide prior to commencing construction. Once construction is complete, Pivot will re-apply broadleaf herbicide if needed to allow planted native grass seed mix to revegetate.

B. Hydroseed or hydro-mulch, drought-tolerant native grass seed mix in the early spring or early fall. The final seed mix will be determined by an approved professional knowledgeable with re-vegetation means and methods.

C. Mow project area a minimum of once per year, at a cut height of no less than six inches. It is possible that mowing may need to take place twice or more during the growing season

D. Since weed seeds remain viable in the soil for several years, site and weed management is a long-term process. Treated areas will be monitored annually and retreated if necessary, using typical weed management practices and procedures.

2) Planting Method

The preferred method will be hydroseed and hydro-mulching. If required, nutrient supplementation will take place to ensure the successful establishment of permanent ground cover. Permanent seeding shall occur between December 1 and May 1 or between August 1 and September 1, or as recommended by a vegetation specialist.

3) Temporary Seed Mix

Temporary seeding areas, which will be ready for stabilization after May 1 and before August 1, shall be seeded with Millet or Sorghum at the rate of 40 pounds per acre, with the amount of fertilizer as specified. The requirement to plant temporary seeding does not eliminate the requirement to plant permanent seeding. Straw mulch is not required for temporary seeding.

4) Permanent Seed Mix

The seed mix will consist of locally appropriate, drought-tolerant, low growing grasses and flowering plants. If viable, preference will be given to a seed mix that can support pollinators. The final mix will be determined at the time of planting by a qualified vegetation specialist.

5) Site Maintenance Checklist

A. Mow project area once per year at a minimum to a cut height of 6 inches or greater.
B. Walk the site and remove any accumulated debris on either side of the fence line and properly dispose of it. No burning of trash will be allowed.
C. Apply herbicide as needed to control noxious weeds.
D. Inspect and re-seed any bare ground with permanent seeding.
E. Inspect fence and repair as needed.
F. Inspect all-weather access roads and repair them as needed.
G. Inspect the site for any visible erosion. Remove transported sediment and implement necessary erosion control measures to minimize future maintenance issues.

6) Dust Mitigation

Tactics to control/manage dust during construction may be any of the following (depending on site conditions:

A. A water truck shall be used as determined by the contractor to wet all access roads and disturbed areas as appropriate to control dust and prevent soil loss
B. Construction traffic to use marked temporary or permanent access points to limit cross-country travel and reduce disturbance
C. Vehicle track-out pads to be used for temporary and permanent access points
D. Sediment controls such as silt fences, sediment barriers, and basins shall be in place prior to soil-disturbing activities
E. Runoff shall be diverted when feasible using temporary slope drains, or earthen berms, or ditches

7) Solar Panel Maintenance Statement

As the long-term owner and operator of the project, the applicant certifies that the solar energy equipment located onsite will be maintained and operated in accordance with all applicable manufacturer specifications, owner environmental health and safety plans, and applicable OSHA requirements, per the Morgan County Zoning Regulations, section 4-820(M).

SPECIAL USE REVIEW

MORGAN PS71/LARSEN TRUST (PHASE 4)

LOCATED IN THE NORTH HALF OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 4 NORTH, RANGE 56 WEST OF THE 6TH P.M.,

COUNTY OF MORGAN, STATE OF COLORADO

CONTACTS

OWNER/DEVELOPER — PIVOT ENERGY
1601 WEWATTA STREET, SUITE 700
DENVER, CO 80202
888-734-3033

ENGINEER/SURVEYOR — TROY SPRAKER/LAINE A LANDAU P.L.S.
LAMP RYNEARSON
4715 INNOVATION DRIVE
FORT COLLINS, CO 80525
970-226-0342

SITE DATA:
PARCEL#:103733300001
PARCEL ACREAGE:60.1971
PROJECT ACREAGE:11.3
EXISTING ZONING: RURAL RESIDENTIAL
EXISTING LAND USE-UNDEVELOPED
SYSTEM SIZE: 2.0 MWDC
SOILS: SAND NRCS TYPE A

FLOOD ZONE DESIGNATION:
ZONE X FIRM PANEL: 08087C0469

PROJECT CONTROL
CONTROL POINT #10: 5/8" X 24" REBAR WITH A 1 1/4" ORANGE PLASTIC CAP, STAMPED: "CONTROL POINT". ALL COORDINATES IN INTERNATIONAL FEET.
N: 1345006.739 LAT: 40°15'56.64183"N
E: 3514820.458 LONG: 103°39'18.22643"W
EL: 4251.025

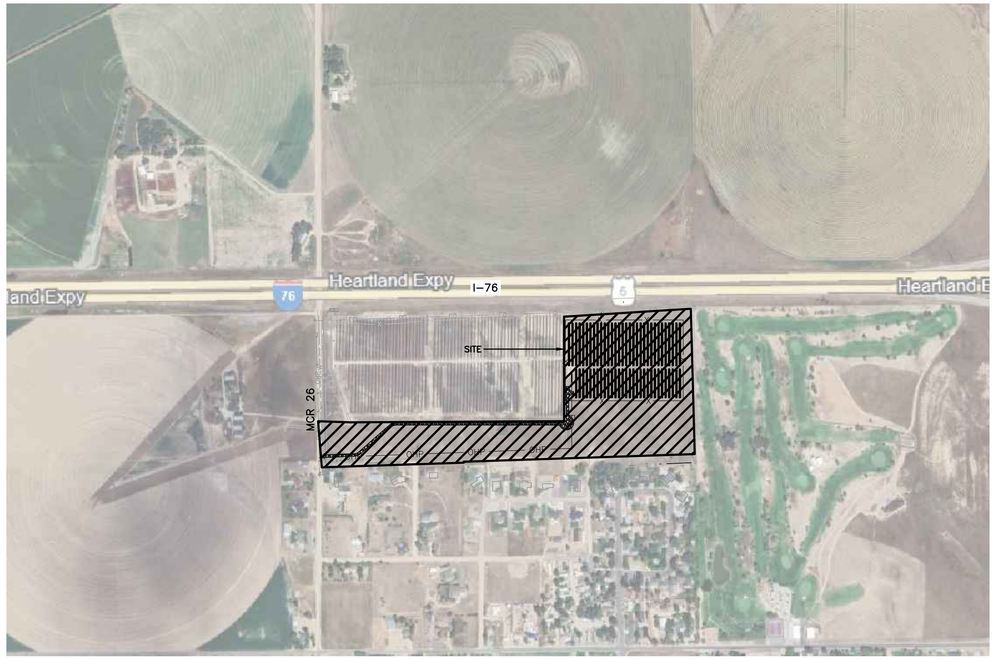
HORIZONTAL DATUM
NORTH AMERICAN DATUM OF 1983 (2011);
COLORADO STATE PLANE SYSTEM, NORTH ZONE
POSITIONS ESTABLISHED USING AN OPUS SOLUTION FROM CP #1
ALL COORDINATES IN INTERNATIONAL FEET.

*PROJECT IS IN MODIFIED STATE PLANE COORDINATES. TO ACHIEVE GRID COORDINATES AND GRID DISTANCES SCALE ENTIRE PROJECT BY 0.999575601 FROM CP #1 AS THE SCALE LOCATION.

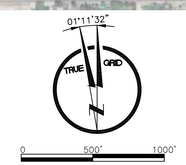
CONTROL POINT #1
NAD83 LAT: 40°15'55.20816"N
NAD83 LONG: 103°38'16.31634"W
HT: 4170.285' INTFT
ELEV: 4234.846' INTFT

VERTICAL DATUM
NORTH AMERICAN VERTICAL DATUM OF 1988,
ELEVATIONS ARE ESTABLISHED THROUGH GNSS MEASUREMENTS USING GEOID MODEL 18.

BENCHMARKS:
NGS MONUMENT DESIGNATED – P 418, PID "LK0380", PUBLISHED EL=4235.41.



LOCATION MAP
SCALE 1" = 500'



INDEX OF SHEETS

Sheet List Table

LEGAL DESCRIPTION
STEWART TITLE GUARANTY COMPANY
ISSUING OFFICE: NORTHERN COLORADO TITLE SERVICE CO. INC.
COMMITMENT NO. NCT24844

LOCATED IN THE NORTH HALF OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 4 NORTH, RANGE 56 WEST OF THE 6TH P.M.,
MORGAN COUNTY,
STATE OF COLORADO

BOARD OF COUNTY COMMISSIONERS CERTIFICATE
SITE PLAN CASE NO. _____

APROVED THIS ___ DAY OF _____, 20___, BOARD OF COUNTY COMMISSIONERS, MORGAN COUNTY, COLORADO

ATTEST _____ _____
CLERK TO THE BOARD CHAIRMAN

CLERK AND RECORDER'S CERTIFICATE
STATE OF COLORADO)
)SS.
COUNTY OF MORGAN)

I HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED IN MY OFFICE AT __O'CLOCK _____.M. THIS ___ DAY OF _____, 20___, AND IS DULY RECORDED IN _____.

RECORDING FEES OF _____ ARE PAID.

_____
CLERK AND RECORDER

_____
DEPUTY

LAMP RYNEARSON

LAMPRYNEARSON.COM
OMAHA, NEBRASKA
14710 W. DODGE RD. STE. 100 (402) 496.2498
NE AUTHORIZATION NO.: CA0130
FORT COLLINS, COLORADO
4715 INNOVATION DR., STE. 100 (970) 226.0342
KANSAS CITY, MISSOURI
9001 STATE LINE RD., STE. 200 (816) 361.1440
MO AUTH. NO.: E-2013011903 | LS-2019043127

L:\Engineering\0224003 Pivot Brush Larsen PS 71\DRAWINGS\CONSTRUCTION DRAWINGS\0224003.01 CVR-01.dwg, 10/6/2024 2:49:45 PM, TROY SPRAKER, LAMP RYNEARSON

0224003.01 10/04/2024 Brush, Colorado
PIVOT SOLAR ARRAY PS-71(LARSEN)

EXISTING

- AIR
- BUILDING OVERHANG
- CABLE
- CONDUIT
- CONSTRUCTION FENCE
- CREEK FLOW LINE
- CREEK FLOW DIRECTION
- DRAIN TILES
- ELECTRIC
- EFF LINE
- FENCE
- FENCE – BARBED WIRE
- FENCE – STEEL
- FENCE – WIRE
- FENCE – WOOD
- FIBER OPTICS
- FLOOD PLAIN
- FLOW ARROW
- FLOW LINE
- FORCE MAIN
- GAS
- GRAVEL AND DIRT EDGE
- GUARD RAIL
- IRRIGATION
- MAIN DRAIN LINE
- NON POTABLE WATER
- OIL
- OIL AND GAS
- OVERHEAD POWER
- OVERHEAD TELEPHONE
- OVERHEAD UTILITY
- POWER
- RAILROAD TRACKS
- RAW WATER
- RECIRCULATION
- ROOF DRAIN
- SANITARY SEWER
- STORM SEWER
- STREAM
- TELEPHONE
- UNDER DRAIN
- UNIDENTIFIED UTILITY
- UTILITY
- VEGETATION LINE
- WATER
- WATERS EDGE

- SANITARY CLEAN OUT
- SANITARY MANHOLE
- SEWER WARNING SIGN
- SEPTIC TANK
- AREA INLET ROUND
- AREA INLET SQUARE
- GRATE INLET
- GRATE INLET W/ HOOD
- STORM MANHOLE
- STORM PIPE END
- 4' CURB INLET
- CURB INLET LEFT
- CURB INLET RIGHT
- DOWN SPOUT/ROOF DRAIN
- FLARED END SECTION
- CONTINUE SYMBOL
- CABLE MANHOLE
- CABLE WARNING SIGN
- CABLE PEDESTAL
- CABLE PULLBOX
- LIGHT POLE
- YARD LIGHT
- GROUND LIGHT
- BLDG MOUNTED LIGHT
- STREET LIGHT
- POWER POLE
- H STRUCTURE
- H STRUCTURE W/ TRANSFORMER
- ELECTRIC MANHOLE
- ELECTRIC METER
- ELECTRIC PEDESTAL
- ELECTRIC PULLBOX
- ELECTRIC TRANSFORMER
- ELECTRIC VAULT
- ELECTRIC WARNING SIGN
- GUY
- FIBER OPTIC MANHOLE
- FIBER OPTIC PULL BOX
- FIBER OPTIC VAULT
- FIBER OPTIC PEDESTAL
- FIBER OPTIC WARNING SIGN
- FUEL TANK
- FUEL CAP
- FUEL PUMP
- GAS CURB STOP
- GAS MANHOLE
- GAS METER
- GAS VALVE
- GAS WARNING SIGN
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- TELEPHONE PULLBOX
- TELEPHONE WARNING SIGN
- UNIDENTIFIED MANHOLE
- UNIDENTIFIED UTILITY PEDESTAL
- UNIDENTIFIED VALVE
- UNIDENTIFIED PULLBOX
- WATER CURB STOP
- WATER MANHOLE
- WATER METER
- WATER VALVE

- WATER WARNING SIGN
- AUTO SPRINKLER BUILDING
- FIRE HYDRANT
- POST INDICATOR VALVE
- YARD HYDRANT
- IRRIGATION CONTROL VALVE
- IRRIGATION SPRINKLER HEAD
- WELL
- MONITORING WELL
- TABLE
- SATELLITE DISH
- MAILBOX
- MISCELLANEOUS POINT
- VENT
- TOWER
- PROPANE TANK
- FLAGPOLE
- AIR CONDITIONING UNIT
- DRINKING FOUNTAIN
- BBQ PIT
- BENCH
- BOLLARD
- BORE HOLE
- COLUMN ROUND
- COLUMN SQUARE
- VACUUM
- TREE DECIDUOUS
- TREE CONIFEROUS
- BUSH
- BOULDER
- ARROW LEFT
- ARROW RIGHT
- ARROW STRAIGHT
- STRIPING "ONLY"
- BICYCLE STRIPING
- HANDICAP SYMBOL
- TRAFFIC SIGNAL
- TRAFFIC SIGNAL PEDESTAL
- TRAFFIC SIGNAL PULL BOX
- PARKING METER
- SIGN
- STOP SIGN
- YIELD SIGN
- RR CROSSING ARM
- BENCHMARK
- TEMPORARY BENCHMARK
- ROW MARKER
- CONTROL POINT
- MONUMENT FOUND
- MONUMENT SET
- WITNESS CORNER
- COMPUTED CORNER
- SECTION CORNER TIE
- SECTION CORNER

RECORD

- AIR
- CABLE
- ELECTRIC
- FIBER OPTIC
- GAS
- SANITARY SEWER
- STORM SEWER
- TELEPHONE
- UNDERGROUND POWER
- UTILITY
- WATER

PROPOSED

UTILITY

- AIR
- CABLE
- CONDUIT
- CONSTRUCTION FENCE
- DRAIN TILES
- FENCE
- FENCE – BARBED WIRE
- FENCE – STEEL
- FENCE – WIRE
- FENCE – WOOD
- FIBER OPTICS
- FLOW ARROW
- FORCE MAIN [SINGLE LINE]
- FORCE MAIN [DOUBLE LINE] — 8"FM
- GAS
- GRAVEL AND DIRT EDGE
- IRRIGATION
- LIMITS OF CONSTRUCTION
- NON POTABLE WATER
- OIL
- OIL AND GAS
- POWER
- RAW WATER
- ROOF DRAIN
- SANITARY SEWER [SINGLE LINE]
- SANITARY SEWER [DOUBLE LINE] — 8"SS
- SANITARY SEWER SERVICE — 8"SS
- SANITARY SERVICE RISER — 8"SS
- STORM SEWER [SINGLE LINE]
- STORM SEWER [DOUBLE LINE] — 18"ST
- TELEPHONE
- UNDER DRAIN
- UTILITY
- WATER [SINGLE LINE]
- WATER [DOUBLE LINE] — 6"W
- DROP MANHOLE
- SLOTTED UNDER DRAIN — 8"DR
- WATER — 2"W
- AIR TAP
- FIRE HYDRANT
- TEE
- BEND
- REDUCER
- VALVE GATE
- MANHOLE
- FLARED END SECTION
- CURB INLET
- AREA INLET
- GRATE INLET

GRADING

- CONTOUR — 1100
- FUTURE CONTOUR — 1100
- EXISTING CONTOUR — 1100
- WETLANDS AREA NOT TO BE DISTURBED
- FILL AREA
- STABILIZED ACCESS ROAD
- VEGETATED BUFFER STRIP
- SPOT ELEVATION — 1000.00
- LIMITS OF DISTURBED AREA
- FLOOD PLAIN

DRAINAGE

- 100 YEAR
- 500 YEAR
- 2 YEAR EGL
- 5 YEAR EGL
- 10 YEAR EGL
- 100 YEAR EGL
- 2 YEAR HGL
- 5 YEAR HGL
- 10 YEAR HGL
- 100 YEAR HGL
- FLOOD WAY
- RIDGE
- FLOW PATH
- DRAINAGE AREA NAME — AC. / C=
- DRAINAGE AREA RUNOFF COEFFICIENT
- DRAINAGE BASIN DELINEATION
- DRAINAGE SUB BASIN DELINEATION
- TIME OF CONCENTRATION DRAINAGE PATH — GRA 254 @ 7.85%

EROSION CONTROL

- EARTH BERM
- EARTH DIVERSION
- EROSION CONTROL LOG
- FILL DIVERSION
- INTERCEPTOR DIKE
- INTERCEPTOR SWALE
- LEVEL SPREADER
- LEVEL TERRACE
- SEDIMENT CONTROL LOG
- SILT FENCE
- STRAW WATTLE
- TEMPORARY DITCH
- BIORETENTION GARDEN
- WATTLE — W
- VEHICLE TRACKING PAD
- TEMPORARY SEEDING
- STRAW HAY BALE — STB
- SLOPE PROTECTION — SP
- PERMANENT SEEDING
- INLET PROTECTION — IP

PAVEMENT

- PAVEMENT
- PCC CURB AND GUTTER
- RETAINING WALL
- X" PCC PAVEMENT
- ASPHALT PAVEMENT
- SIDEWALK PAVEMENT
- PAVING BARRICADE
- BUILDING
- PARKING STALL COUNT — 15
- FLOW LINE
- JOINT A
- JOINT B
- JOINT D
- JOINT E
- JOINT F
- JOINT G
- JOINT H
- JOINT JLC–K
- JOINT JLH–S

PLATTING

- PROPERTY/BOUNDARY LINE
- PROPOSED LOT LINE
- ADJACENT LOT LINE
- SECTION LINE
- EASEMENT
- MONUMENT SET
- MONUMENT FOUND
- SECTION CORNER
- COMPUTED CORNER
- WITNESS CORNER

GENERAL ABBREVIATIONS

ADA	AMERICANS WITH DISABILITIES ACT
ASPH	ASPHALT
BC	BACK OF CURB
BOSW	BACK OF WALK
BP	BOTTOM OF PIPE
BW	BOTTOM OF WALL
(C)	COMPUTED DIMENSION
CATV	CABLE TELEVISION
CF	CUBIC FOOT
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CP	CONTROL POINT
CPP	CORRUGATED PLASTIC PIPE
CY	CUBIC YARD
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
E	EAST
ELEV	ELEVATION
EOG	EDGE OF GRAVEL
FES	FLARED END SECTION
FF	FINISH FLOOR ELEVATION
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOWLINE
G	GUTTER
GB	GRADE BREAK
HP/LP	HIGH POINT/LOW POINT
HORIZ	HORIZONTAL
HPC	HORIZONTAL POINT OF CURVATURE
HPI	HORIZONTAL POINT OF INTERSECTION
HPT	HORIZONTAL POINT OF TANGENCY
HPCC	HORIZONTAL POINT OF COMPOUND CURVATURE
HPRC	HORIZONTAL POINT OF REVERSE CURVATURE
IE	INVERT ELEVATION
LF	LINEAR FEET
(M)	MEASURED DIMENSION
MH	MANHOLE
ME	MATCH EXISTING
N	NORTH
N.T.S.	NOT TO SCALE
OT	OPEN TOP PIPE
(P)	PLAT DIMENSION
PL	PROPERTY LINE
PT	PINCHED TOP PIPE
P.V.C.	POLYVINYL CHLORIDE
PVC	POINT OF VERTICAL CURVE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
X 1020.12	SPOT ELEVATION
(R)	RECORD DIMENSION
RB	REBAR
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT OF WAY
S	SOUTH
SF	SQUARE FEET
SS	SANITARY SEWER
ST	STORM
STA	STATION
STD	STANDARD
SW	SIDEWALK
T	TELEPHONE
TC	TOP OF CURB
TOF	TOP OF FOUNDATION
TOG	TOP OF GRADE
TOI	TOP OF ISLAND
TP	TOP OF PAVEMENT
TS	TOP OF SLAB
TW	TOP OF WALL
TYP.	TYPICAL
VERT	VERTICAL
W	WEST
WQCV	WATER QUALITY CAPTURE VOLUME
YPC	YELLOW PLASTIC CAP
TYP.	TYPICAL
VERT	VERTICAL

LAMP RYNEARSON

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KANSAS CITY, MISSOURI
9001 STATE LINE RD., STE. 200 (816) 361.0440
MO AUTH. NO.: E-2013011903 | LS-2019043127

PRELIMINARY

NOT RELEASED FOR CONSTRUCTION

Troy Spraker

P.E. 38538

LEGEND

PIVOT SOLAR ARRAY PS-71(LARSEN)

BRUSH, COLORADO

811 Know what's **below.** **Call** before you dig.

ALL UTILITIES ARE SHOWN BASED ON THE INFORMATION AVAILABLE TO THE ENGINEER. THERE IS NO GUARANTEE ALL FACILITIES ARE SHOWN OR THAT THE LOCATIONS, TYPES AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES AND SERVICE LINES PRIOR TO CONSTRUCTION.

REVISIONS

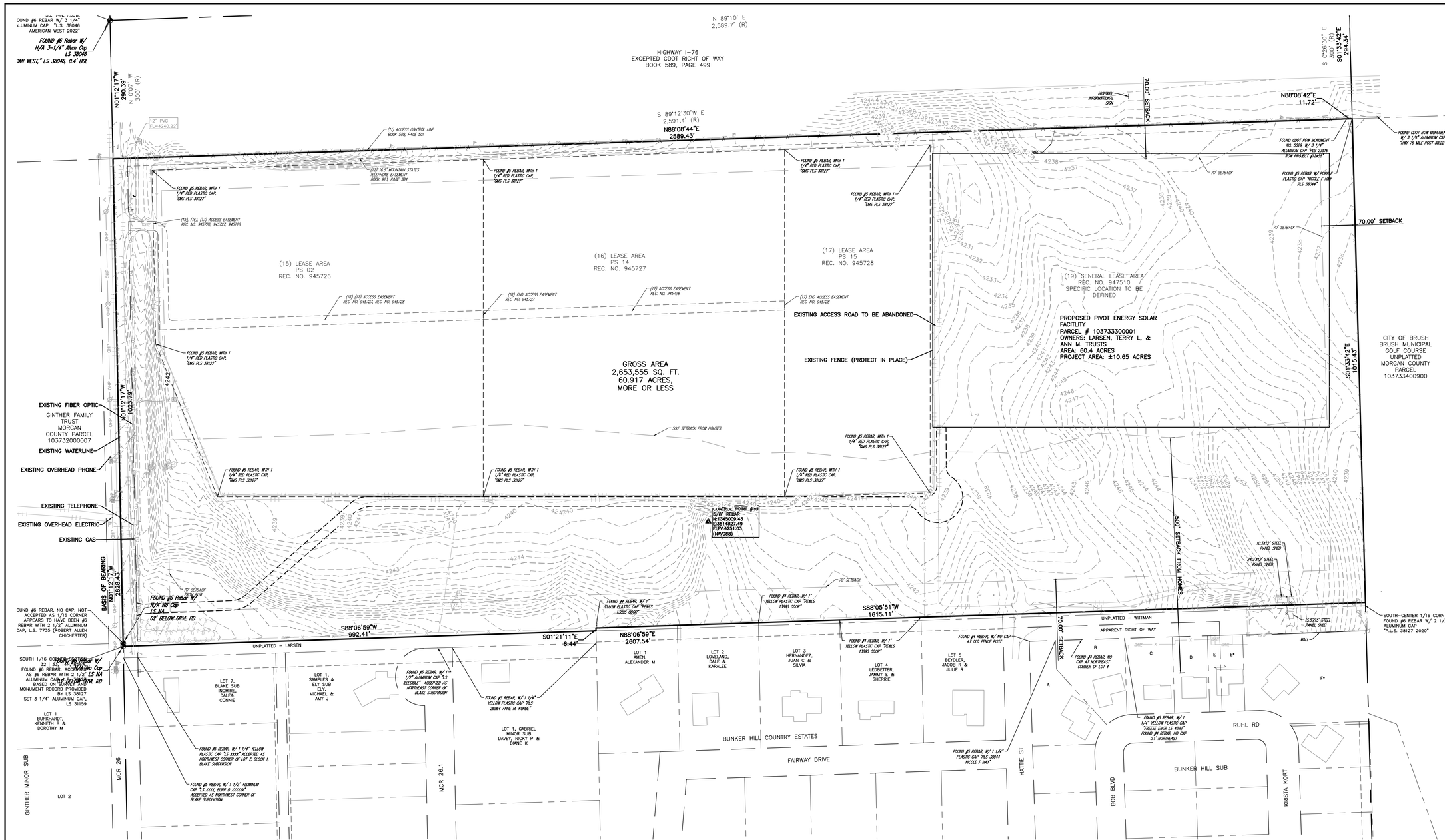
DESIGNER / DRAFTER
AGM

DATE
10/04/2024

PROJECT NUMBER
0224003.01

BOOK AND PAGE

SHEET
2 OF 8



EXISTING LEGEND

WATER	PROPERTY/BOUNDARY LINE
ELECTRIC	PROPOSED LOT LINE
FENCE	ADJACENT LOT LINE
FIBER OPTICS	SECTION LINE
GAS	GRAVEL AND DIRT EDGE
OVERHEAD POWER	MONUMENT FOUND
TELEPHONE	SECTION CORNER
POWER POLE	

LAMP RYNEARSON

LAMPRYNEARSON.COM

OMAHA, NEBRASKA
14710 W. DODGE RD, STE. 100 (402) 496.2498
NE AUTHORIZATION NO.: CA0130

FORT COLLINS, COLORADO
4715 INNOVATION DR., STE. 100 (970) 226.0342

KANSAS CITY, MISSOURI
9001 STATE LINE RD., STE. 200 (816) 361.0440
MO AUTH. NO.: E-2013011903 | LS-2019043127

PRELIMINARY

NOT RELEASED FOR CONSTRUCTION

Troy Spraker
P.E. 38538

EXISTING CONDITIONS

PIVOT SOLAR ARRAY BRUSH LARSEN
BRUSH, COLORADO

811 Know what's **below.** **Call** before you dig.

ALL UTILITIES ARE SHOWN BASED ON THE INFORMATION AVAILABLE TO THE ENGINEER. THERE IS NO GUARANTEE AS TO THE ACCURACY OR THAT THE LOCATION, DEPTH, AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES AND SERVICE LINES PRIOR TO CONSTRUCTION.

REVISIONS

DESIGNER / DRAFTER
AGM
DATE
10/04/2024
PROJECT NUMBER
0224003.01
BOOK AND PAGE

SHEET
3 OF 8

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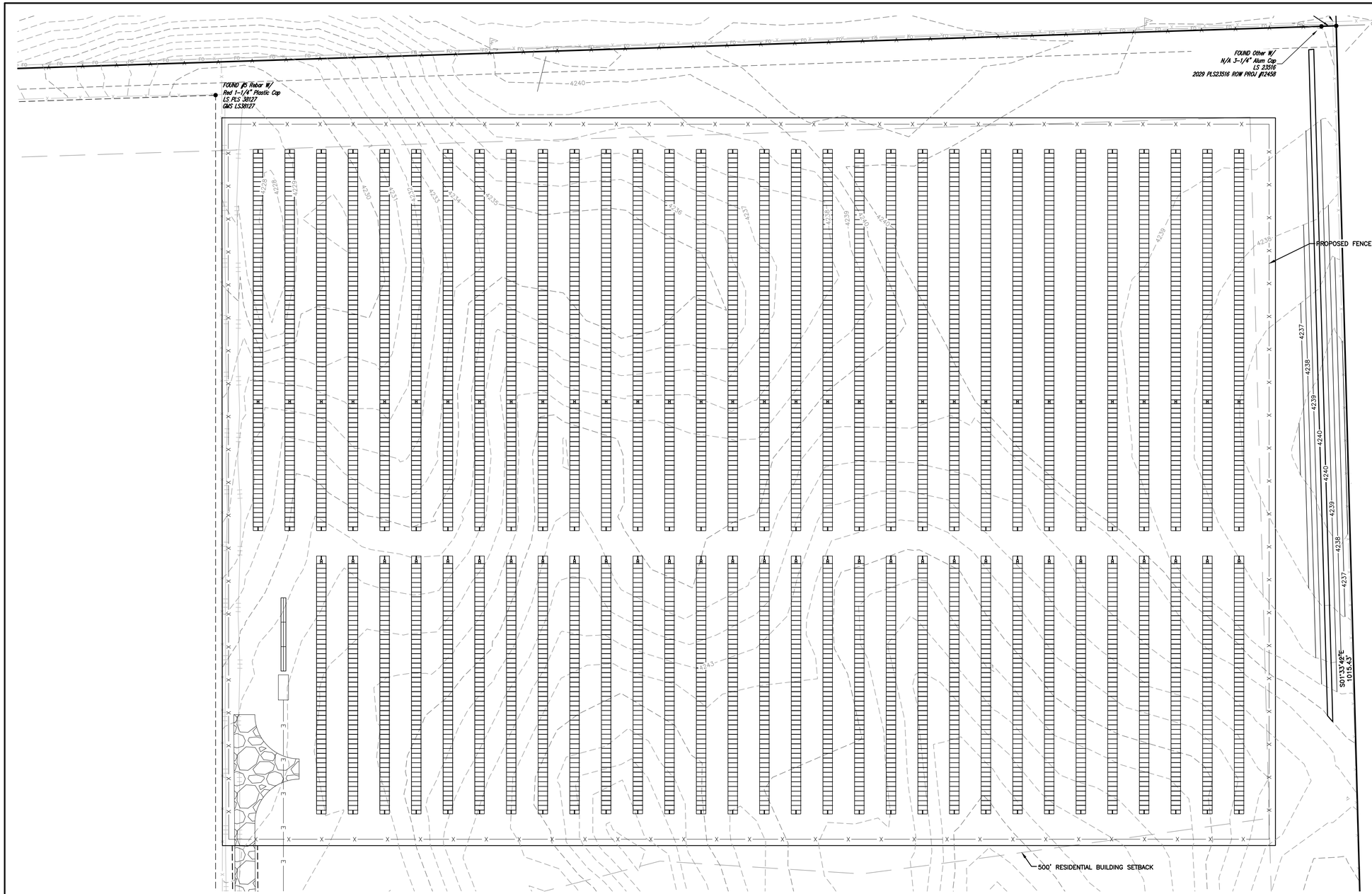

LEGEND

- EXISTING WATER
- EXISTING ELECTRIC
- EXISTING FENCE
- EXISTING FIBER OPTICS
- EXISTING GAS
- EXISTING OVERHEAD POWER
- EXISTING TELEPHONE
- EXISTING POWER POLE
- EXISTING PROPERTY/BOUNDARY LINE
- EXISTING PROPOSED LOT LINE
- EXISTING ADJACENT LOT LINE
- EXISTING SECTION LINE
- EXISTING GRAVEL AND DIRT EDGE
- MONUMENT FOUND
- SECTION CORNER

NOTES:

1. EQUIPMENT PAD TYPICALLY INCLUDES AC COMBINER PANEL, AC SWITCHER, LOW VOLTAGE PANEL, TRANSFORMER, PRODUCTION METER, AC DISCONNECT, LOCKING BILLING METER, DAS, POCC
2. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES, WHETHER SHOWN OR NOT SHOWN ON THE APPROVED CONSTRUCTION DOCUMENTS.
3. PROVIDING NOTIFICATION AND RECEIVING MARKINGS OF UNDERGROUND MEMBER UTILITIES IN NO WAY CONSTITUTES PERMISSION TO PERFORM CONSTRUCTION.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, PROTECTION, AND REPAIR OF ALL UTILITIES ENCOUNTERED DURING CONSTRUCTION, WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL CONTACT ALL RESPECTIVE UTILITIES AND HAVE ALL UTILITIES FIELD LOCATED PRIOR TO CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO VERIFY THE LOCATION OF ALL EXISTING STRUCTURES AND UTILITIES PRIOR TO CONSTRUCTION.
5. LOCATIONS OF UTILITIES REPRESENT THE BEST KNOWN LOCATIONS AT THE TIME OF PREPARATION OF DRAWINGS. THE CONTRACTOR SHALL FIELD LOCATE ALL UTILITIES IN ADVANCE OF EXCAVATION. RELOCATION OF UTILITIES IS NOT ANTICIPATED FOR THIS PROJECT. IF REQUIRED, THE CONTRACTOR SHALL COOPERATE WITH COMPANIES TO COORDINATE THE RELOCATION EFFORT. LINES NOT RELOCATED SHALL BE PROTECTED BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE ALLOWED FOR THE MINOR ADJUSTMENT OF STRUCTURES IN ORDER TO CLEAR A CONFLICTING UTILITY.
6. TREES AND SHRUBS ARE TO BE REMOVED AS NECESSARY TO ALLOW FOR THE INSTALLATION OF THE ARRAYS AND TO ELIMINATE SHADING.
7. THE LOCATION AND QUANTITIES OF SOLAR ENERGY GENERATION EQUIPMENT SHOWN ARE NOT FINAL AND SHALL BE SUBJECT TO FINAL DESIGN WITHIN THE DESIGNATED LEASE BOUNDARY AREA.
8. ELECTRIC DESIGN IN THIS PLAN SET IS SHOWN FOR INFORMATION PURPOSES ONLY. FINAL ELECTRIC DESIGN SHALL BE COMPLETED BY OTHERS UNDER SEPARATE COVER.

LAMP RYNEARSON
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OMAHA, NEBRASKA
14710 W. DODGE RD, STE. 100 (402) 496.2498
NE AUTHORIZATION NO.: CA0130
FORT COLLINS, COLORADO
4715 INNOVATION DR., STE. 100 (970) 226.0342
KANSAS CITY, MISSOURI
9001 STATE LINE RD., STE. 200 (816) 361.0440
MO AUTH. NO.: E-2013011903 | LS-2019043127

01°11'32"
TRUE
GRID
0 40' 80'

PRELIMINARY

NOT RELEASED FOR CONSTRUCTION

Troy Spraker
P.E. 38538

811 ALL UTILITIES ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE. THERE IS NO GUARANTEE ALL FACILITIES ARE SHOWN OR THAT THE LOCATION, DEPTH, AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR LOCATING ALL UTILITIES AND PROTECTING LINES PRIOR TO CONSTRUCTION.
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SITE PLAN

PIVOT SOLAR ARRAY BRUSH LARSEN
BRUSH, COLORADO

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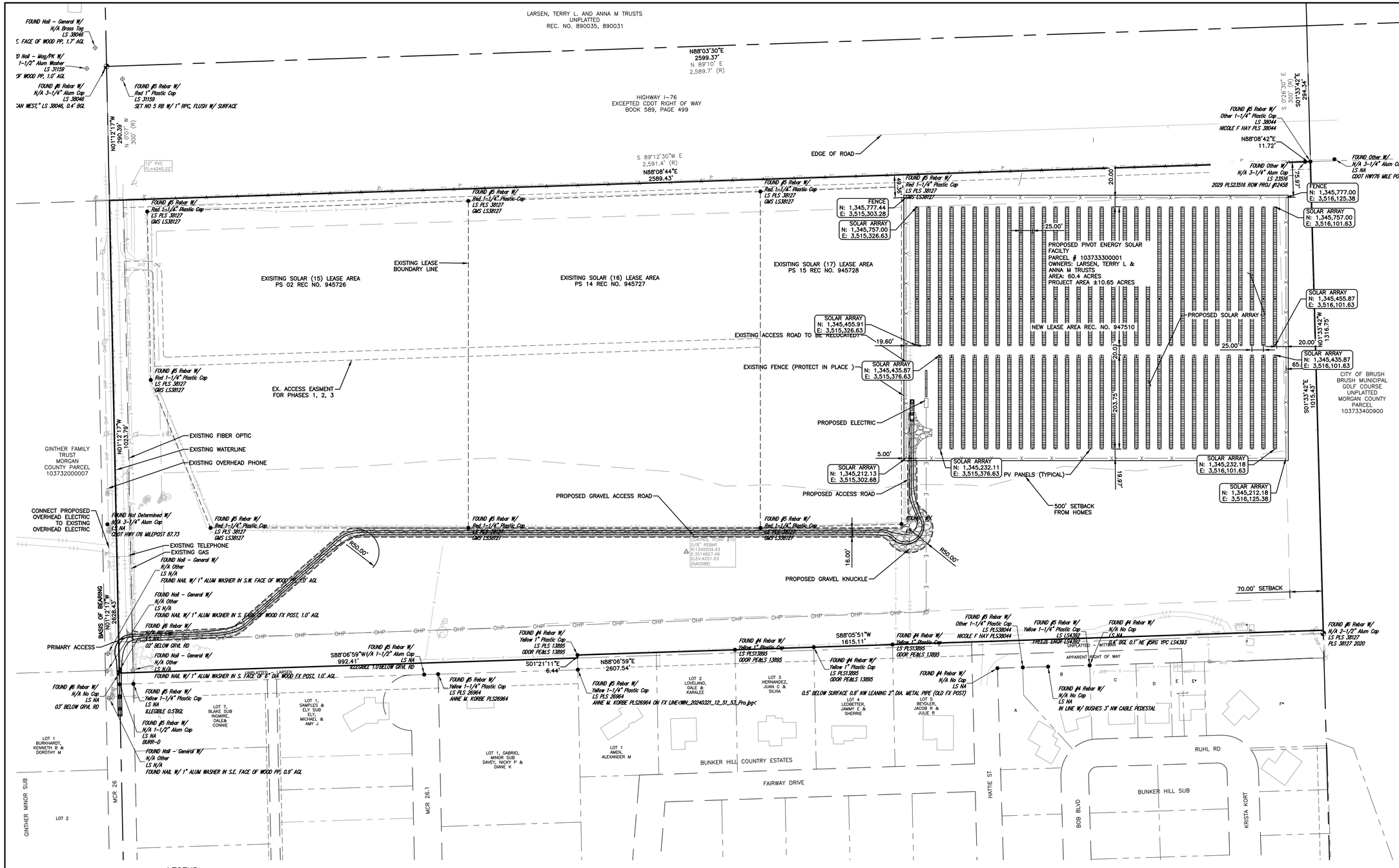

LEGEND

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- EXISTING ELECTRIC
- EXISTING FENCE
- EXISTING FIBER OPTICS
- EXISTING GAS
- EXISTING OVERHEAD POWER
- EXISTING TELEPHONE
- EXISTING POWER POLE
- EXISTING PROPERTY/BOUNDARY LINE
- PROJECT LOT LINE
- EXISTING ADJACENT LOT LINE
- EXISTING SECTION LINE
- EXISTING GRAVEL AND DIRT EDGE
- MONUMENT FOUND
- SECTION CORNER
- SETBACK

NOTES:

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01°11'32"
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GRID

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P.E. 38538

HORIZONTAL CONTROL

PIVOT SOLAR ARRAY BRUSH LARSEN
BRUSH, COLORADO

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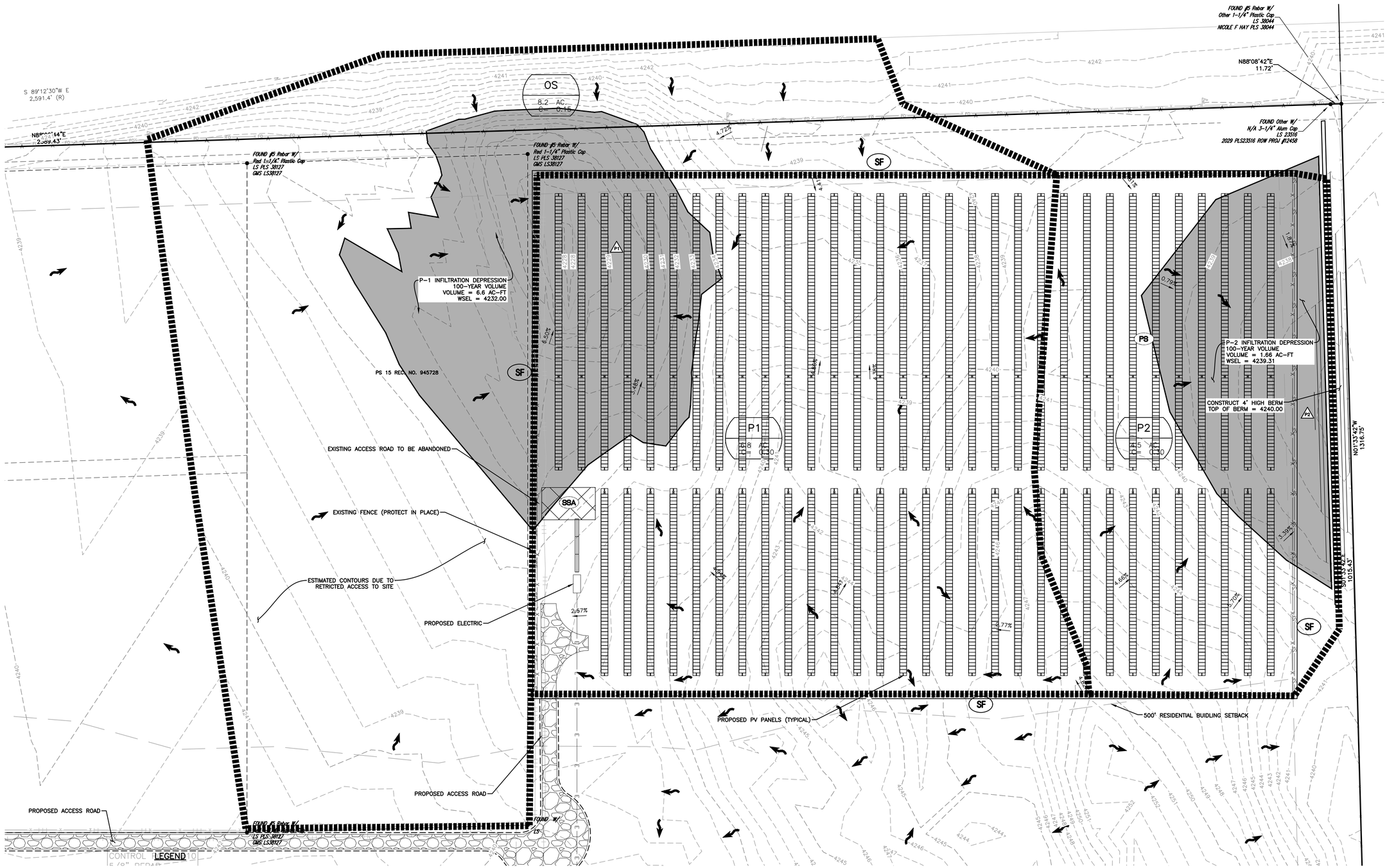

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- EXISTING GRAVEL AND DIRT EDGE
- MONUMENT FOUND
- SECTION CORNER
- PROPOSED SOLAR ARRAY
- EXISTING CONTOUR
- SECURITY FENCE
- OVERLAND FLOW ARROW
- CHANNELIZED FLOW ARROW
- EXISTING STORM SEWER
- VEHICLE TRACKING CONTROL, SEE M-208-1, SHEET 8
- PERMANENT SEEDING
- CONCRETE WASHOUT PIT SEE M-208-1, SHEET 8
- STORAGE AND STAGING SEE SM-6, SHEET 8
- SEDIMENT CONTROL LOG SEE SC-2, SHEET 8
- SILT FENCE SEE SC-1, SHEET 8 OR CONTRACTOR OPTION - EARTHEN BERM

NOTES:
1. DUE TO THIS SITE BEING IN A LOW POINT NO DRAINAGE OUTFALL IS AVAILABLE, THEREFORE ALL RUNOFF WILL FLOW TO THE LOW POINT AND POND. PONDING DEPTHS HAVE BEEN CALCULATED FOR THE 100 YEAR STORM EVENT. ARRAY STRUCTURAL DESIGNER SHALL TAKE THIS PONDING INTO ACCOUNT WHEN DESIGNING THE PILES

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DRAINAGE EROSION CONTROL PLAN

PIVOT SOLAR ARRAY BRUSH LARSEN
BRUSH, COLORADO

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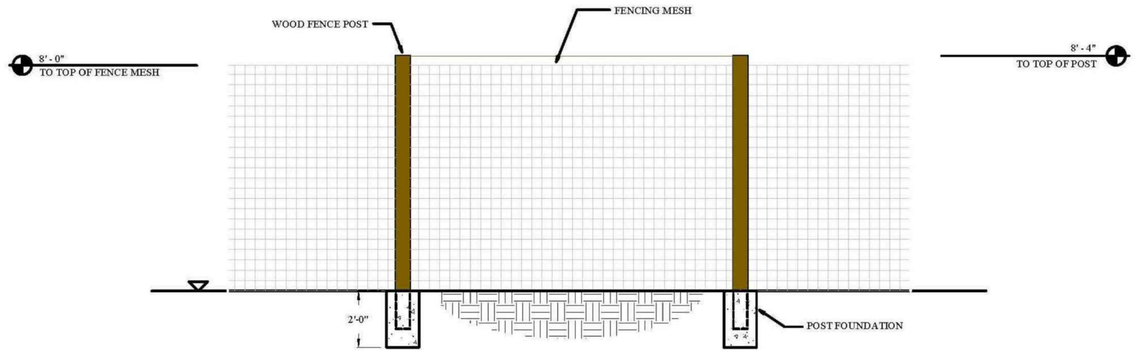
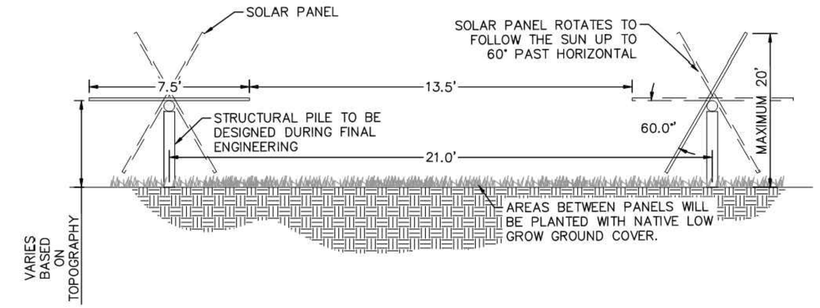
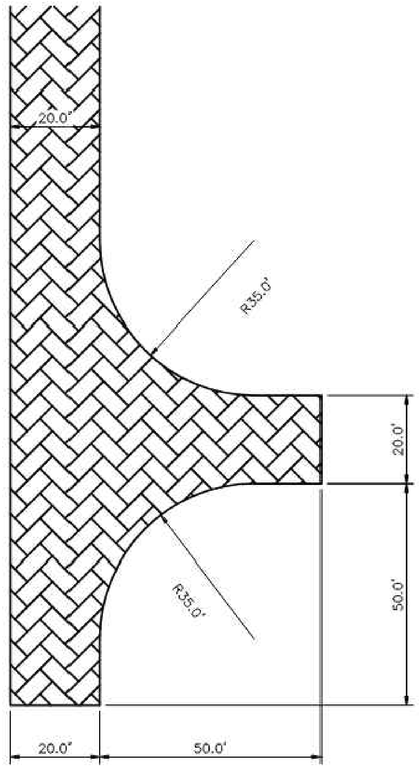


GAME FENCE DETAIL

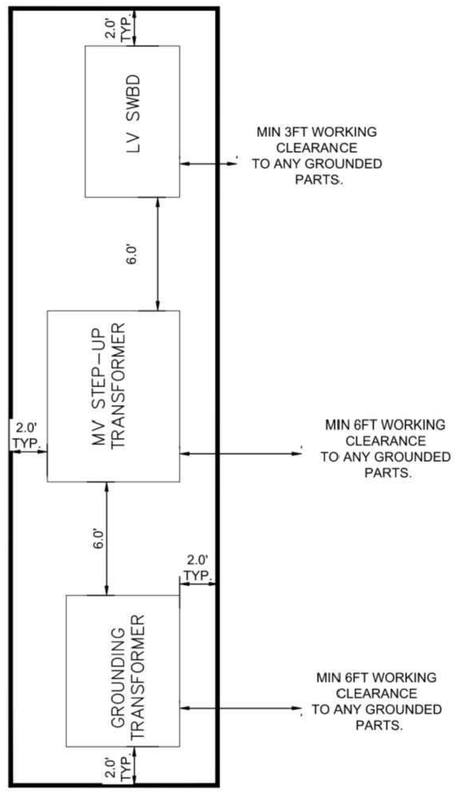


TRACKER ELEVATION VIEW

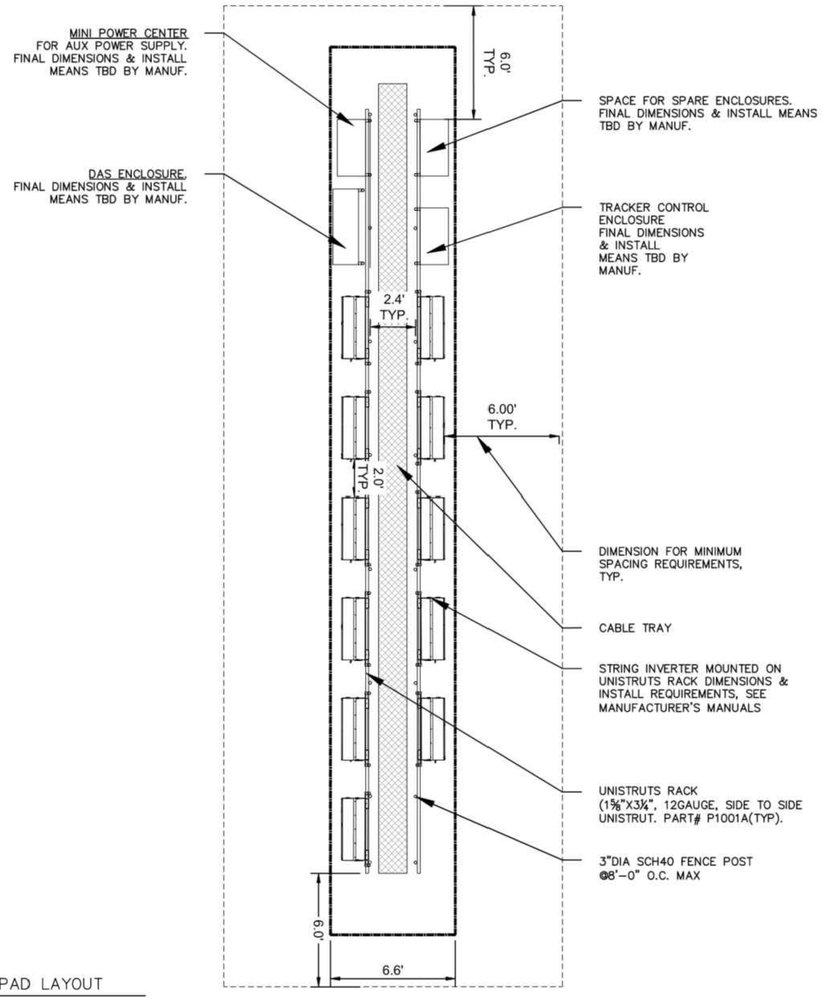
1 TYPICAL SOLAR PANEL SPACING
N.T.S.



3 TYPICAL TURN AROUND DETAIL
1"=20'



4 TYPICAL EQUIPMENT PAD LAYOUT
N.T.S.



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SITE DETAILS

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BRUSH, COLORADO

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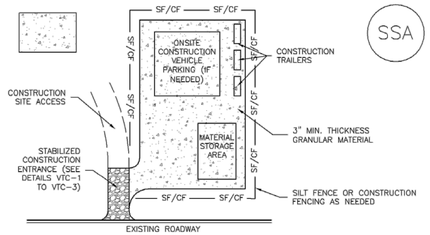
Stabilized Staging Area (SSA) SM-6



SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF STAGING AREA(S).
   –CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

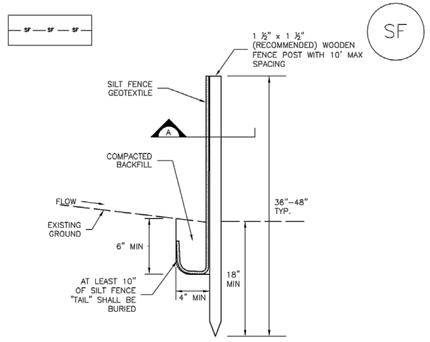
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

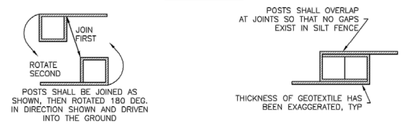
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

Silt Fence (SF) SC-1



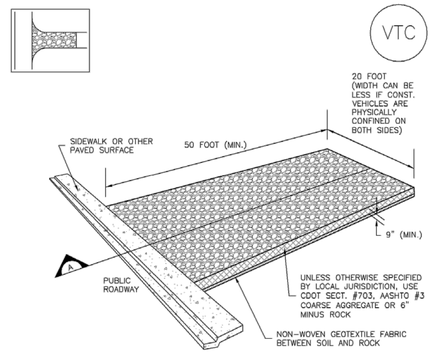
SILT FENCE

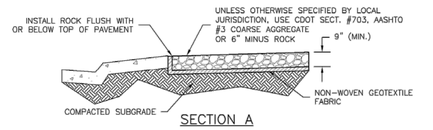


SECTION A

SF–1. SILT FENCE

Vehicle Tracking Control (VTC) SM-4

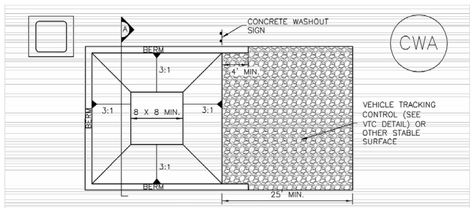




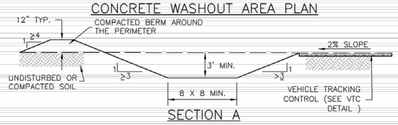
SECTION A

VTC–1. AGGREGATE VEHICLE TRACKING CONTROL

Concrete Washout Area (CWA) MM-1



CONCRETE WASHOUT AREA PLAN



SECTION A

CWA–1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE. ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

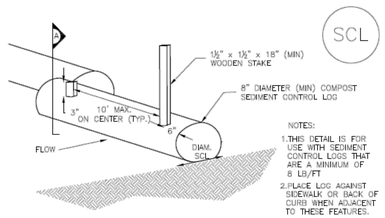
5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

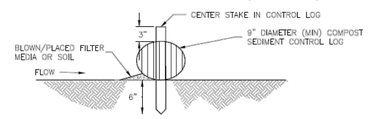
7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

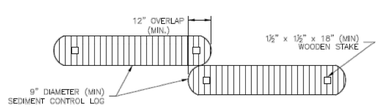
SC-2 Sediment Control Log (SCL)



COMPOST SEDIMENT CONTROL LOG (WEIGHTED)



SECTION A
COMPOST SEDIMENT CONTROL LOG



LOG JOINTS

SCL–2. COMPOST SEDIMENT CONTROL LOG (WEIGHTED)

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BMP DETAILS

PIVOT SOLAR ARRAY BRUSH LARSEN
BRUSH, COLORADO

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LAMP RYNEARSON

4715 Innovation Dr., Ste. 100
Fort Collins, CO 80525
[redacted]
[F] 970.226.0879
LampRynearson.com

October 6, 2024

Morgan County Planning-Zoning and Building Department
Nicole Hay
231 Ensign P.O. Box 596
Fort Morgan, Colorado 80701

RE: Pivot Energy Solar Array Morgan PS71/Larsen Trust (Phase 4) – Drainage Narrative

Dear Nicole,

On behalf of Pivot Energy, we would like to convey our appreciation for taking the time and effort to review our Drainage Analysis for the Pivot Energy Solar Array Morgan PS 71/Larsen Trust (Phase 4).

Site Location
The property is located south of HWY 76, west of County Road 26, and east of Hospital Road. The site comprises approximately 11.3 acres of leased land zoned Rural Residential (RR). The proposed development is a portion of Parcel #10373330001 located in the N ½ of the SW ¼ portion of Section 33, Township 4 North, Range 56 West of the 6th P.M., Morgan County, Colorado.

The facility is proposed as a photovoltaic solar facility that will provide electrical power. The land will be leased and the facility will be owned and operated by Pivot Energy.

Site access will be full movement access from County Road 26, which is a two-lane gravel road. Site access to the proposed development is approximately 725 feet south of the I-76 interchange.

The site will consist of a 2MW$_{DC}$ photovoltaic community solar facility and will generally include a tracker system with panels mounted to a torque tube, H-piles driven into the ground, or similar; it is anticipated that the inverters will sit on a concrete pad or skid mounted, an access drive with an emergency turnaround, and perimeter security fencing with an access gate. The proposed fence shall be 8' tall game fence with wood posts.

Drainage Design

Existing Drainage Conditions

Per the FEMA FIRM Panel: 08087C0469D, the project site is in a Zone X floodplain indicating minimal flood hazard. The soils in this area (Valent Sand and Bijou loamy sand) are classified as Type A per the NCRS HSG with high infiltration and low runoff. The average surface slopes are between 1-2 percent with approximately half the site conveying runoff to the northwest corner of the site to an established depression and the remaining portion of the site conveying east to southeast towards the Brush Golf Course (The Course at Pettey's Park). A portion of the existing solar array to the west flows onto this site and into the existing depression. The entire site is covered in native vegetation that will be preserved. Mass grading is not proposed with this project and existing contours will be preserved.

Site Improvements
Solar Array Components – The array will include solar panels placed on steel H-pipes, I-beams, or similar (driven into the ground), rack-mounted inverters and electric transformers, and a gated perimeter fence. Overhead and underground electrical lines will also be included in the site improvements. Since the solar panels are tracking panels

(rotate throughout the day to track the path of the sun), the ground surface vegetation beneath the panels will continue to grow. The tracking system will be installed in a north/south direction.

Access Road -The access road will consist of a 16' wide gravel road; access road section shall be in accordance with the project-specific geotechnical report. The road will run east/west at the southern boundary of the parcel with a gravel driveway connecting to the eastside of County Road 26.

Site Land Cover Areas and Composite Imperviousness

Land Cover	Imperviousness (%)	Existing Areas (Acres)	Proposed Area (Acres)
Solar Field (Diagonal Placement) *	20%	0	10.3
Gravel Road	80%	0	0.81
Concrete Pads	100%	0	0.088
Open Space	5%	11.3	0.1
Total Imperviousness		5.00%	25%

* From Mile High Flood District Technical Memorandum Determination of Solar Panel Field Runoff Coefficients Table 4

Stormwater Runoff

The 100-year stormwater runoff for both the existing conditions and the developed site were calculated using the Mile High Flood District "Peak Runoff Prediction by the Rational Method" Workbook. The existing total and proposed composite imperviousness values were used along with the site topography and the precipitation data from NOAA ATLAS 14 100-year, 1-hour storm data for the site to calculate the values below:

Peak Runoff Rate

Site Condition	Time of Concentration (Minutes)	100 YR Runoff Coefficients	100-YR Peak Flow (cfs)
Existing 1	29.57	0.15	4.54
P1	25.33	0.30	10.14
Existing 2	21.25	0.15	3.85
P2	18.14	0.30	8.56
OS	26.76	0.15	1.81

Using the MHFD methodology P1 and P2 it will be observed that there is an increase in peak runoff. P1 will have an increase in peak flow of approximately 5.6 cfs. P2 will have an increase in peak flow of approximately 4.71 cfs. These flows will continue flowing in the existing conveyance paths to an existing and proposed depression. For basin P1 and OS in the proposed condition, 6.8 acres of the total site and the additional 8.14 offsite acres will convey into the existing depression. For basin P2, 4.5 acres will be conveyed into the proposed depression located along the eastern property line. This depression is created by the construction of a 4' high berm to capture runoff from basin P2. These 100-yr volumes will be retained in the depressions within the site and under a portion of the solar arrays. Due to these being at a low point with no identifiable outfall system, all runoff will infiltrate, evaporate, or evapotranspirate.

Depression Design

Using the Colorado Floodplain and Stormwater Criteria Manual (CFSCM) it has been calculated the runoff from the proposed site can be infiltrated into the existing depression located at the northwest corner of the site.

Depression P1

The tributary on-site (P1) and off-site (OS) flows to the existing depression (P1) were calculated by taking the tributary area of 6.8 onsite and 8.14 offsite acres; and the 24-hour 100-year storm event rainfall depth of 4.43 inches (per NOAA ATLAS 14 100-year, 24-hour storm data) to find the required volume for the existing depression. The required volume of 5.52 acre-ft will also have a 1' freeboard added to the volume. The infiltration of the depression was calculated using the maximum drain time for the 5-year storm per the CFSCM and the most conservative infiltration rate for sandy soils at 0.8 in/hr. A volume of 12.9 acre-ft can be drained in approximately 72 hours which is much greater than both the 5-year and the 100-year volumes (per section 5.7.1 of the CFSCM).

P1-REQUIRED DEPRESSION VOLUME

Onsite TA	6.8	Acres
Offsite TA	8.14	Acres
Total Tributary Area	14.94	Acres
100-year-24 Hour (rainfall depth)	4.43	Inches
Total Required Volume	5.52	Acre-ft

(TA)=TRIBUTARY AREA

P1-INFILTRATION RATE/VOLUME/TIME

Infiltration Area (Bottom of Pond)	2.70	Acres
Approx. Infiltration Rate	0.8	in./hr
Maximum Drain-down time	72	hr
72-hour Infiltration Volume	155.52	acre-in
Total Infiltration Volume in 72-hours	12.96	acre-ft

Depression P2

The tributary on-site (P2) flows to the proposed depression (P2) were calculated by taking the tributary area of 4.5 acres and the 24-hour 100-year storm rainfall depth of 4.43 inches (per NOAA ATLAS 14 100-year, 24-hour storm data) to find the required volume for the existing depression (P2). The required volume of 1.66 acre-ft will also have 0.70' freeboard added to the volume. With the provided freeboard, the available storage volume is 3.03 acre-ft which is almost double the calculated 100 year, 24 hour storm event. The infiltration of the depression was calculated using the maximum drain time for the 5-year storm event per the CFSCM and the most conservative infiltration rate for sandy soils at 0.8 in/hr. A volume of 3.84 acre-ft can be drained in approximately 72 hours which is much greater than both the 5-year and the 100-year volumes (per section 5.7.1 of the CFSCM).

P2-REQUIRED DEPRESSION VOLUME

Onsite TA	4.5	Acres
Offsite TA	0	Acres
Total Tributary Area	4.5	Acres
100-year-24 Hour (rainfall depth)(inches)	4.43	Inches
Total Required Volume	1.66	Acre-ft

(TA)=TRIBUTARY AREA

P2-INFILTRATION RATE/VOLUME/TIME

Infiltration Area (Bottom of Pond)	0.80	Acres
Approx. Infiltration Rate	0.8	in./hr
Maximum Drain-down time	72	hr
72-hour Infiltration Volume	46.08	acre-in
Total Infiltration Volume in 72-hours	3.84	acre-ft

Sediment and Erosion Control

During construction, land grading activities will be minimized to allow for the installation of the solar arrays and BMP's will be installed where needed to reduce the transport of sediment downstream. Once the project is completed, any disturbed areas will be reseeded with a native low-growth dryland seed mix. Once vegetation is considered established, then any temporary BMP's will be removed. The established vegetation will provide permanent water quality and sediment and erosion control for the site. If additional erosion control measures are needed after the site has been completed, then further measures will be implemented.

Conclusion

The proposed solar array site has been evaluated using the current Colorado Floodplain and Stormwater Criteria Manual, Mile High Flood District criteria, and the "Technical Memorandum-Determination of Solar Panel Runoff Coefficients" dated October 13, 2023. This memorandum increases the imperviousness of a solar array site to at least 15% and up to 60%. The imperviousness values used for this evaluation accounted for the direction of the arrays in relation to the minimally disturbed site contours. The finished ground cover, and reestablished native grass, were also accounted for to give a proposed composite imperviousness of 25%. Compared to the existing condition value of 5% the increased runoff volume of 5.52 acre-ft from basin P1 and 1.66 acre-ft from P2 will need to be captured in an existing and proposed depressions at the northwest corner and east side of the site. A stage storage evaluation was performed using the MHFD Detention workbook and using the existing contours the depressions were found to have an approximate 4.0' and 3.3' depths during the 100-YR event respectively. The existing depressions are estimated to have volumes above the required volumes, with a 1' freeboard which will add a factor of safety and will satisfy the Colorado Floodplain and Stormwater Criteria Manual requirements. With the above calculations, it should also be noted that infiltration during the respective storm events has not been considered in the volume calculations and provides another layer of conservativeness to the drainage design.

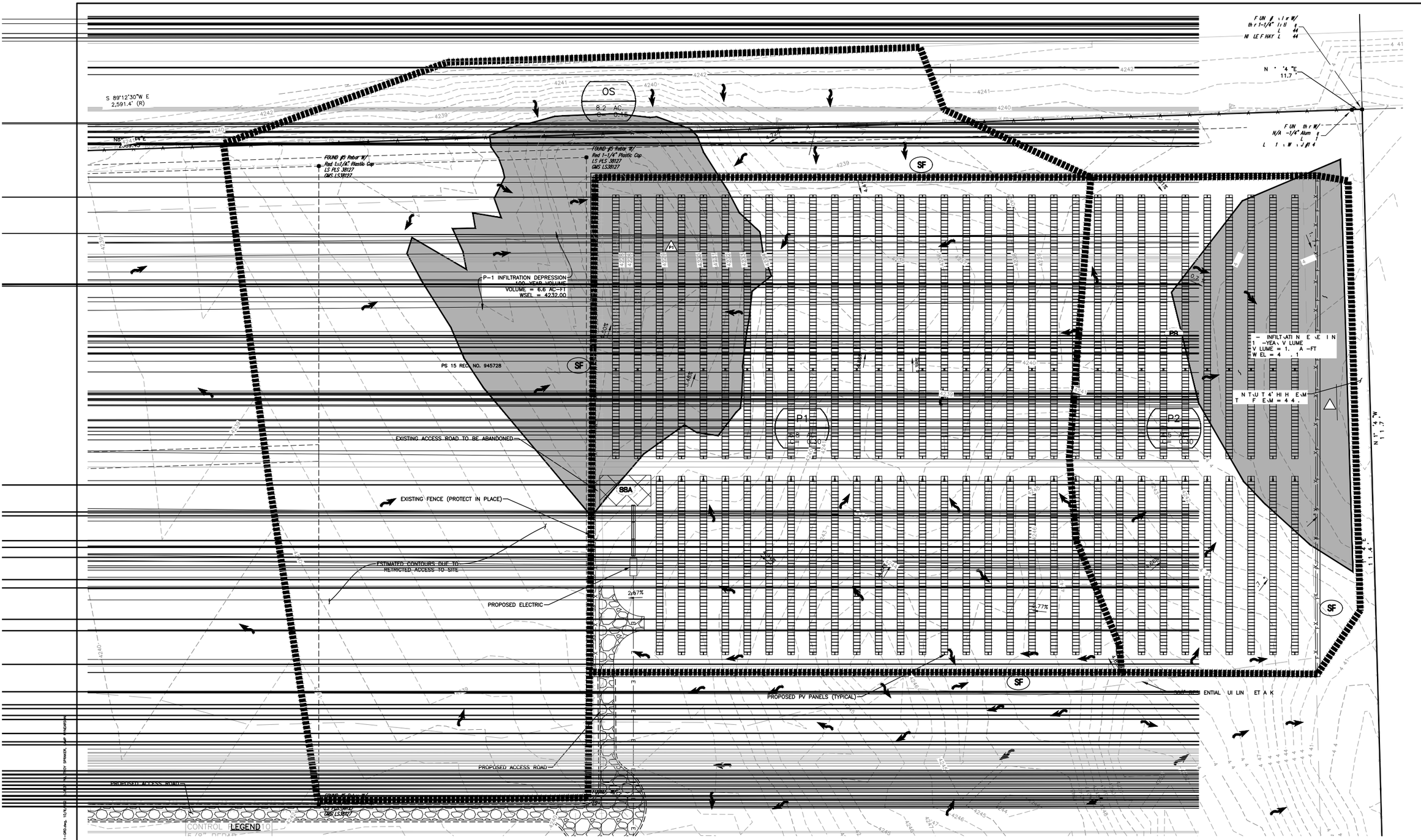
We look forward to working with County staff to discuss the proposed project and see the facility constructed.

Prepared by:

Andrea McDaniel, EIT

Reviewed by:

Troy Spraker, PE
Lic# 38538
Senior Project Manager



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14710 W. DODGE RD., STE. 100 (402) 496.2498
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KANSAS CITY, MISSOURI
9001 STATE LINE RD., STE. 200 (816) 361.0440
MO AUTH. NO.: E-2013011903 | LS-2019043127

ELIMINARY

NOT RELEASED FOR CONSTRUCTION

Troy Spraker

P.E. 38538

DRAINAGE EROSION CONTROL PLAN

PIVOT SOLAR ARRAY BRIDGE HILL ROAD

811 Know what's below. Call before you dig.

ALL UTILITIES SHOWN ARE BASED ON AVAILABLE INFORMATION AND ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES.

REVISIONS

DESIGNER / DRAFTER
A.M.

DATE
/ / 4

PROJECT NUMBER
4 1

BOOK AND PAGE

SHEET

OF

APPENDIX A

National Flood Hazard Layer FIRMette

FEMA

103°39'25"W 40°16'16"N

103°38'47"W 40°15'48"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/14/2024 at 4:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Morgan County, Colorado

October 6, 2024

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Morgan County, Colorado
Survey Area Data: Version 25, Aug 29, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 14, 2022—Jun 15, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BIB	Bijou loamy sand, 1 to 3 percent slopes	4.4	37.1%
VcD	Valent sand, 3 to 9 percent slopes	7.4	62.9%
Totals for Area of Interest		**11.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Morgan County, Colorado

BIB—Bijou loamy sand, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3pvv
Elevation: 4,400 to 6,000 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bijou and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bijou

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Noncalcareous alluvium derived from arkose

Typical profile

H1 - 0 to 14 inches: loamy sand
H2 - 14 to 52 inches: coarse sandy loam
H3 - 52 to 60 inches: loamy coarse sand

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent
Hydric soil rating: No

Glenberg

Percent of map unit: 5 percent
Hydric soil rating: No

VcD—Valent sand, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2tczf
Elevation: 3,050 to 5,150 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Valent and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valent

Setting

Landform: Hills, dunes
Landform position (two-dimensional): Shoulder, backslope, footslope, summit
Landform position (three-dimensional): Head slope, nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Noncalcareous eolian sands

Typical profile

A - 0 to 5 inches: sand
AC - 5 to 12 inches: sand
C1 - 12 to 30 inches: sand
C2 - 30 to 80 inches: sand

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R067BY015CO - Deep Sand, R072XY109KS - Rolling Sands
Hydric soil rating: No

Minor Components

Dailey

Percent of map unit: 10 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY015CO - Deep Sand, R072XA021KS - Sands (North) (PE 16-20)
Hydric soil rating: No

Vona

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains, R072XA022KS - Sandy (North) Draft (April 2010) (PE 16-20)
Hydric soil rating: No

Haxtun

Percent of map unit: 5 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY024CO - Sandy Plains, R072XY111KS - Sandy Plains
Hydric soil rating: No

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Morgan County, Colorado			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
BIB—Bijou loamy sand, 1 to 3 percent slopes			
Bijou	90	Very low	A

Hydrologic Soil Group and Surface Runoff–Morgan County, Colorado			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
VcD—Valent sand, 3 to 9 percent slopes			
Valent	80	Very low	A

Data Source Information

Soil Survey Area: Morgan County, Colorado
Survey Area Data: Version 24, Aug 24, 2023

MEMORANDUM

To: Holly Piza, P.E., CFM, Brik Zivkovich, P.E, CFM
Mile High Flood District

Via email: [redacted]

From: Wright Water Engineers, Inc.
Andrew Earles, Ph.D., P.E., P.H., D.WRE, Chris Olson, Ph.D., P.E., and Matthew Howard, EIT

Date: October 13, 2023

Re: Determination of Solar Panel Field Runoff Coefficients

This memorandum documents the methods and results of hydrologic modeling analysis to estimate runoff coefficients and imperviousness values for solar panel fields under two different situations. The first scenario addresses solar installations that involve minimal land disturbances in areas that are or will be vegetated using native grasses. This approach assumes that soils are not significantly compacted during construction and that where disturbance (cut and fill) is required, proper measures are taken to manage topsoil (see the Topsoil Management Guide) and all land disturbed is revegetated to an approximate uniform density of at least 80%. The second scenario addresses solar installations that use gravel for the areas between and beneath the panels.

1.0 Methodology

The EPA Stormwater Management Model (SWMM) was used to simulate runoff from typical solar panel field installations. The SWMM model was used because it has the computational and workflow capabilities of being able to "cascade" runoff from one type of surface (e.g., solar panel) onto another type of surface (e.g., ground), with each surface having different runoff-generating characteristics.

For this analysis, we simulated three different surfaces under three different configurations of solar panel alignments. The surfaces were:

- The Solar Panel surface is impervious, receives direct rainfall and directs runoff onto the Inter-Panel surface.
- The Inter-Panel ground surface represents the ground surface between the solar panels. It receives both direct rainfall and runoff from the Solar Panel surface and directs runoff to either the Rain Shadow surface or adjacent Inter-Panel surfaces depending on configuration. The perviousness of the Inter-Panel is dependent upon the surface type.
- The Rain Shadow ground surface represents the ground surface underneath the solar panels. It does not receive any direct rainfall and only receives direct runoff from the Inter-Panel surface under certain configurations. The perviousness of the Rain Shadow is dependent upon the surface type.

4.0 Recommendations

In Table 12 and Table 13, WWE presents recommended values for runoff coefficients and percent imperviousness based on rounding of average values calculated from SWMM and the Solar Runoff Calculator.

Table 12. Recommended Runoff Coefficients and Imperviousness to Use for Evaluation of Solar Installations with Native Grass Cover*

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.06	10%	0.14	20%	0.34	45%
5-year	0.12	10%	0.20	20%	0.40	45%
100-year	0.52	10%	0.57	20%	0.67	45%

* These values of runoff coefficients and imperviousness percentages are based on assumptions of HSG C soils and equal widths of Panels and Inter-Panel aisles. If site conditions differ from these assumptions, the engineer can follow the SWMM procedures described in the memorandum to perform site-specific analysis.

Table 13. Recommended Runoff Coefficients and Imperviousness to Use for Evaluation of Solar Installations with Gravel Cover*

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.38	50%	0.47	60%	0.60	75%
5-year	0.44	50%	0.52	60%	0.65	75%
100-year	0.69	50%	0.73	60%	0.79	75%

* These values of runoff coefficients and imperviousness percentages are based on assumptions of HSG C soils and equal widths of Panels and Inter-Panel aisles. If site conditions differ from these assumptions, the engineer can follow the SWMM procedures described in the memorandum to perform site-specific analysis.

WWE recommends basing imperviousness values for determining runoff coefficients on the imperviousness values and runoff coefficients presented in Table 12 and Table 13. At the master planning level, before the layout of a solar site is known, the imperviousness values and runoff coefficients for perpendicular installations should be used. Once the layout is known, the engineer can conduct site-specific analysis to assign runoff coefficients based on the alignment of panels relative to contours, interpolating between values in Table 12 and Table 13, as illustrated in the following example.

NOAA Atlas 14, Volume 8, Version 2
Location name: Brush, Colorado, USA*
Latitude: 40.266°, Longitude: -103.6535°
Elevation: 4238 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.276** (0.219-0.357)	**0.336** (0.266-0.434)	**0.443** (0.350-0.574)	**0.541** (0.424-0.704)	**0.689** (0.526-0.942)	**0.813** (0.603-1.12)	**0.946** (0.676-1.34)	**1.09** (0.745-1.58)	**1.30** (0.848-1.93)	**1.46** (0.926-2.19)
10-min	**0.405** (0.321-0.522)	**0.492** (0.390-0.636)	**0.649** (0.512-0.841)	**0.792** (0.622-1.03)	**1.01** (0.771-1.38)	**1.19** (0.883-1.64)	**1.38** (0.990-1.96)	**1.60** (1.09-2.32)	**1.90** (1.24-2.83)	**2.14** (1.36-3.21)
15-min	**0.493** (0.391-0.637)	**0.600** (0.475-0.775)	**0.792** (0.625-1.02)	**0.966** (0.758-1.26)	**1.23** (0.940-1.68)	**1.45** (1.08-2.00)	**1.69** (1.21-2.39)	**1.95** (1.33-2.83)	**2.31** (1.51-3.45)	**2.61** (1.65-3.92)
30-min	**0.672** (0.533-0.868)	**0.813** (0.644-1.05)	**1.07** (0.843-1.38)	**1.30** (1.02-1.70)	**1.66** (1.27-2.28)	**1.96** (1.46-2.72)	**2.29** (1.64-3.24)	**2.64** (1.81-3.84)	**3.15** (2.06-4.70)	**3.56** (2.26-5.35)
60-min	**0.822** (0.652-1.06)	**0.999** (0.792-1.29)	**1.32** (1.04-1.71)	**1.61** (1.26-2.10)	**2.06** (1.57-2.82)	**2.43** (1.80-3.36)	**2.83** (2.03-4.01)	**3.27** (2.24-4.75)	**3.90** (2.55-5.81)	**4.40** (2.79-6.61)
2-hr	**0.972** (0.780-1.24)	**1.18** (0.950-1.51)	**1.57** (1.25-2.00)	**1.92** (1.52-2.46)	**2.45** (1.90-3.30)	**2.90** (2.18-3.94)	**3.38** (2.45-4.71)	**3.90** (2.70-5.58)	**4.64** (3.08-6.81)	**5.24** (3.37-7.75)
3-hr	**1.04** (0.844-1.32)	**1.28** (1.03-1.61)	**1.69** (1.36-2.14)	**2.07** (1.65-2.63)	**2.63** (2.05-3.52)	**3.11** (2.36-4.19)	**3.62** (2.64-5.00)	**4.17** (2.91-5.91)	**4.95** (3.32-7.20)	**5.58** (3.62-8.18)
6-hr	**1.19** (0.974-1.48)	**1.45** (1.18-1.80)	**1.90** (1.55-2.37)	**2.31** (1.87-2.89)	**2.91** (2.30-3.82)	**3.42** (2.62-4.53)	**3.95** (2.92-5.37)	**4.53** (3.21-6.31)	**5.34** (3.63-7.64)	**5.99** (3.95-8.64)
12-hr	**1.38** (1.14-1.69)	**1.65** (1.37-2.02)	**2.13** (1.75-2.61)	**2.54** (2.09-3.14)	**3.16** (2.52-4.07)	**3.66** (2.84-4.77)	**4.19** (3.14-5.59)	**4.76** (3.42-6.52)	**5.55** (3.83-7.80)	**6.18** (4.14-8.77)
24-hr	**1.63** (1.37-1.96)	**1.89** (1.58-2.28)	**2.35** (1.96-2.84)	**2.76** (2.29-3.35)	**3.37** (2.73-4.28)	**3.88** (3.06-4.98)	**4.43** (3.37-5.82)	**5.01** (3.66-6.76)	**5.84** (4.09-8.08)	**6.50** (4.42-9.09)
2-day	**1.89** (1.60-2.24)	**2.15** (1.83-2.56)	**2.62** (2.22-3.12)	**3.04** (2.56-3.63)	**3.66** (3.00-4.56)	**4.17** (3.34-5.26)	**4.72** (3.64-6.10)	**5.30** (3.93-7.04)	**6.13** (4.37-8.35)	**6.79** (4.70-9.34)
3-day	**2.07** (1.78-2.44)	**2.34** (2.00-2.75)	**2.80** (2.39-3.30)	**3.22** (2.73-3.81)	**3.84** (3.18-4.74)	**4.36** (3.51-5.44)	**4.91** (3.82-6.28)	**5.50** (4.11-7.22)	**6.33** (4.55-8.54)	**7.00** (4.89-9.53)
4-day	**2.21** (1.91-2.59)	**2.48** (2.14-2.90)	**2.95** (2.53-3.46)	**3.38** (2.88-3.97)	**4.00** (3.33-4.90)	**4.52** (3.67-5.61)	**5.07** (3.98-6.44)	**5.66** (4.26-7.38)	**6.49** (4.70-8.69)	**7.16** (5.03-9.68)
7-day	**2.53** (2.20-2.91)	**2.84** (2.47-3.28)	**3.38** (2.93-3.91)	**3.84** (3.31-4.46)	**4.50** (3.77-5.41)	**5.03** (4.12-6.13)	**5.58** (4.42-6.96)	**6.16** (4.68-7.89)	**6.95** (5.09-9.15)	**7.57** (5.39-10.1)
10-day	**2.80** (2.46-3.20)	**3.16** (2.77-3.62)	**3.76** (3.29-4.32)	**4.27** (3.71-4.92)	**4.98** (4.19-5.91)	**5.53** (4.55-6.66)	**6.09** (4.85-7.52)	**6.67** (5.11-8.46)	**7.45** (5.50-9.71)	**8.05** (5.79-10.7)
20-day	**3.66** (3.25-4.12)	**4.13** (3.67-4.65)	**4.90** (4.33-5.52)	**5.52** (4.86-6.26)	**6.38** (5.44-7.43)	**7.04** (5.87-8.31)	**7.69** (6.21-9.30)	**8.34** (6.48-10.4)	**9.20** (6.88-11.7)	**9.84** (7.19-12.8)
30-day	**4.39** (3.93-4.89)	**4.96** (4.44-5.52)	**5.86** (5.23-6.55)	**6.59** (5.85-7.40)	**7.58** (6.50-8.72)	**8.32** (6.99-9.71)	**9.04** (7.36-10.8)	**9.76** (7.65-12.0)	**10.7** (8.07-13.5)	**11.4** (8.40-14.6)
45-day	**5.32** (4.80-5.87)	**6.01** (5.42-6.64)	**7.10** (6.39-7.86)	**7.97** (7.13-8.86)	**9.12** (7.87-10.4)	**9.96** (8.43-11.5)	**10.8** (8.83-12.7)	**11.5** (9.12-14.0)	**12.5** (9.54-15.6)	**13.2** (9.85-16.8)
60-day	**6.11** (5.55-6.69)	**6.92** (6.28-7.58)	**8.18** (7.40-8.99)	**9.17** (8.25-10.1)	**10.4** (9.06-11.7)	**11.4** (9.67-13.0)	**12.2** (10.1-14.3)	**13.0** (10.3-15.7)	**14.0** (10.7-17.3)	**14.7** (11.0-18.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Calculation of Peak Runoff using Rational Method

Designer: Andrea MCDaniel
Company: Lamp Rynearson
Date: 10/2/2024
Project: Pivot Solar Array PS 71
Location: Brush CO

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	0.83	1.09	1.33	1.62	2.43	2.83	3.88
	a	b	c				
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786				

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

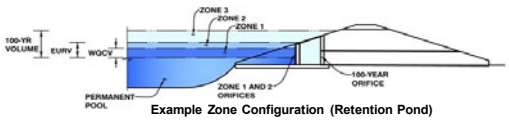
Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
P1	6.80	A	25.0	0.14	0.15	0.16	0.19	0.24	0.30	0.42	300.00			0.031	20.52	430.00	4239.00	4228.00	0.026	5	0.80	8.96	29.48	25.33	25.33	1.43	1.89	2.30	2.80	4.20	4.89	6.71	1.34	1.88	2.48	3.55	6.82	10.14	18.95
Existing 1	6.80	A	5.0	0.02	0.02	0.02	0.03	0.07	0.15	0.29	300.00			0.031	23.28	430.00			0.260	5	2.55	2.81	26.09	26.60	26.09	1.40	1.85	2.26	2.76	4.13	4.81	6.60	0.16	0.24	0.34	0.57	1.90	4.88	12.85
P2	4.80	A	25.0	0.14	0.15	0.16	0.19	0.24	0.30	0.42	170.00			0.031	15.45	150.00	4239.00	4236.00	0.020	5	0.71	3.54	18.98	23.16	18.98	1.67	2.20	2.69	3.27	4.91	5.72	7.84	1.11	1.55	2.04	2.92	5.62	8.37	15.63
Existing 2	4.80	A	5.0	0.02	0.02	0.02	0.03	0.07	0.15	0.29	170.00			0.031	17.52	150.00	4239.00	4236.00	0.020	5	0.71	3.54	21.06	26.97	21.06	1.58	2.09	2.55	3.10	4.65	5.42	7.43	0.13	0.19	0.27	0.45	1.51	3.87	10.21
OS	8.20	A	5.0	0.02	0.02	0.02	0.03	0.07	0.15	0.29	300.00			0.020	26.90	50.00			0.020	5	0.71	1.18	28.08	25.76	25.76	1.41	1.87	2.28	2.78	4.16	4.85	6.65	0.20	0.29	0.41	0.69	2.31	5.92	15.61

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Pivot PS 71 Solar Array

Basin ID: EXISTING DEPRESSION



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**No BMP**	
Watershed Area =	6.80	acres
Watershed Length =	730	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.013	ft/ft
Watershed Imperviousness =	100.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	N/A	hours
Location for 1-hr Rainfall Depths =	User Input	

Flood Control Only

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.283	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.680	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1 in.) =	0.542	acre-feet	1.00 inches
5-yr Runoff Volume (P1 = 1.33 in.) =	0.738	acre-feet	1.33 inches
10-yr Runoff Volume (P1 = 1.62 in.) =	0.911	acre-feet	1.62 inches
25-yr Runoff Volume (P1 = 2.06 in.) =	1.171	acre-feet	2.06 inches
50-yr Runoff Volume (P1 = 2.43 in.) =	1.390	acre-feet	2.43 inches
100-yr Runoff Volume (P1 = 2.83 in.) =	1.628	acre-feet	2.83 inches
500-yr Runoff Volume (P1 = 3.88 in.) =	2.251	acre-feet	3.88 inches
Approximate 2-yr Detention Volume =	0.524	acre-feet	
Approximate 5-yr Detention Volume =	0.724	acre-feet	
Approximate 10-yr Detention Volume =	0.881	acre-feet	
Approximate 25-yr Detention Volume =	1.037	acre-feet	
Approximate 50-yr Detention Volume =	1.107	acre-feet	
Approximate 100-yr Detention Volume =	1.174	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (User Defined) =	2.600	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	2.600	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

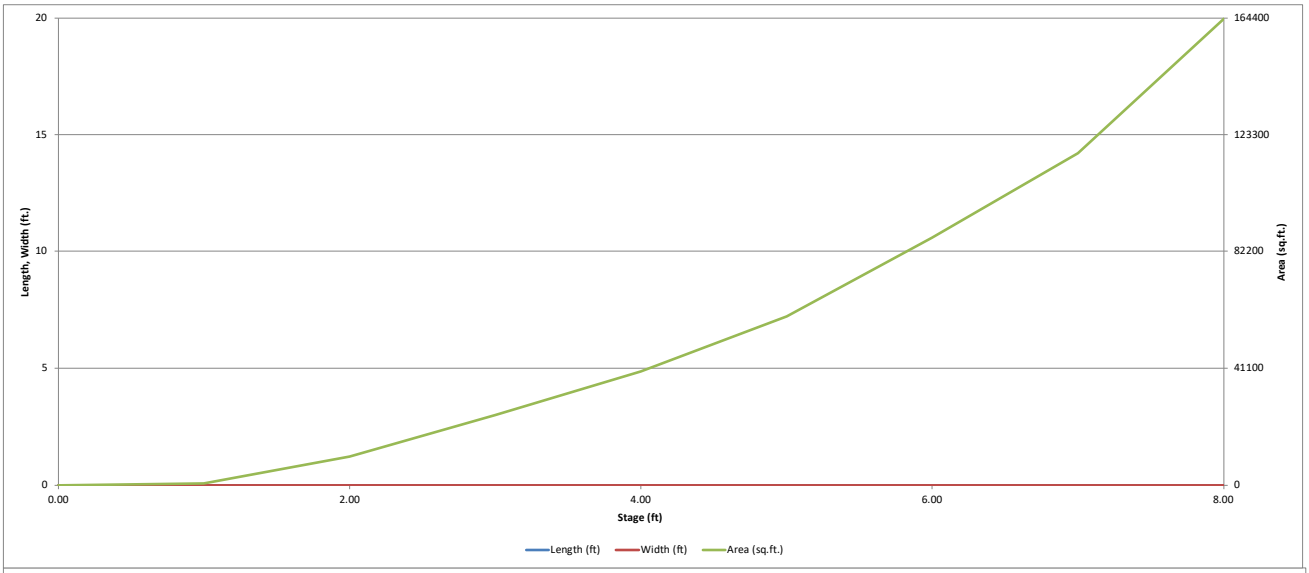
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

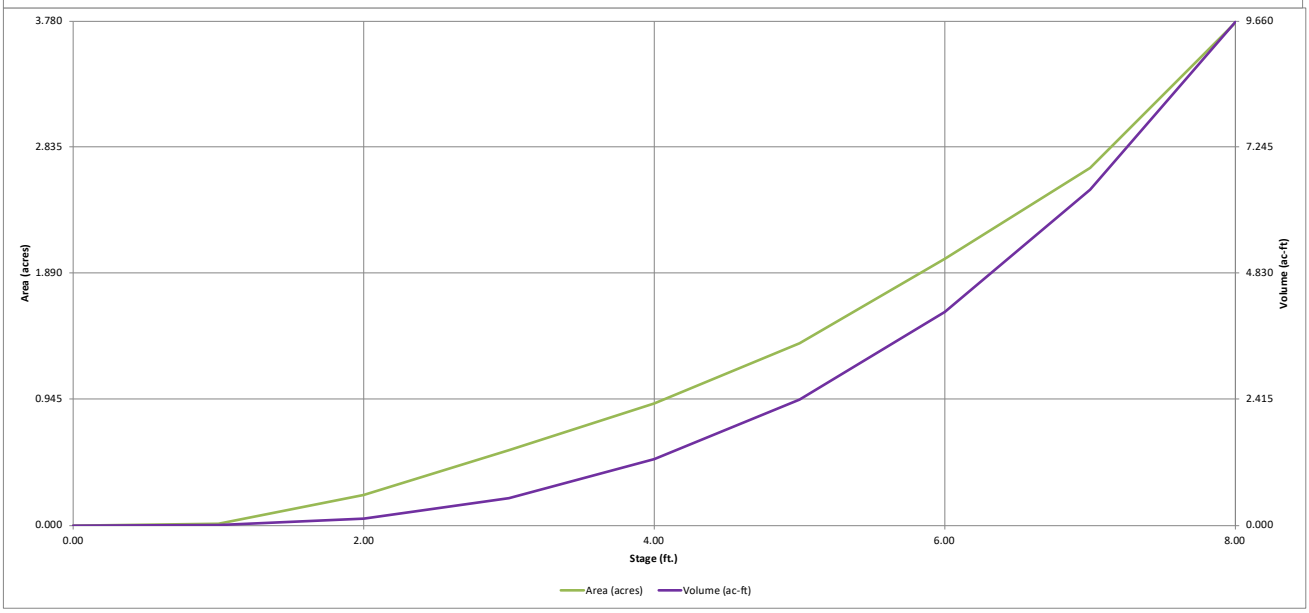
Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	0	0.000		
4228	--	1.00	--	--	--	584	0.013	292	0.007
4229	--	2.00	--	--	--	10,000	0.230	5,584	0.128
4230	--	3.00	--	--	--	24,620	0.565	22,894	0.526
4231	--	4.00	--	--	--	39,840	0.915	55,124	1.265
4232	--	5.00	--	--	--	59,317	1.362	104,702	2.404
4233	--	6.00	--	--	--	86,981	1.997	177,851	4.083
4234	--	7.00	--	--	--	116,745	2.680	279,714	6.421
4235	--	8.00	--	--	--	164,201	3.770	420,187	9.646

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



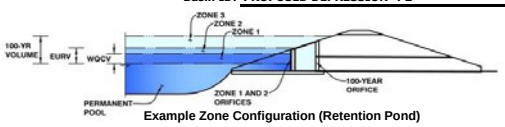


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Pivot PS 71 Solar Array**

Basin ID: **PROPOSED DEPRESSION -P2**



Example Zone Configuration (Retention Pond)

Watershed Information

			Flood Control Only
Selected BMP Type =	**No BMP**		
Watershed Area =	6.80	acres	
Watershed Length =	730	ft	
Watershed Length to Centroid =	500	ft	
Watershed Slope =	0.013	ft/ft	
Watershed Imperviousness =	100.00%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	0.0%	percent	
Percentage Hydrologic Soil Groups C/D =	100.0%	percent	
Target WQCV Drain Time =	N/A	hours	
Location for 1-hr Rainfall Depths =	User Input		

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.283	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.680	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1 in.) =	0.542	acre-feet	1.00 inches
5-yr Runoff Volume (P1 = 1.33 in.) =	0.738	acre-feet	1.33 inches
10-yr Runoff Volume (P1 = 1.62 in.) =	0.911	acre-feet	1.62 inches
25-yr Runoff Volume (P1 = 2.06 in.) =	1.171	acre-feet	2.06 inches
50-yr Runoff Volume (P1 = 2.43 in.) =	1.390	acre-feet	2.43 inches
100-yr Runoff Volume (P1 = 2.83 in.) =	1.628	acre-feet	2.83 inches
500-yr Runoff Volume (P1 = 3.88 in.) =	2.251	acre-feet	3.88 inches
Approximate 2-yr Detention Volume =	0.524	acre-feet	
Approximate 5-yr Detention Volume =	0.724	acre-feet	
Approximate 10-yr Detention Volume =	0.881	acre-feet	
Approximate 25-yr Detention Volume =	1.037	acre-feet	
Approximate 50-yr Detention Volume =	1.107	acre-feet	
Approximate 100-yr Detention Volume =	1.174	acre-feet	

Define Zones and Basin Geometry

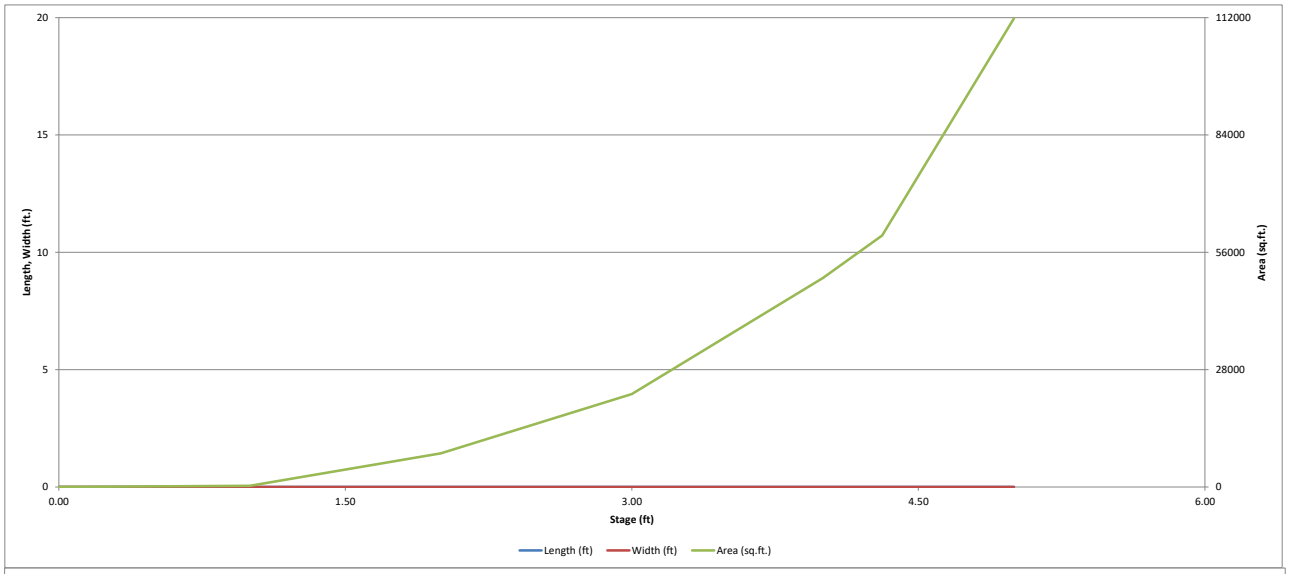
Zone 1 Volume (User Defined) =	2.600	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	2.600	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

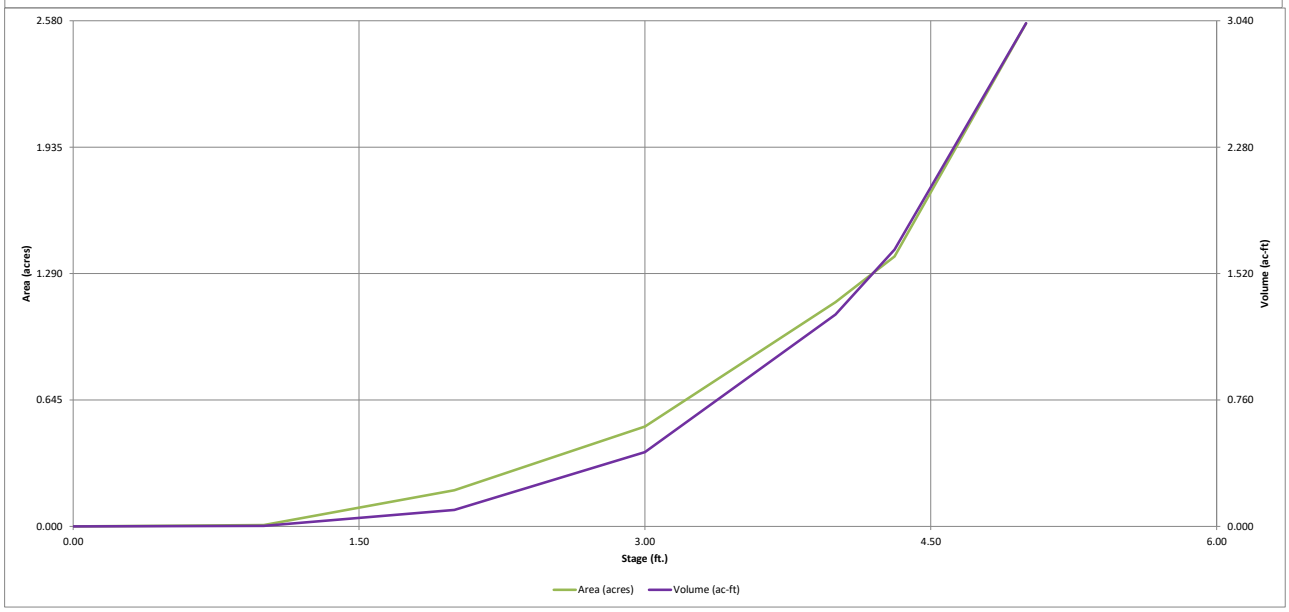
Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	0	0.000		
4236	--	1.00	--	--	--	300	0.007	150	0.003
4237	--	2.00	--	--	--	8,050	0.185	4,325	0.099
4238	--	3.00	--	--	--	22,200	0.510	19,450	0.447
4239	--	4.00	--	--	--	49,850	1.144	55,475	1.274
4239.31	--	4.31	--	--	--	60,000	1.377	72,501	1.664
4240	--	5.00	--	--	--	111,800	2.567	131,772	3.025

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





LAMP
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LampRynearson.com

June 14, 2024

Morgan County Planning-Zoning and Building Department
Nicole Hay
231 Ensign P.O. Box 596
Fort Morgan, Colorado 80701

RE: Pivot Energy Solar Array Morgan PS71/Larsen Trust (Phase 4) – Drainage Narrative

Dear Nicole,

On behalf of Pivot Energy, we would like to convey our appreciation for taking the time and effort to review our Drainage Analysis for the Pivot Energy Solar Array Morgan PS 71/Larsen Trust (Phase 4).

Site Location
The property is located south of HWY 76, west of County Road 26, and east of Hospital Road. The site comprises approximately 11.3 acres of leased land zoned Rural Residential (RR). The proposed development is a portion of Parcel #10373330001 located in the N ½ of the SW ¼ portion of Section 33, Township 4 North, Range 56 West of the 6th P.M., Morgan County, Colorado.

The facility is proposed as a photovoltaic solar facility that will provide electrical power. The land will be leased and the facility will be owned and operated by Pivot Energy.

Site access will be full movement access from County Road 26, which is a two-lane gravel road. Site access to the proposed development is approximately 725 feet south of the I-76 interchange.

The site will consist of a 2MWDC photovoltaic community solar facility and will generally include a tracker system with panels mounted to a torque tube, H-piles driven into the ground, or similar; it is anticipated that the inverters will sit on a concrete pad or skid mounted, an access drive with an emergency turnaround, and perimeter security fencing with an access gate. The proposed fence shall be 8' tall game fence with wood posts.

Drainage Design

Existing Drainage Conditions
Per the FEMA FIRM Panel: 08087C0469D, the project site is in a Zone X floodplain indicating minimal flood hazard. The soil in this area is classified as Type A per the NCRS HSG with high infiltration and low runoff. The average surface slopes between 1-2 percent with approximately half the site conveying runoff to the northwest corner of the site to an established depression and the remaining portion of the site conveying east to southeast towards the Brush Golf Course (The Course at Pettey's Park). The entire site is covered in native vegetation that will be preserved. Mass grading is not proposed with this project and existing contours will be preserved.

Site Improvements
Solar Array Components – The array will include solar panels placed on steel H-pipes, I-beams, or similar (driven into the ground), rack-mounted inverters and electric transformers, and a gated perimeter fence. Overhead and underground electrical lines will also be included in the site improvements. Since the solar panels are tracking panels (rotate through the day to track the path of the sun), the ground surface vegetation beneath the panels will continue to grow. The tracking system will be installed in a north/south direction.

Access Road -The access road will consist of a 16' wide gravel road; access road section shall be in accordance with the project-specific geotechnical report. The road will run east/west at the southern boundary of the parcel with a gravel driveway connecting to eastside of County Road 26.

Site Land Cover Areas and Composite Imperviousness

Land Cover	Imperviousness(%)	Existing Area (Acres)	Area (Acres)	Impervious Area
Solar Field (Diagonal Placement)*	20%	0	10.3	2.06
Gravel Road	80%	0	0.81	0.648
Concrete Pads	100%	0	0.088	0.088
Open Space	5%	11.3	0.1	0.005
Total	Total		11.298	2.801
		5.00%		25%

* From Mile High Flood District Technical Memorandum Determination of Solar Panel Field Runoff Coefficients Table 4

Stormwater Runoff

The 100-year stormwater runoff for both the existing conditions and the developed site was calculated using the Mile High Flood District "Peak Runoff Prediction by the Rational Method" Workbook. The existing total and proposed composite imperviousness values were used along with the site topography and the precipitation data from the NOAA ATLAS 14 100-year, 1-hour storm data for the site to calculate the values below:

Site Condition	Time of Concentration (Minutes)	100 YR Runoff Coefficients	100-YR Peak Flow (cfs)
Existing 1	29.57	0.15	4.54
P1	25.33	0.30	10.14
Existing 2	21.25	0.15	3.85
P2	18.14	0.30	8.56

Using the MHFD methodology P1 and P2 it will be observed that there in an increase in peak runoff. P1 will have an increase in peak flow of approximately 5.6 cfs. P2 will have an increase in peak flow of approximately 4.71 cfs. These flows will continue following in the existing conveyance paths. In the proposed P1 condition 6.8 acres of the total site will convey northwest towards a retention area and other 4.8 acres will sheet flow east to southeast. The portion of the additional site runoff that will be detained is 6.8 acres and will produce approximately **0.683 acre-ft** of runoff during the 100-year storm event. This volume will be retained in the depression located at the northeast portion of the site under a portion of the solar arrays. Due to this being a low point there is no identifiable outfall and therefore all runoff will infiltrate, evaporate, or evapotranspirate.

Sediment and Erosion Control

During construction, land grading activities will be minimized to allow for the installation of the solar arrays and BMP's will be installed where needed to reduce the transport of sediment off-site. Once the project is completed, any disturbed areas will be reseeded with a native low-growth dryland seed mix. Once vegetation is considered established, then BMP's will be removed. The established vegetation will provide permanent water quality and

sediment and erosion control for the site. If additional erosion control measures are needed after the site has been completed, then further measures will be implemented.

Conclusion

The proposed solar array site has been evaluated using the current Mile High Flood district criteria and the "Technical Memorandum-Determination of Solar Panel Runoff Coefficients" dated October 13, 2023. This memorandum increases the imperviousness of a solar array site to at least 15% and up to 60%. The imperviousness values used for this evaluation accounted for the direction of the arrays in relation to the minimally disturbed site contours. The finished ground cover, reestablished native grass, was also accounted for to give a proposed composite imperviousness of 25%. Compared to the existing condition value of 5% the increased runoff volume (0.683 acre-ft) from the site will need to be retained in an existing depression at the northwest corner of the site. A stage storage evaluation was performed using the MHFD Detention workbook and using the existing contours it was found to have an approximate 2.5 depth during the 100-YR event. The existing depression is estimated to have a volume in excess of 1.29 acre-ft, which will add a factor of safety. These calculations are considered to be conservative as percolation is not being considered.

We look forward to working with County staff to discuss the proposed project and are excited to receive feedback.

Prepared by:

Andrea McDaniel, EIT

Reviewed by:

Troy Spraker, PE
Lic# 38538
Senior Project Manager

MEMORANDUM

To: Holly Piza, P.E., CFM, Brik Zivkovich, P.E, CFM
Mile High Flood District

Via email: [redacted]

From: Wright Water Engineers, Inc.
Andrew Earles, Ph.D., P.E., P.H., D.WRE, Chris Olson, Ph.D., P.E., and Matthew Howard, EIT

Date: October 13, 2023

Re: Determination of Solar Panel Field Runoff Coefficients

This memorandum documents the methods and results of hydrologic modeling analysis to estimate runoff coefficients and imperviousness values for solar panel fields under two different situations. The first scenario addresses solar installations that involve minimal land disturbances in areas that are or will be vegetated using native grasses. This approach assumes that soils are not significantly compacted during construction and that where disturbance (cut and fill) is required, proper measures are taken to manage topsoil (see the Topsoil Management Guide) and all land disturbed is revegetated to an approximate uniform density of at least 80%. The second scenario addresses solar installations that use gravel for the areas between and beneath the panels.

1.0 Methodology

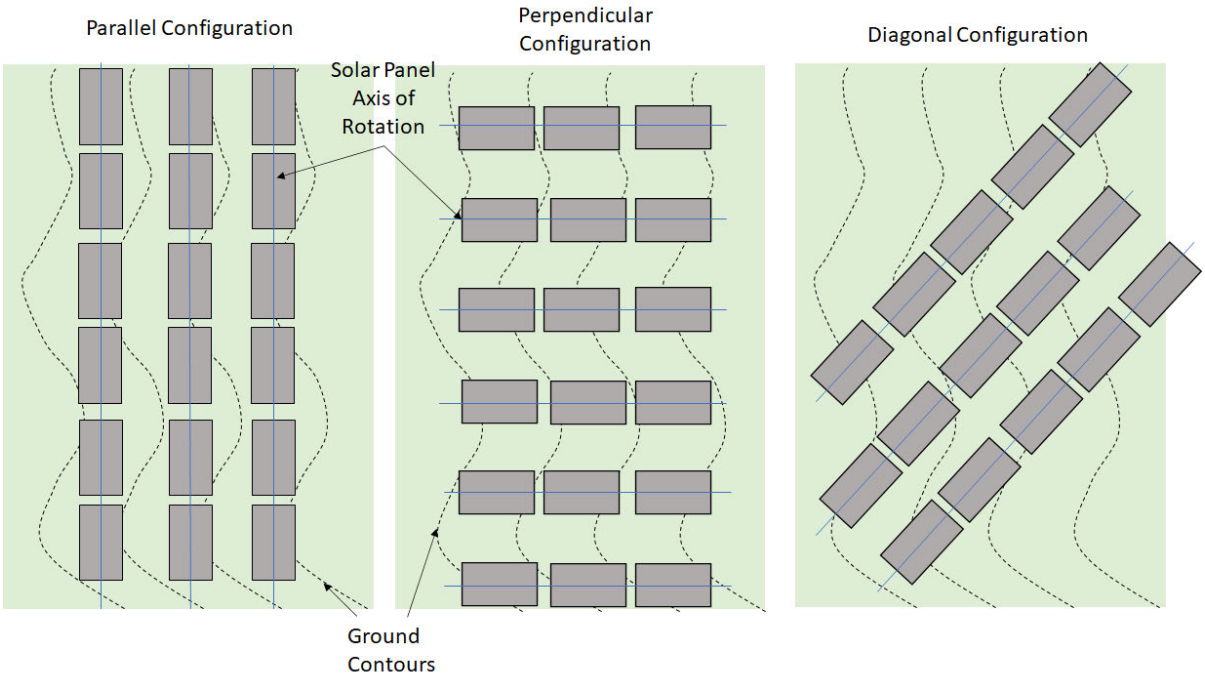
The EPA Stormwater Management Model (SWMM) was used to simulate runoff from typical solar panel field installations. The SWMM model was used because it has the computational and workflow capabilities of being able to "cascade" runoff from one type of surface (e.g., solar panel) onto another type of surface (e.g., ground), with each surface having different runoff-generating characteristics.

For this analysis, we simulated three different surfaces under three different configurations of solar panel alignments. The surfaces were:

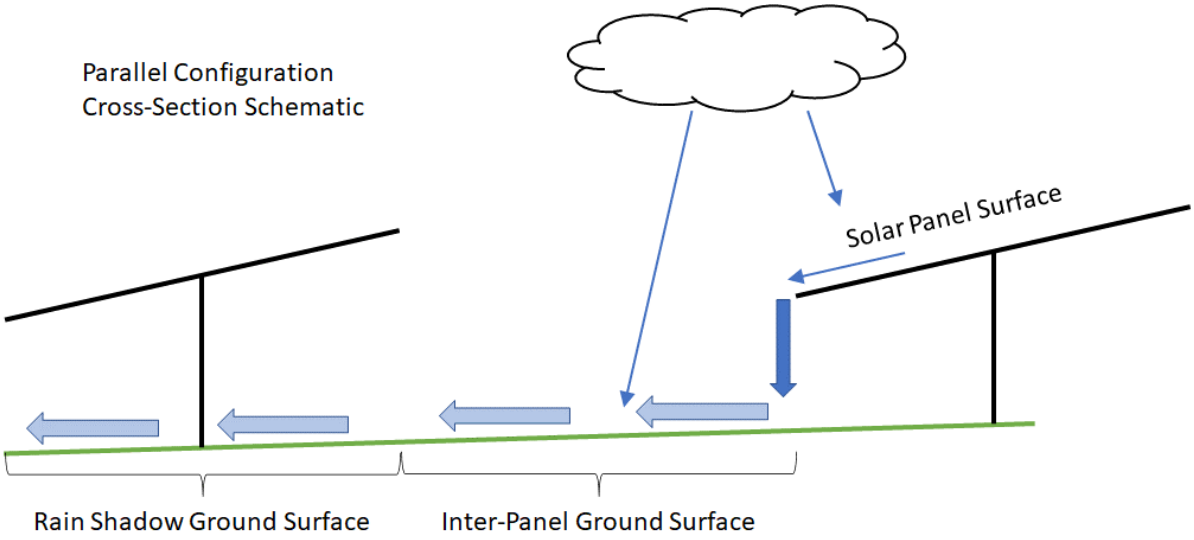
- The Solar Panel surface is impervious, receives direct rainfall and directs runoff onto the Inter-Panel surface.
- The Inter-Panel ground surface represents the ground surface between the solar panels. It receives both direct rainfall and runoff from the Solar Panel surface and directs runoff to either the Rain Shadow surface or adjacent Inter-Panel surfaces depending on configuration. The perviousness of the Inter-Panel is dependent upon the surface type.
- The Rain Shadow ground surface represents the ground surface underneath the solar panels. It does not receive any direct rainfall and only receives direct runoff from the Inter-Panel surface under certain configurations. The perviousness of the Rain Shadow is dependent upon the surface type.

This analysis only addressed the areas of the site where panels are installed. Typically, a solar field will also include additional impervious area such as access roads and pads for electrical appurtenances. These areas must be included in the overall imperviousness by area-weighting appropriate imperviousness values for the solar panel areas and the other impervious surfaces on the project site. An example is provided at the end of this memorandum that illustrates this process.

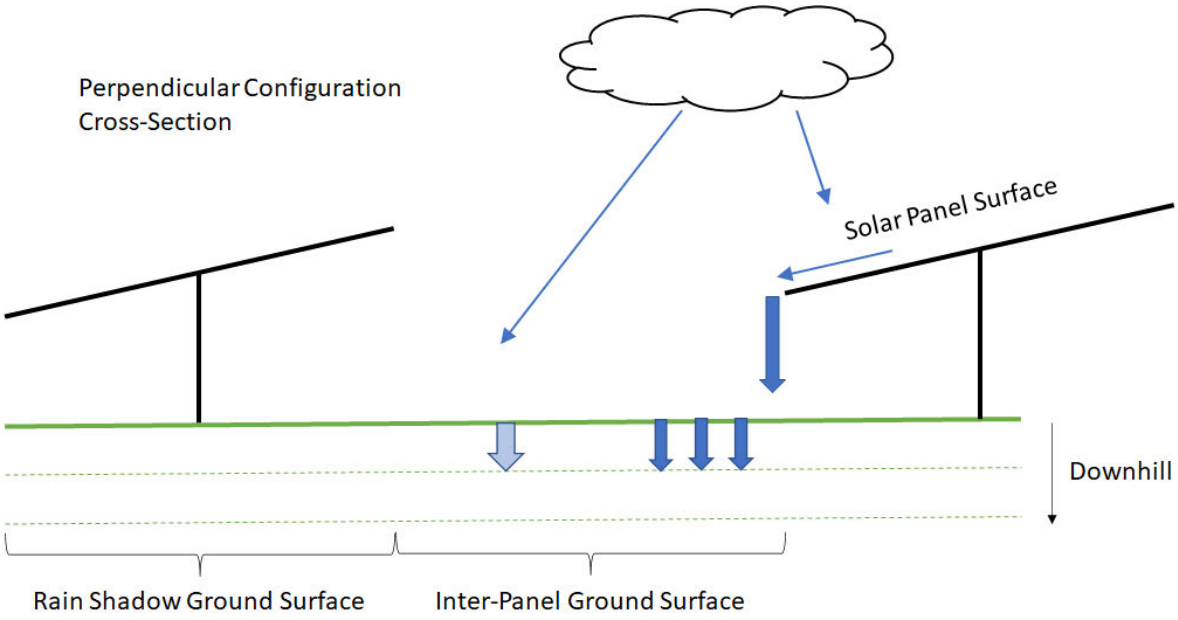
The three different configurations (parallel, perpendicular, and diagonal) represent different alignments of the solar panels with the contours of the ground surface. These alignments affect how runoff from the solar panels cascades across the ground surface in the downhill direction. These three configurations were evaluated for native grass cover and for gravel cover.



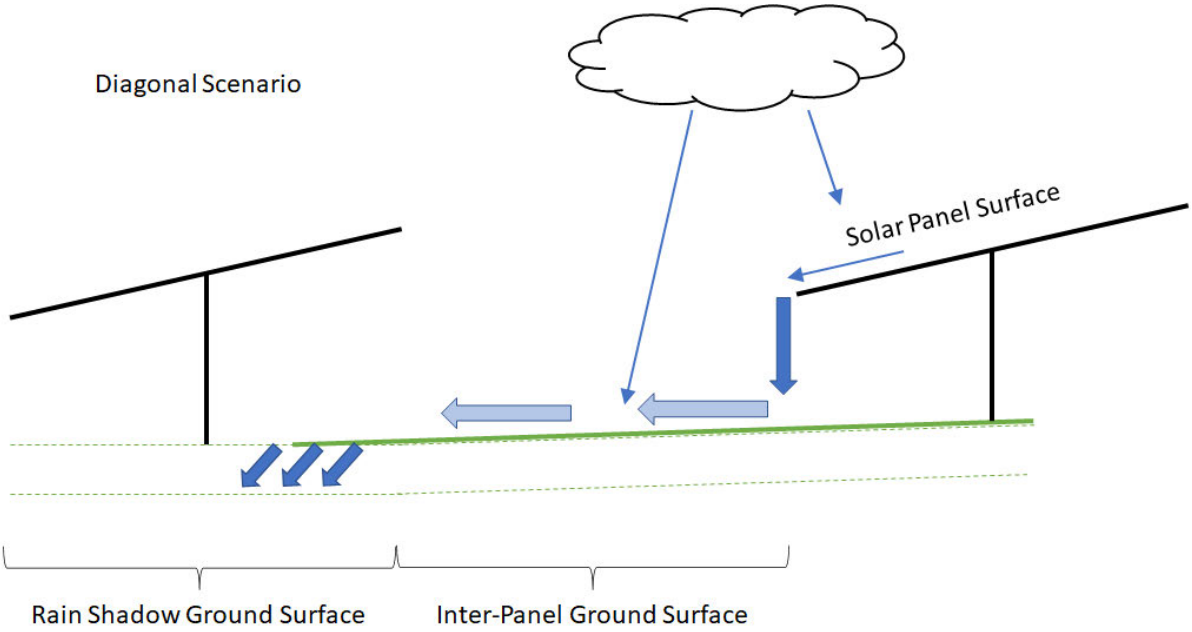
Parallel Configuration - Due to the solar panels being aligned parallel to the ground contours, runoff from the Solar Panel surface is distributed evenly across both the Inter-Panel and Rain Shadow surfaces. This configuration maximizes runoff reduction potential because runoff from the solar panels has the opportunity to attenuate and infiltrate across all available pervious area.



Perpendicular Configuration - Due to the solar panels being aligned perpendicular to the ground contours, runoff from the solar panels becomes channelized quickly after reaching the Inter-Panel surface and does not continue to runoff into the Rain Shadow surface. The Inter-Panel surface is only partially effective for runoff reduction and the Rain Shadow surface is not effective at all for runoff reduction. This configuration represents the minimum runoff reduction opportunity.



Diagonal Configuration - Runoff from the solar panels is distributed evenly across the Inter-Panel surface but becomes mostly channelized by the time it reaches the Rain Shadow surface.



In addition to analysis using SWMM, WWE performed comparisons with results from the University of Minnesota's PV-SMaRT Solar Runoff Calculator Version 3.0[1] (referred to as "Solar Runoff Calculator"). This is a spreadsheet calculator that implements Natural Resource Conservation Service (NRCS) Curve Number (CN) volumetric runoff calculations. The solar calculator is based on a 24-hour storm instead of the 2-hour storm that is used in the Mile High Flood District (MHFD) region. WWE corresponded with the author of the Solar Runoff Calculator, Dr. David Mulla, to confirm that 2-hour storms, with greater intensity, would be expected to have fewer losses (e.g., less infiltration) than represented by a CN for a 24-hour storm. Dr. Mulla provided WWE with a reference that he recommended for adjustment of results for a 2-hour storm duration[2]. Although the CN method, even with adjustments, was expected to generate different results than SWMM due to fundamental differences in infiltration methods, WWE performed calculations using the Solar Runoff Calculator, adjusted for a 2-hour storm duration as a point of comparison with SWMM results.

2.0 SWMM Model Parameterization

The surfaces described above were represented as a series of individual subcatchments. Runoff from each subcatchment was either "cascaded" to downhill subcatchments or directed to the model "outlet," depending on the solar panel configuration. Table 1 summarizes the names, areas and description of the subcatchments used for each configuration.

[1] Mulla, D. 2023. *PV-SMaRT Solar Runoff Calculator Version 3.0.* University of Minnesota, Technology No. 2023-053, https://license.umn.edu/product/pv-smart-solar-runoff-calculator-version-30.
[2] Meadows, M. 2016. Adjusting NRCS Curve Number for Rainfall Durations Less Than 24 Hours. Journal of South Carolina Water Resources, Volume 3, Issue 1, Pages 43-47.

Table 1. Summary of SWMM Subcatchments Used to Represent each Solar Panel Farm Configuration

Configuration	Subcatchment Name and Area	Description
Parallel	Solar Panel: 1 acre Inter-Panel: 1 acre Rain Shadow: 1 acre	Runoff from the Solar Panel is directed to the Inter-Panel. Inter-Panel runoff is directed to the Rain Shadow. The ratio of Receiving Pervious Area to Unconnected Impervious area is 2:1
Perpendicular	Solar Panel: 1 acre Inter-Panel_1: 0.5 acres Inter-Panel_2: 0.5 acres Rain Shadow: 1 acre	Runoff from the Solar Panel is directed to Inter-Panel_1. Inter-Panel_1 and Inter-Panel_2 runoff is directed to the outlet (downhill). The ratio of Receiving Pervious Area to Unconnected Impervious area is 0.5:1
Diagonal	Solar Panel: 1 acre Inter-Panel: 1 acre Rain Shadow_1: 0.5 acre Rain Shadow_2: 0.5 acre	Runoff from the Solar Panel is directed to the Inter-Panel. Inter-Panel runoff is directed to the Rain Shadow_1 surface. The ratio of Receiving Pervious Area to Unconnected Impervious area is 1.5:1

Rainfall for the 2-, 5-, and 100-year design storms was applied only to the Solar Panel and Inter-Panel surfaces. The 2-hour design storms were generated using CUHP and NOAA Atlas 14 60-minute rainfall depths for Aurora, Colorado.

All simulations used Horton's infiltration parameters for Type C/D soils and slopes of 5%. Typical Manning's N and depression storage values for impervious and pervious surfaces were applied based on the MHFD's Urban Storm Drainage Criteria Manual.

For the Solar Runoff Calculator, WWE used the same geometric parameters and soil types represented in SWMM. WWE implemented an adjustment procedure for CN values based on Meadows' work in 2016 to reflect CN losses for a 2-hour storm duration.

3.0 Results and Discussion

3.1 Solar Fields with Native Vegetation

3.1.1 SWMM Analysis

The results of the SWMM simulations were used to calculate volumetric runoff coefficients. Volumetric runoff coefficients were computed by dividing the total runoff volume by the total precipitation volume. Table 2 and Figure 1 present the runoff coefficient results from SWMM. As expected, the parallel configuration has the lowest runoff coefficients, the perpendicular configuration has the largest and the diagonal configuration is in between the others. Imperviousness percentages were assigned based on Table 6-5 in the MHFD's Urban Storm Drainage Criteria Manual (MHFD Manual) which is provided in Appendix A. WWE calculated imperviousness from SWMM results

for the 2-, 5-, and 100-year events. WWE presents results of the SWMM simulations in Table 2 and Figure 1.

Table 2. Volumetric Coefficients and Percent Imperviousness from SWMM Modeling – Solar Fields with Native Vegetation

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.01	2%	0.01	2%	0.37	48%
5-year	0.02	<2%	0.16	15%	0.45	52%
100-year	0.47	<2%	0.58	23%	0.72	58%
Average	----	2%	----	13%	----	52%

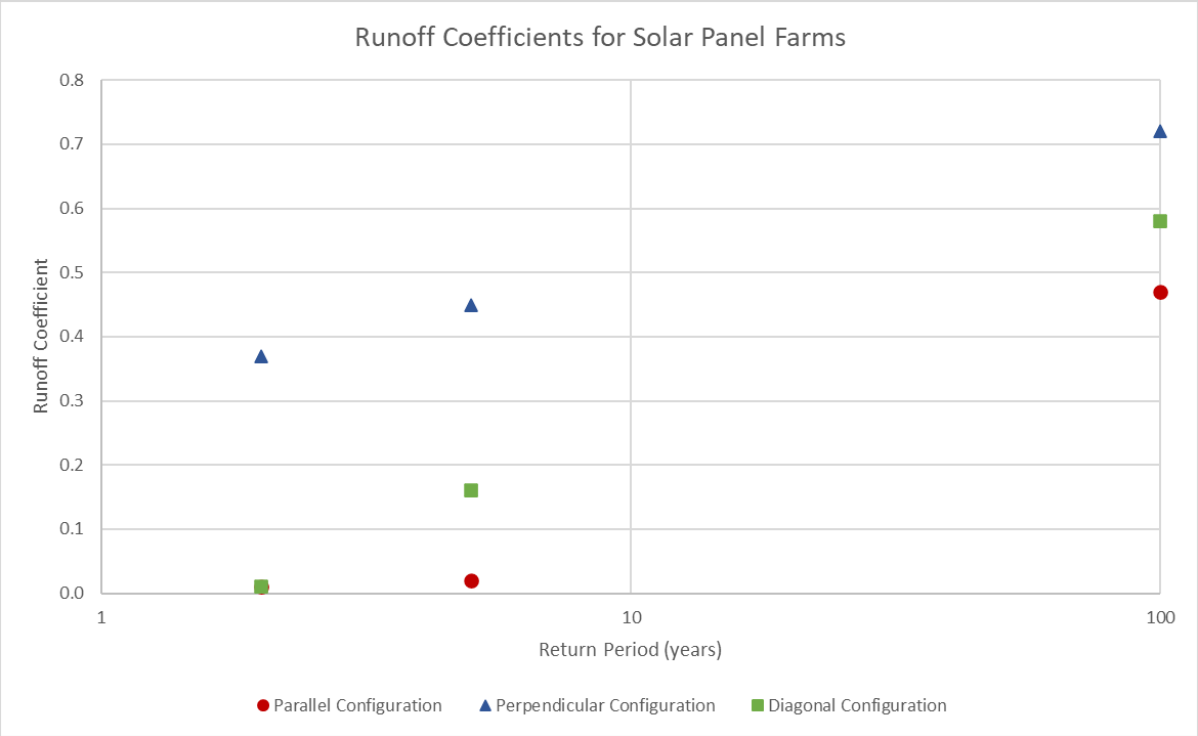


Figure 1. Volumetric Runoff Coefficients from SWMM Modeling – Solar Fields with Native Vegetation

Percentage imperviousness values back-calculated from Table 6-5 varied only slightly for parallel solar orientations, despite the volumetric runoff coefficient increasing from 0.01 to 0.47 from the 2- to the 100-year event. This is due to the low infiltration rate of hydrologic soil group (HSG) C soils once saturated, which is modeled by SWMM and accounted for in the intercepts of the relationships summarized by Table 6-5. For the simulated 2- and 5-year events with solar panels oriented parallel to surface contours, the pervious native vegetation surface type in the Rain Shadow and Inter-Panel infiltrated most of the runoff from the Solar Panel without saturating the HSG C soils. However, during the simulated 100-year event the underlying soils were fully saturated and runoff was produced which was less than but similar to values expected for low-imperviousness watersheds with HSG C soils. The relationship between calculated volumetric runoff coefficients and event return periods varied according to an approximately log-linear relationship for each panel configuration which is expected for watersheds with HSG C soils.

3.1.2 Solar Runoff Calculator

Using similar input parameters and the adjustments from a 24-hour to 2-hour storm recommended by the developer of the Solar Runoff Calculator, the Solar Runoff Calculator produced the results shown in Table 3. As noted above, imperviousness values that were back-calculated from SWMM using Table 6-5 in the MHFD Manual are averaged in Table 3 due to variability in calculated imperviousness values.

Table 3. Volumetric Coefficients and Percent Imperviousness from Solar Runoff Calculator Adjusted for 2-hour Storm – Solar Fields with Native Vegetation

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.01	2%	0.07	12%	0.14	20%
5-year	0.24	25%	0.29	31%	0.33	37%
100-year	0.63	35%	0.65	40%	0.67	45%
Average	----	21%	----	28%	----	34%

While there are differences between the Solar Runoff Calculator and SWMM results (as expected), the Solar Runoff Calculator results clearly show that solar fields have the potential to increase runoff relative to undeveloped conditions. The Solar Runoff Calculator results show higher estimated percent imperviousness for the parallel and diagonal installations relative to SWMM, while the results for perpendicular conditions are slightly lower than the SWMM results, but of a similar magnitude. Table 4 presents averaged and rounded percent imperviousness results from SWMM and the Solar Runoff Calculator with the range of results. This averaging was performed since there is uncertainty associated with both methods, and the two methods yield generally similar results, with some differences. Since SWMM is commonly used for hydrology in the MHFD region and because the Solar Runoff Calculator has been widely applied by the solar industry elsewhere, WWE averaged values from the two methods and then rounded results to the nearest 5% for the recommended values.

Table 4. Averages and Ranges of Percent Imperviousness Values from SWMM and Solar Runoff Calculator for Solar Fields with Native Vegetation

Parameter	Parallel Percent Impervious	Diagonal Percent Impervious	Perpendicular Percent Impervious
Avg of SWMM and Solar Runoff Calculator	10%	20%	45%
Low Range	<2%	2%	20%
High Range	35%	40%	58%

3.2 Solar Fields with Gravel Cover

3.2.1 SWMM Analysis

SWMM simulations were repeated with input parameters appropriate to reflect increased roughness and imperviousness in the rain shadow and inter-panel areas when gravel is selected for solar field installations. Table 5 and Figure 2 present the runoff coefficient results from SWMM modeling of solar fields with gravel ground cover. The runoff coefficients calculated from SWMM modeling results for solar fields with gravel ground cover followed the same trend as the simulations performed for solar fields with native vegetation, but the increased magnitude of calculated runoff coefficients reflects the impact of the increased imperviousness of gravel ground cover. As expected, the parallel configuration has the lowest runoff coefficients, the perpendicular configuration has the largest, and the diagonal configuration is in between the others. Imperviousness percentages were assigned based on Table 6-5 in the MHFD Manual. WWE calculated imperviousness from SWMM results for the 2-, 5-, and 100-year events. WWE presents averages in Table 5 since there is some variability in the imperviousness values when they are back-calculated from SWMM runoff results using Table 6-5 in the MHFD Manual.

Table 5. Volumetric Coefficients and Percent Imperviousness from SWMM Modeling – Solar Fields with Gravel Ground Cover

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.28	37%	0.39	51%	0.65	80%
5-year	0.38	43%	0.51	59%	0.70	81%
100-year	0.69	50%	0.76	68%	0.85	90%
Average	-	43%	-	59%	-	84%

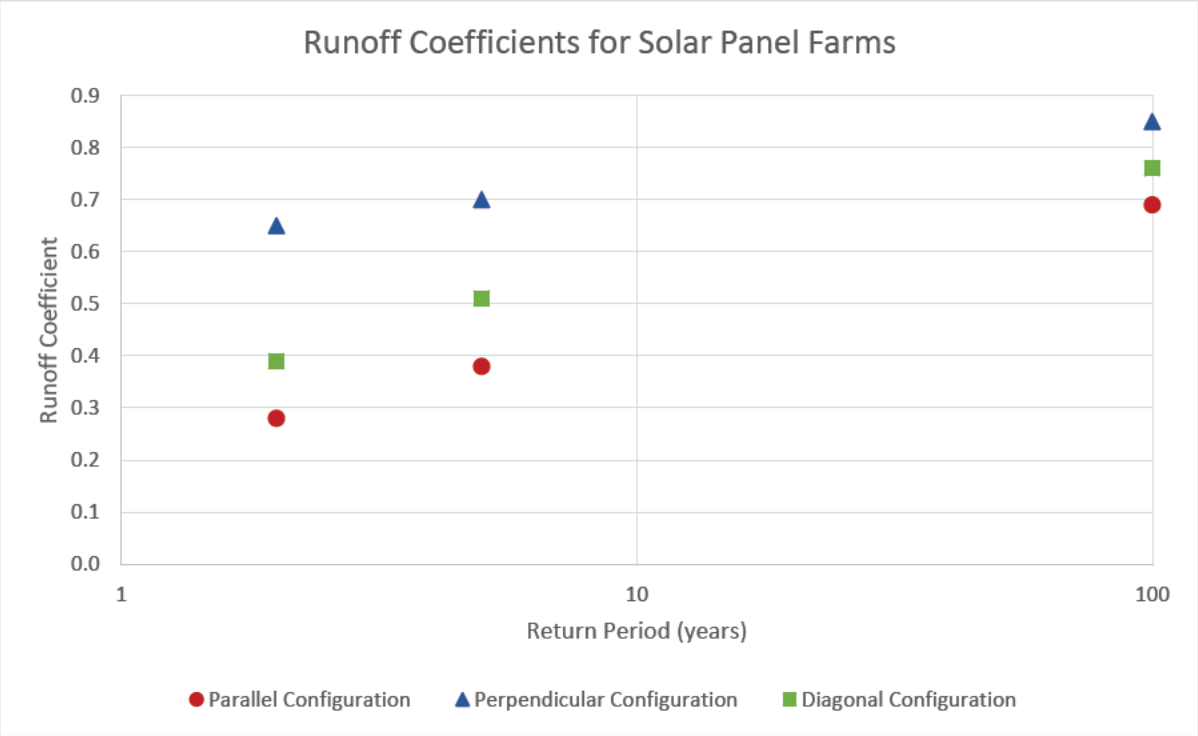


Figure 2. Volumetric Runoff Coefficients from SWMM Modeling – Solar Fields with Gravel Ground Cover

3.2.2 Solar Runoff Calculator

Solar Runoff Calculator analyses repeated for solar fields with gravel ground cover produce the results shown in Table 6. As described above, imperviousness values that were back-calculated from the Solar Runoff Calculator using Table 6-5 in the MHFD Manual are averaged in Table 6 due to variability in calculated imperviousness values. due to variability in calculated imperviousness values.

Table 6. Volumetric Coefficients and Percent Imperviousness from Solar Runoff Calculator Adjusted for 2-hour Storm – Solar Fields with Gravel Ground Cover

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.32	43%	0.38	50%	0.43	55%
5-year	0.47	54%	0.52	60%	0.56	65%
100-year	0.74	63%	0.76	68%	0.78	73%
Average	----	53%	----	59%	----	64%

The differences between runoff coefficients calculated with the Solar Runoff Calculator and SWMM results show the same relationship observed when analyses were performed for solar panel fields with native vegetation. The Solar Runoff Calculator results show higher estimated percent imperviousness for the parallel and diagonal installations relative to SWMM, while the results for perpendicular conditions are similar to, but slightly lower than, the SWMM results. Table 7 presents averages of percent imperviousness from SWMM and the Solar Runoff Calculator with the range of results. As previously noted, we have averaged and rounded results from the SWMM and Solar Runoff Calculator analysis in Table 7. Averaging was performed because there is uncertainty associated with both methods, and the two methods yield generally similar results, with some differences. WWE averaged values from the two methods and then rounded results to the nearest 5% for the recommended values.

Table 7. Averages and Ranges of Percent Imperviousness Values from SWMM and Solar Runoff Calculator for Solar Fields with Gravel Ground Cover

Parameter	Parallel Percent Impervious	Diagonal Percent Impervious	Perpendicular Percent Impervious
Avg of SWMM and Solar Runoff Calculator	50%	60%	75%
Low Range	37%	50%	55%
High Range	63%	68%	90%

3.3 Adjustments for Variable Panel and Aisle Widths

WWE performed SWMM modeling and Solar Runoff Calculator analyses assuming equal widths for solar panels and inter-panel areas. To apply these analyses to solar fields with variable panel spacing, Equation 1 through Equation 4 were developed. Equation 1 accounts for the relative impact of panel and aisle width on runoff coefficients calculated for solar fields, while

Equation 2 through Equation 4 are evaluated to solve Equation 1. Because our analyses indicate that solar arrays parallel to ground contours provide minimal increases in site imperviousness, standard recommended impervious values remain constant for all combinations of solar panel and inter-panel aisle widths.

$$I^* = \frac{2I + I_a C_a + I_p C_p}{2 + C_a + C_p}$$

Equation 1. I^*= The calculated impervious proportion of solar fields with variable aisle/panel widths, I = Standard imperviousness for solar panel orientation/ground cover type, I_a = Aisle ground cover imperviousness, I_p = Solar panel orientation imperviousness, C_a = Aisle width adjustment factor, C_p = Panel width adjustment factor

$$I_p = 2I - I_a;\ I_a = \begin{cases} 0.10\ if\ native\ grass \\ 0.50\ if\ gravel \end{cases}$$

Equation 2. NOTE: For solar array configurations oriented parallel to surface contours, $I_a = I_p = I = I^*$

$$C_a = \frac{w_{a,proj}}{10} - 1$$

Equation 3. $w_{a,proj}$ = Width of aisles from project site plans

$$C_p = \frac{w_{p,proj}}{10} - 1$$

Equation 4. $w_{p,proj}$ = Width of solar panels from project site plans

Equation 1 through Equation 4 have been solved for each solar array orientation and ground cover type with a variety of panel and aisle width combinations in Table 8 through Table 11 presented below.

Table 8. Runoff Coefficients Calculated for Variable Widths for Solar Fields Oriented Diagonal to Ground Surface Contours with Native Grass Ground Cover

Width of Panels, $w_{p,proj}$ (feet) \ Width of Aisle, $w_{a,proj}$ (feet)	10	15	20	25	30	35	40	45	50
10	0.20	0.18	0.17	0.16	0.15	0.14	0.14	0.14	0.13
15	0.22	0.20	0.19	0.18	0.17	0.16	0.15	0.15	0.15
20	0.23	0.21	0.20	0.19	0.18	0.17	0.17	0.16	0.16
25	0.24	0.23	0.21	0.20	0.19	0.18	0.18	0.17	0.17
30	0.25	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.18

Table 9. Runoff Coefficients Calculated for Variable Widths for Solar Fields Oriented Perpendicular to Ground Surface Contours with Native Grass Ground Cover

Width of Panels, $w_{p,proj}$ (feet) \ Width of Aisle, $w_{a,proj}$ (feet)	10	15	20	25	30	35	40	45	50
10	0.45	0.38	0.33	0.30	0.28	0.26	0.24	0.23	0.22
15	0.52	0.45	0.40	0.36	0.33	0.31	0.29	0.28	0.26
20	0.57	0.50	0.45	0.41	0.38	0.35	0.33	0.32	0.30
25	0.60	0.54	0.49	0.45	0.42	0.39	0.37	0.35	0.33
30	0.63	0.57	0.52	0.48	0.45	0.42	0.40	0.38	0.36

Table 10. Runoff Coefficients Calculated for Variable Widths for Solar Fields Oriented Diagonal to Ground Surface Contours with Gravel Ground Cover

Width of Panels, $w_{p,proj}$ (feet) \ Width of Aisle, $w_{a,proj}$ (feet)	10	15	20	25	30	35	40	45	50
10	0.60	0.58	0.57	0.56	0.55	0.54	0.54	0.54	0.53
15	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.55	0.55
20	0.63	0.61	0.60	0.59	0.58	0.57	0.57	0.56	0.56
25	0.64	0.63	0.61	0.60	0.59	0.58	0.58	0.57	0.57
30	0.65	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.58

Table 11. Runoff Coefficients Calculated for Variable Widths for Solar Fields Oriented Perpendicular to Ground Surface Contours with Gravel Ground Cover

Width of Panels, $w_{p,proj}$ (feet) \ Width of Aisle, $w_{a,proj}$ (feet)	10	15	20	25	30	35	40	45	50
10	0.75	0.70	0.67	0.64	0.63	0.61	0.60	0.59	0.58
15	0.80	0.75	0.71	0.69	0.67	0.65	0.64	0.63	0.62
20	0.83	0.79	0.75	0.72	0.70	0.68	0.67	0.65	0.64
25	0.86	0.81	0.78	0.75	0.73	0.71	0.69	0.68	0.67
30	0.88	0.83	0.80	0.77	0.75	0.73	0.71	0.70	0.69

4.0 Recommendations

In Table 12 and Table 13, WWE presents recommended values for runoff coefficients and percent imperviousness based on rounding of average values calculated from SWMM and the Solar Runoff Calculator.

Table 12. Recommended Runoff Coefficients and Imperviousness to Use for Evaluation of Solar Installations with Native Grass Cover*

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.06	10%	0.14	20%	0.34	45%
5-year	0.12	10%	0.20	20%	0.40	45%
100-year	0.52	10%	0.57	20%	0.67	45%

* These values of runoff coefficients and imperviousness percentages are based on assumptions of HSG C soils and equal widths of Panels and Inter-Panel aisles. If site conditions differ from these assumptions, the engineer can follow the SWMM procedures described in the memorandum to perform site-specific analysis.

Table 13. Recommended Runoff Coefficients and Imperviousness to Use for Evaluation of Solar Installations with Gravel Cover*

Return Period	Parallel		Diagonal		Perpendicular	
	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious	Volumetric Runoff Coefficient	Percent Impervious
2-year	0.38	50%	0.47	60%	0.60	75%
5-year	0.44	50%	0.52	60%	0.65	75%
100-year	0.69	50%	0.73	60%	0.79	75%

* These values of runoff coefficients and imperviousness percentages are based on assumptions of HSG C soils and equal widths of Panels and Inter-Panel aisles. If site conditions differ from these assumptions, the engineer can follow the SWMM procedures described in the memorandum to perform site-specific analysis.

WWE recommends basing imperviousness values for determining runoff coefficients on the imperviousness values and runoff coefficients presented in Table 12 and Table 13. At the master planning level, before the layout of a solar site is known, the imperviousness values and runoff coefficients for perpendicular installations should be used. Once the layout is known, the engineer can conduct site-specific analysis to assign runoff coefficients based on the alignment of panels relative to contours, interpolating between values in Table 12 and Table 13, as illustrated in the following example.

5.0 Example

The following example illustrates how to determine runoff coefficients and imperviousness percentages for a project site. There are many ways to perform this analysis and achieve the same results, but a simple and effective method for obtaining runoff coefficients can be performed using the Spatial Analyst extension in ArcGIS Pro.

Step 1. Delineate drainage sub-basins based on best available survey data.

The example solar field is approximately 1 square mile in area and is located in Aurora, Colorado. A gravel access road, gravel parking areas, and concrete pads for energy transmission equipment are included in the example site plan. Due to the extent of the project, it is assumed that grading will be limited to the access road, parking areas, and concrete pads. A total of 8 sub-basins and 7 direct run-off areas were delineated for the site. For brevity of this example, only Sub-basin 5 (highlighted in the figures below) will be analyzed here. Refer to the site map provided in Appendix B for locations of all design points, sub-basins, and non-site-specific drainage basins.

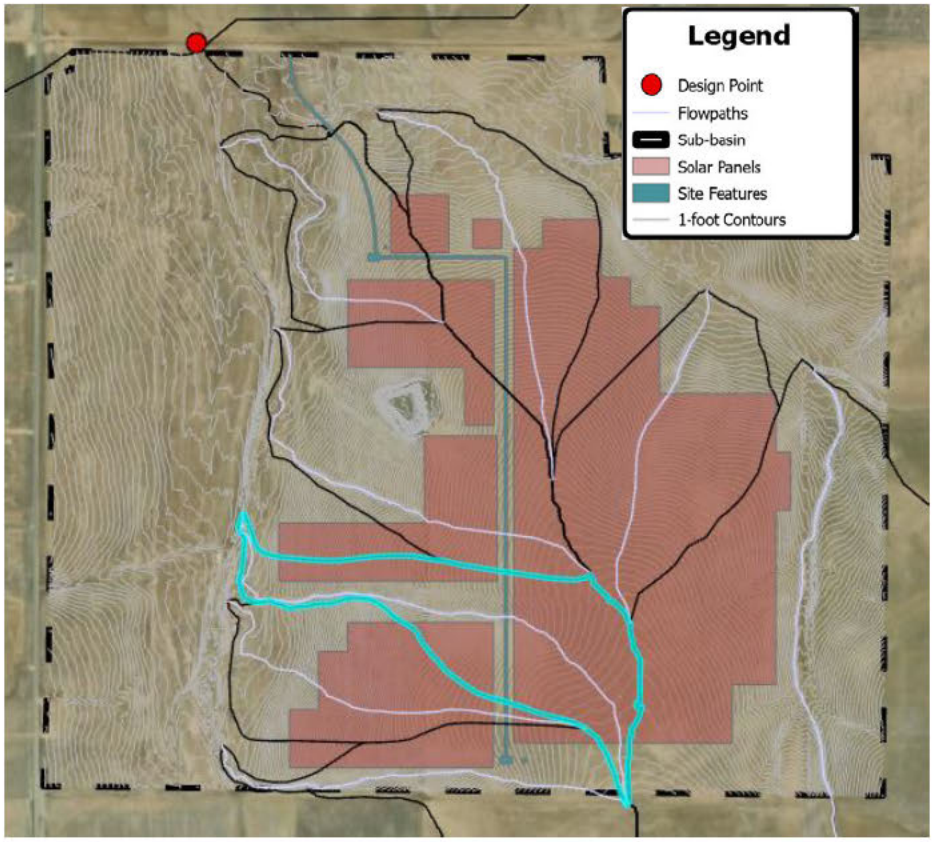


Figure EX-1. Hypothetical Solar Field Site with Sub-basins Delineated: Sub-basin 5 (Used in this Example) is Highlighted in Teal

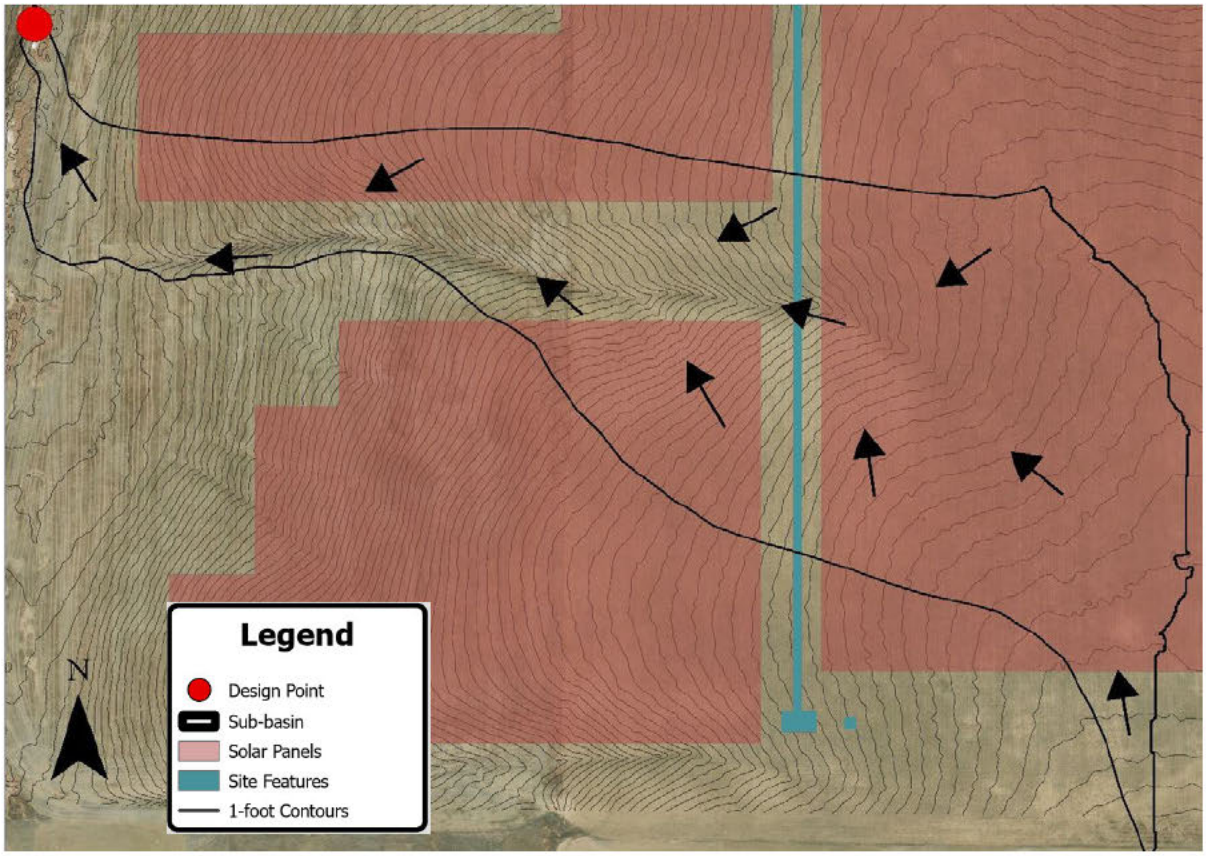


Figure EX-2. Sub-basin 5

Step 2. Determine the percent of each relevant land use within each sub-basin including open space, solar panels, gravel road, gravel pads, and other pervious and impervious land uses.

Land cover in Sub-basin 5 includes a portion of the gravel access road, undeveloped open space, and solar panels in various orientations relative to the natural ground contours. Create sub-basin-specific shapefiles to represent the geometry of each land use within the sub-basin.

Figure EX-3. Land Cover Categories in Sub-basin 5 Include Open-space (Green), Solar Panels (Orange), and Gravel (Yellow)

Once the shapefiles are created, calculate the area of each land use in the sub-basin by adding a field to the shapefile attribute table and using the **Calculate Geometry** function. Once calculated, areas for each component of the shapefile are either be summed manually or calculated using the **Summary Statistics** function. Access the **Summary Statistics** function by right clicking on the attribute table and selecting **Summarize.**

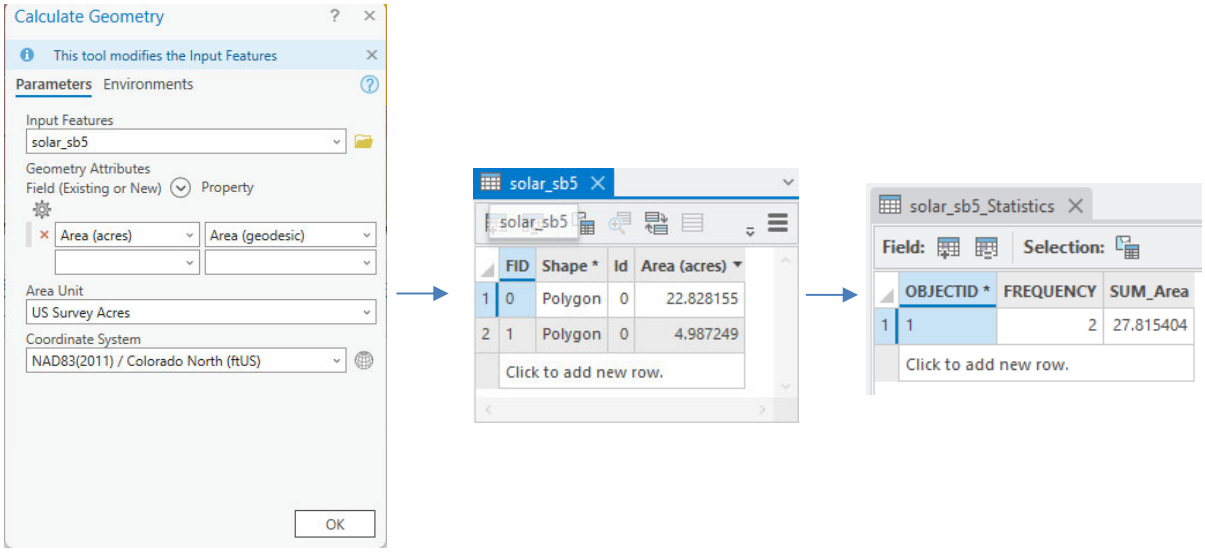


Figure EX-4. Example Area Calculation Workflow in ArcGIS Pro: Figure Shows Calculation of Solar Panel Area within Sub-basin 5 (Orange Area in Figure EX-3)

After calculating the area of all land cover in the sub-basin, tabulate results to determine composite areal percentages for each category.

Table EX-1. Sub-basin 5 Land Cover Summary

Land Cover	Area (acres)	Area (% of Total)
Solar Field	27.82	68%
Gravel	0.41	1%
Open Space	12.95	31%
Total	41.17	100%

Step 3. Determine representative angle of panels relative to ground contours for each sub-basin and calculate the composite imperviousness of the solar fields on site.

Use the **Surface Parameters** tool to calculate the aspect of the natural surface where solar fields are proposed. Aspect is essentially the flow direction of the natural surface measured in degrees clockwise from north. The output cell size is specified by the user and cannot be smaller than the cell size of the input raster. The selected cell size is used to calculated area later in this example.

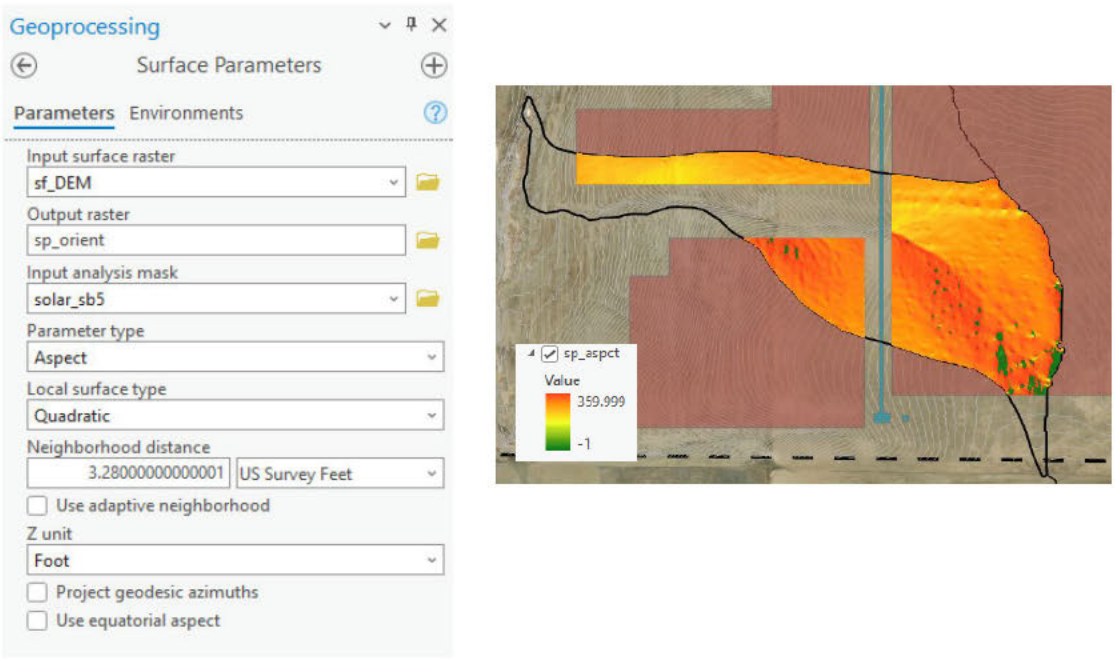


Figure EX-5. Surface Parameters Tool Input and Output Example

NOTE: 1.) A digital elevation model (DEM) must be specified for the "Input surface raster" parameter. 2.) A polygon shapefile can be specified for the "Input analysis mask" option to restrict the tool to only analyze the area within the mask. In this case, the analysis mask is the polygon representing the portions of the solar field within the sub-basin of interest.

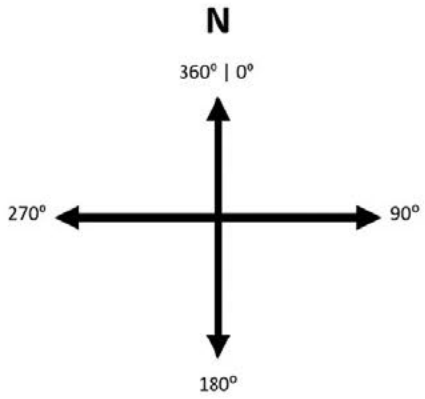


Figure EX-6. Surface Aspect Definition

Once the aspect raster is developed, use the **Reclassify** tool to count the number of cells in the aspect raster within user-specified bins. The start and end values chosen should be selected to define cells in the aspect raster as parallel, perpendicular, or diagonal.

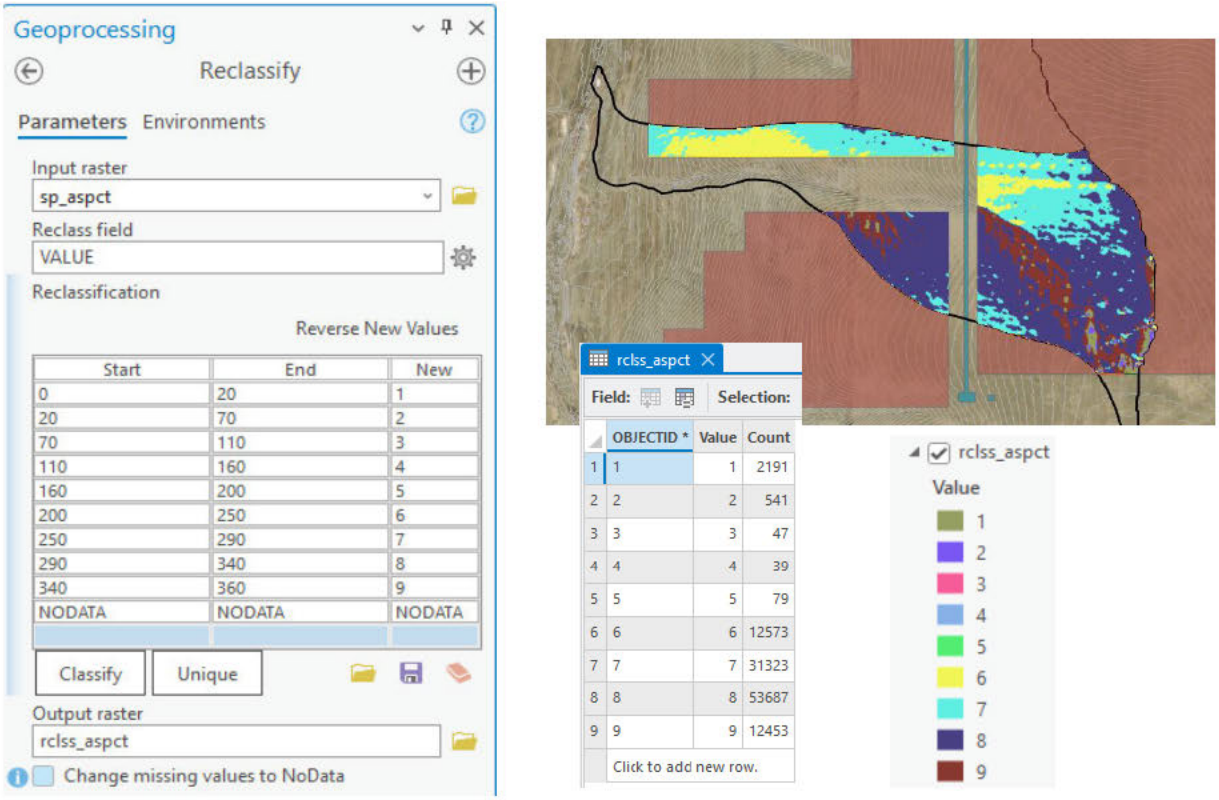


Figure EX-7. Reclassify Tool Input and Output Example

NOTE: For this example, solar panels were considered parallel to contours if the aspect was within 20 degrees of north or south and perpendicular if the aspect was within 20 degrees of east or west. Reference aspect definition in Figure EX-6 above.

The output shapefile from the Reclassify tool will contain an attribute table with the total number of raster cells which meet each bin definition. Once tabulated, sum the counts for each Solar Field Orientation and multiply by the aspect raster cell size to obtain the total area of each panel orientation. Then, calculate composite imperviousness percentages for each sub-basin using total area for each solar field orientation. Analysis results for Sub-basin 5 are presented in Tables EX-2 and EX-3 below.

Value	Representative Aspect (degrees)	Category	Count
1	0 - 20	Parallel	2191
2	20 - 70	Diagonal	541
3	70 - 110	Perpendicular	47
4	110 - 160	Diagonal	39
5	160 - 200	Parallel	79
6	200 - 250	Diagonal	12573
7	250 - 290	Perpendicular	31323
8	290 - 340	Diagonal	53687
9	340 - 360	Parallel	12453

Table EX-3. Composite Imperviousness Calculation for Solar Field within Sub-basin 5 with Native Grass or Gravel Ground Cover

Category	Count	Area (ac)	Imperviousness (%)		Impervious Area (ac)	
			Grass	Gravel	Grass	Gravel
Parallel	14723	3.64	10%	50%	0.36	1.82
Diagonal	66840	16.5	20%	60%	3.30	9.90
Perpendicular	31370	7.75	45%	75%	3.49	5.81
				Total IA:	7.15	17.53
				Composite IA (%):	26%	63%

Step 4. Calculate composite imperviousness percentages for each sub-basin.

Once the imperviousness of the solar field portion of the basin is known, calculate sub-basin composite imperviousness using the land cover areas evaluated in step 3 and imperviousness percentages for surface types in the MHFD Manual. Composite areas were calculated for solar fields with native vegetation and gravel ground cover. Results of analysis for Sub-basin 5 are presented in Table EX-4 and Table EX-5 below.

Table EX-4. Composite Imperviousness Calculation for Sub-basin 5 with Native Grass Ground Cover in Solar Field

Land Cover	Imperviousness (%)	Area (acres)	Impervious Area (acres)
Solar Field	26%	27.82	7.15
Gravel (access roads and parking lots)	80%	0.41	0.33
Open Space	5%	12.95	0.65
	Total	**41.18**	**8.13**
		Composite IA (%):	**20%**

Table EX-5. Composite Imperviousness Calculation for Sub-basin 5 with Gravel Ground Cover in Solar Field

Land Cover	Imperviousness (%)	Area (acres)	Impervious Area (acres)
Solar Field	63%	27.82	17.53
Gravel (access roads and parking lots)	80%	0.41	0.33
Open Space	5%	12.95	0.65
	Total	**41.18**	**18.51**
		Composite IA (%):	**45%**

Step 5. Evaluate runoff coefficients.

Evaluate runoff coefficients using the calculated composite imperviousness values and Table 6-5 in the MHFD Manual. Runoff coefficients for the 2-year, 5-year, and 100-year storms are presented for Sub-basin 5 in Table EX-6 below.

Table EX-6. Runoff Coefficients Evaluated from Composite Imperviousness Values

Recurrence Interval	Solar Field Runoff Coefficient	
	Native Grass	Gravel
2-year	0.14	0.34
5-year	0.20	0.40
100-year	0.57	0.67

6.0 Attachments

- Appendix A. MHFD Urban Storm Drainage Criteria Manual Volume Chapter 6: Runoff– Table 6-5
- Appendix B. Example Solar Field Site Map

Appendix A.

MHFD Urban Storm Drainage Criteria Manual Volume
Chapter 6: Runoff – Table 6-5

Table 6-5. Runoff coefficients, *c*

Total or Effective % Impervious	NRCS Hydrologic Soil Group A						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.01	0.01	0.01	0.04	0.13	0.27
5%	0.02	0.02	0.02	0.03	0.07	0.15	0.29
10%	0.04	0.05	0.05	0.07	0.11	0.19	0.32
15%	0.07	0.08	0.08	0.1	0.15	0.23	0.35
20%	0.1	0.11	0.12	0.14	0.2	0.27	0.38
25%	0.14	0.15	0.16	0.19	0.24	0.3	0.42
30%	0.18	0.19	0.2	0.23	0.28	0.34	0.45
35%	0.21	0.23	0.24	0.27	0.32	0.38	0.48
40%	0.25	0.27	0.28	0.32	0.37	0.42	0.51
45%	0.3	0.31	0.33	0.36	0.41	0.46	0.54
50%	0.34	0.36	0.37	0.41	0.45	0.5	0.58
55%	0.39	0.4	0.42	0.45	0.49	0.54	0.61
60%	0.43	0.45	0.47	0.5	0.54	0.58	0.64
65%	0.48	0.5	0.51	0.54	0.58	0.62	0.67
70%	0.53	0.55	0.56	0.59	0.62	0.65	0.71
75%	0.58	0.6	0.61	0.64	0.66	0.69	0.74
80%	0.63	0.65	0.66	0.69	0.71	0.73	0.77
85%	0.68	0.7	0.71	0.74	0.75	0.77	0.8
90%	0.73	0.75	0.77	0.79	0.79	0.81	0.84
95%	0.79	0.81	0.82	0.83	0.84	0.85	0.87
100%	0.84	0.86	0.87	0.88	0.88	0.89	0.9
Total or Effective % Impervious	**NRCS Hydrologic Soil Group B**						
	2-Year	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**	**500-Year**
2%	0.01	0.01	0.07	0.26	0.34	0.44	0.54
5%	0.03	0.03	0.1	0.28	0.36	0.45	0.55
10%	0.06	0.07	0.14	0.31	0.38	0.47	0.57
15%	0.09	0.11	0.18	0.34	0.41	0.5	0.59
20%	0.13	0.15	0.22	0.38	0.44	0.52	0.61
25%	0.17	0.19	0.26	0.41	0.47	0.54	0.63
30%	0.2	0.23	0.3	0.44	0.49	0.57	0.65
35%	0.24	0.27	0.34	0.47	0.52	0.59	0.66
40%	0.29	0.32	0.38	0.5	0.55	0.61	0.68
45%	0.33	0.36	0.42	0.53	0.58	0.64	0.7
50%	0.37	0.4	0.46	0.56	0.61	0.66	0.72
55%	0.42	0.45	0.5	0.6	0.63	0.68	0.74
60%	0.46	0.49	0.54	0.63	0.66	0.71	0.76
65%	0.5	0.54	0.58	0.66	0.69	0.73	0.77
70%	0.55	0.58	0.62	0.69	0.72	0.75	0.79
75%	0.6	0.63	0.66	0.72	0.75	0.78	0.81
80%	0.64	0.67	0.7	0.75	0.77	0.8	0.83
85%	0.69	0.72	0.74	0.78	0.8	0.82	0.85
90%	0.74	0.76	0.78	0.81	0.83	0.84	0.87
95%	0.79	0.81	0.82	0.85	0.86	0.87	0.88
100%	0.84	0.86	0.86	0.88	0.89	0.89	0.9

Table 6-5. Runoff coefficients, *c* (continued)

Total or Effective % Impervious	NRCS Hydrologic Soil Group C						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.05	0.15	0.33	0.40	0.49	0.59
5%	0.03	0.08	0.17	0.35	0.42	0.5	0.6
10%	0.06	0.12	0.21	0.37	0.44	0.52	0.62
15%	0.1	0.16	0.24	0.4	0.47	0.55	0.64
20%	0.14	0.2	0.28	0.43	0.49	0.57	0.65
25%	0.18	0.24	0.32	0.46	0.52	0.59	0.67
30%	0.22	0.28	0.35	0.49	0.54	0.61	0.68
35%	0.26	0.32	0.39	0.51	0.57	0.63	0.7
40%	0.3	0.36	0.43	0.54	0.59	0.65	0.71
45%	0.34	0.4	0.46	0.57	0.62	0.67	0.73
50%	0.38	0.44	0.5	0.6	0.64	0.69	0.75
55%	0.43	0.48	0.54	0.63	0.66	0.71	0.76
60%	0.47	0.52	0.57	0.65	0.69	0.73	0.78
65%	0.51	0.56	0.61	0.68	0.71	0.75	0.79
70%	0.56	0.61	0.65	0.71	0.74	0.77	0.81
75%	0.6	0.65	0.68	0.74	0.76	0.79	0.82
80%	0.65	0.69	0.72	0.77	0.79	0.81	0.84
85%	0.7	0.73	0.76	0.79	0.81	0.83	0.86
90%	0.74	0.77	0.79	0.82	0.84	0.85	0.87
95%	0.79	0.81	0.83	0.85	0.86	0.87	0.89
100%	0.83	0.85	0.87	0.88	0.89	0.89	0.9

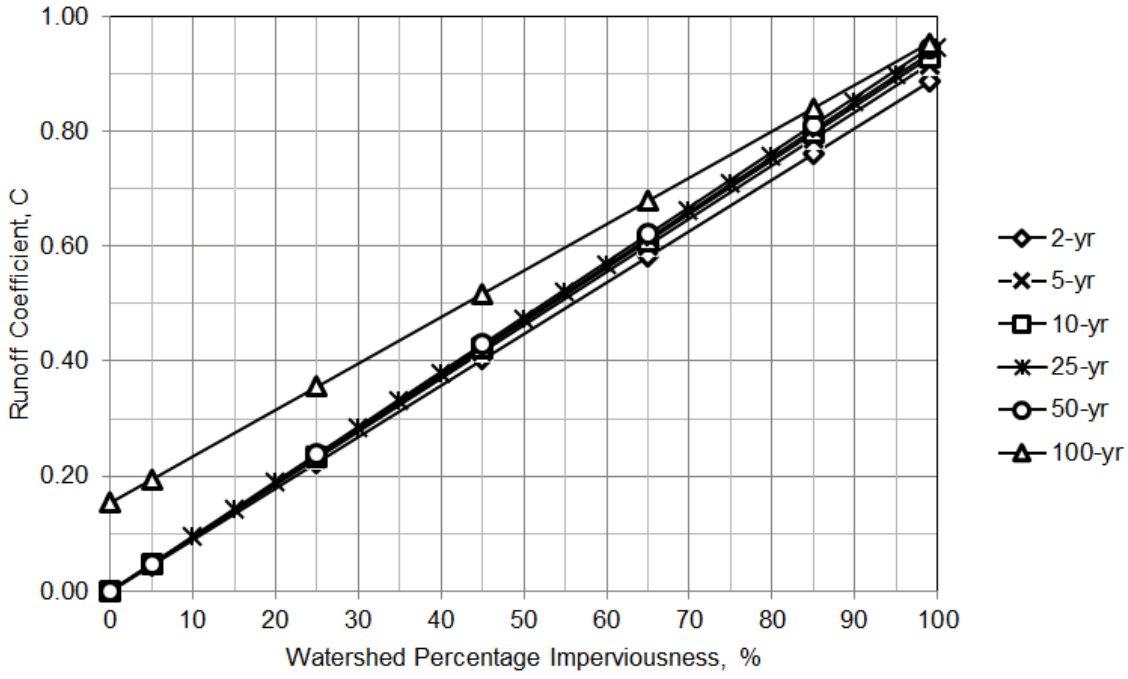


Figure 6-1. Runoff coefficient vs. watershed imperviousness NRCS HSG A

Appen x B.

Exam e So r Fi d S e Map

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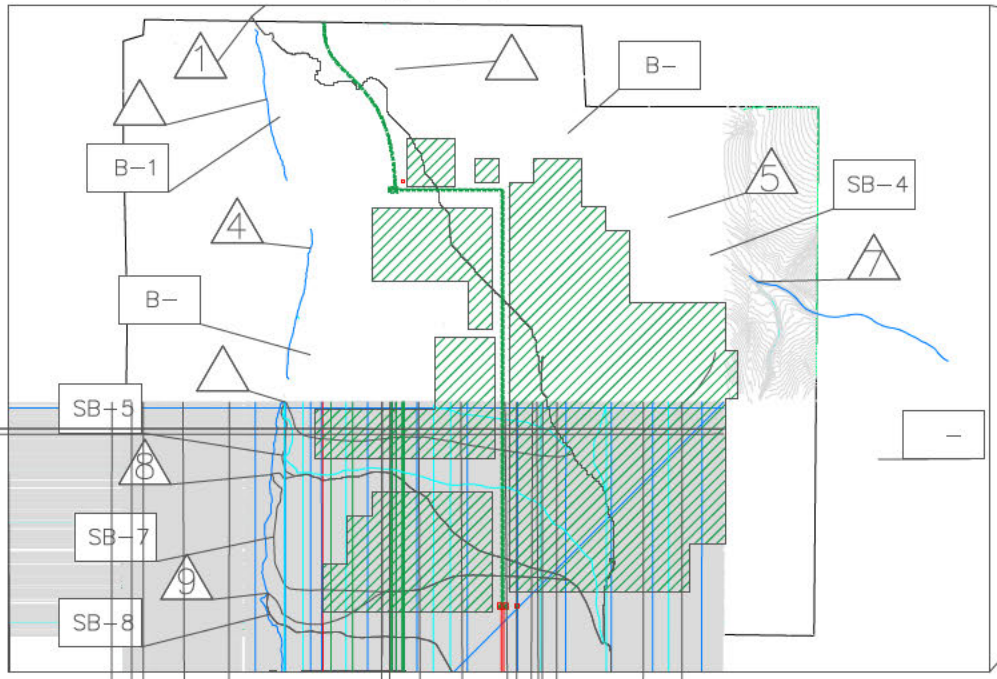

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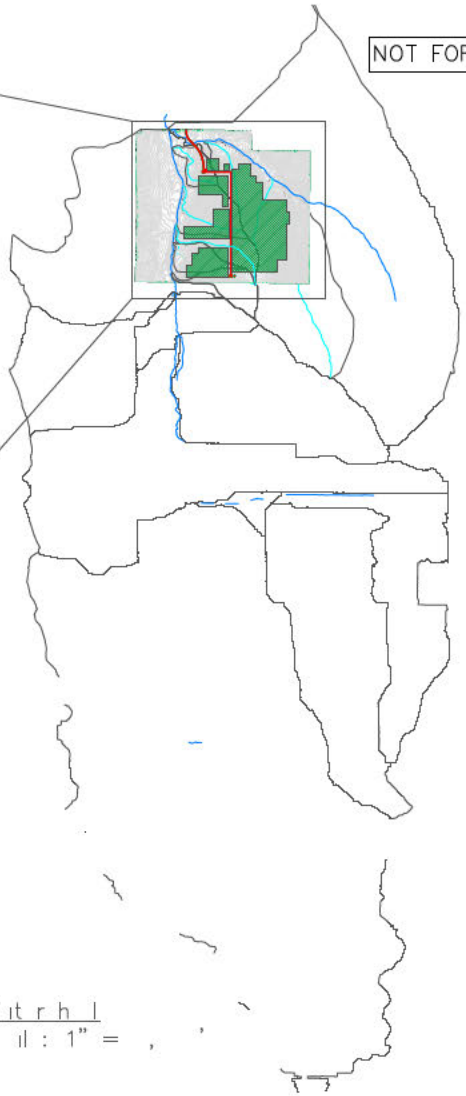

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LEGEND:

Solar Panels		Drainage Basin	
Road/Parking		Minor Stream	
Concrete Pad		Major Stream	
Design Point	1		

WRIGHT WATER ENGINEERS, INC.
2490 W. 26TH AVE. SUITE 100A
DENVER, CO 80211
(303)480-1700 FAX(303)480-1020

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ETAIL	XXX	XX/XX/XX
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ALE	1"=	

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National Flood Hazard Layer FIRMette

FEMA

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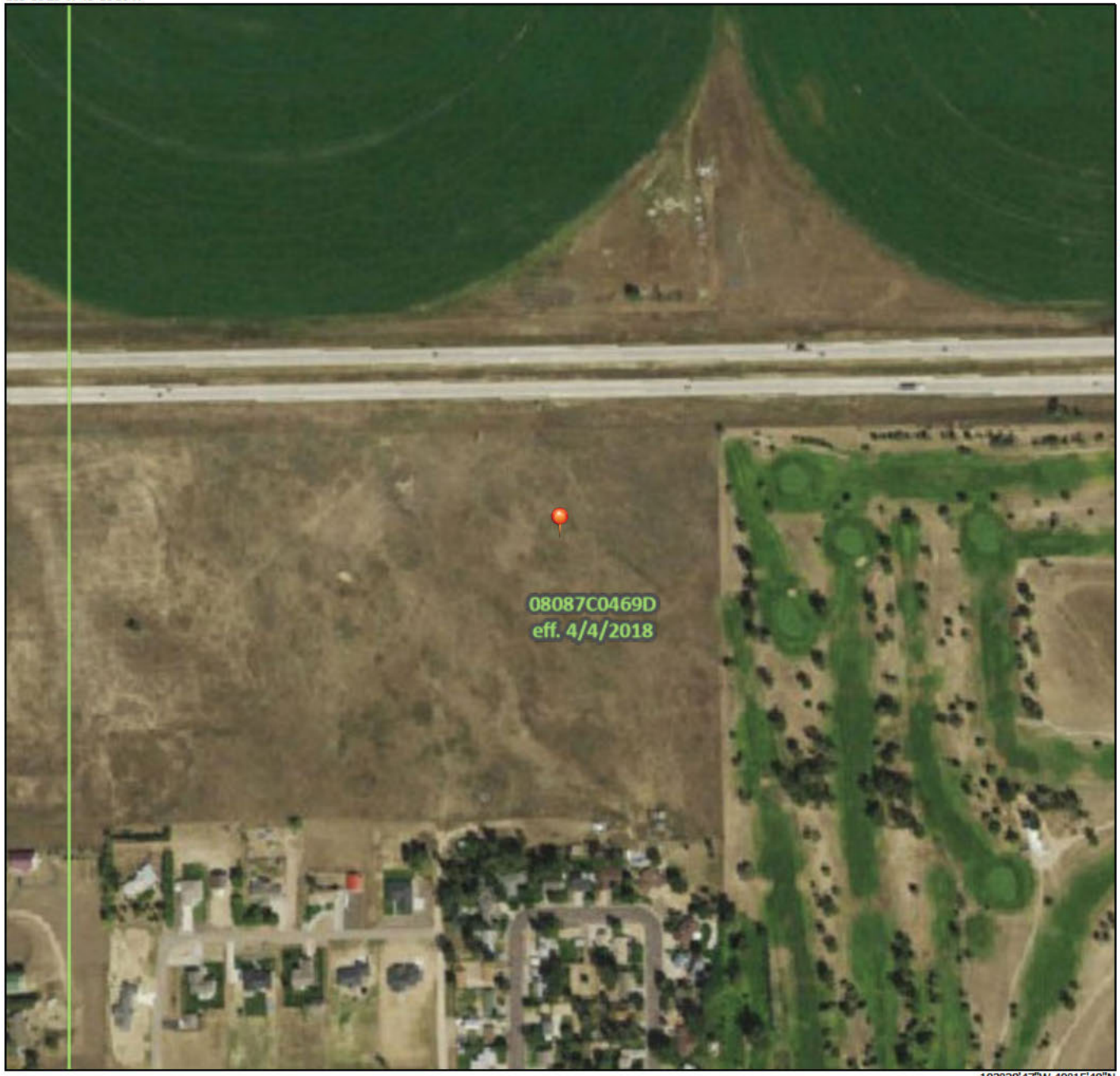

103°38'47"W 40°15'48"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/14/2024 at 4:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Morgan County, Colorado			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
BIB—Bijou loamy sand, 1 to 3 percent slopes			
Bijou	90	Very low	A

Hydrologic Soil Group and Surface Runoff–Morgan County, Colorado			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
VcD—Valent sand, 3 to 9 percent slopes			
Valent	80	Very low	A

Data Source Information

Soil Survey Area: Morgan County, Colorado
Survey Area Data: Version 24, Aug 24, 2023

NOAA Atlas 14, Volume 8, Version 2
Location name: Brush, Colorado, USA*
Latitude: 40.266°, Longitude: -103.6535°
Elevation: 4238 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.276 (0.219-0.357)	0.336 (0.266-0.434)	0.443 (0.350-0.574)	0.541 (0.424-0.704)	0.689 (0.526-0.942)	0.813 (0.603-1.12)	0.946 (0.676-1.34)	1.09 (0.745-1.58)	1.30 (0.848-1.93)	1.46 (0.926-2.19)
10-min	0.405 (0.321-0.522)	0.492 (0.390-0.636)	0.649 (0.512-0.841)	0.792 (0.622-1.03)	1.01 (0.771-1.38)	1.19 (0.883-1.64)	1.38 (0.990-1.96)	1.60 (1.09-2.32)	1.90 (1.24-2.83)	2.14 (1.36-3.21)
15-min	0.493 (0.391-0.637)	0.600 (0.475-0.775)	0.792 (0.625-1.02)	0.966 (0.758-1.26)	1.23 (0.940-1.68)	1.45 (1.08-2.00)	1.69 (1.21-2.39)	1.95 (1.33-2.83)	2.31 (1.51-3.45)	2.61 (1.65-3.92)
30-min	0.672 (0.533-0.868)	0.813 (0.644-1.05)	1.07 (0.843-1.38)	1.30 (1.02-1.70)	1.66 (1.27-2.28)	1.96 (1.46-2.72)	2.29 (1.64-3.24)	2.64 (1.81-3.84)	3.15 (2.06-4.70)	3.56 (2.26-5.35)
60-min	0.822 (0.652-1.06)	0.999 (0.792-1.29)	1.32 (1.04-1.71)	1.61 (1.26-2.10)	2.06 (1.57-2.82)	2.43 (1.80-3.36)	2.83 (2.03-4.01)	3.27 (2.24-4.75)	3.90 (2.55-5.81)	4.40 (2.79-6.61)
2-hr	0.972 (0.780-1.24)	1.18 (0.950-1.51)	1.57 (1.25-2.00)	1.92 (1.52-2.46)	2.45 (1.90-3.30)	2.90 (2.18-3.94)	3.38 (2.45-4.71)	3.90 (2.70-5.58)	4.64 (3.08-6.81)	5.24 (3.37-7.75)
3-hr	1.04 (0.844-1.32)	1.28 (1.03-1.61)	1.69 (1.36-2.14)	2.07 (1.65-2.63)	2.63 (2.05-3.52)	3.11 (2.36-4.19)	3.62 (2.64-5.00)	4.17 (2.91-5.91)	4.95 (3.32-7.20)	5.58 (3.62-8.18)
6-hr	1.19 (0.974-1.48)	1.45 (1.18-1.80)	1.90 (1.55-2.37)	2.31 (1.87-2.89)	2.91 (2.30-3.82)	3.42 (2.62-4.53)	3.95 (2.92-5.37)	4.53 (3.21-6.31)	5.34 (3.63-7.64)	5.99 (3.95-8.64)
12-hr	1.38 (1.14-1.69)	1.65 (1.37-2.02)	2.13 (1.75-2.61)	2.54 (2.09-3.14)	3.16 (2.52-4.07)	3.66 (2.84-4.77)	4.19 (3.14-5.59)	4.76 (3.42-6.52)	5.55 (3.83-7.80)	6.18 (4.14-8.77)
24-hr	1.63 (1.37-1.96)	1.89 (1.58-2.28)	2.35 (1.96-2.84)	2.76 (2.29-3.35)	3.37 (2.73-4.28)	3.88 (3.06-4.98)	4.43 (3.37-5.82)	5.01 (3.66-6.76)	5.84 (4.09-8.08)	6.50 (4.42-9.09)
2-day	1.89 (1.60-2.24)	2.15 (1.83-2.56)	2.62 (2.22-3.12)	3.04 (2.56-3.63)	3.66 (3.00-4.56)	4.17 (3.34-5.26)	4.72 (3.64-6.10)	5.30 (3.93-7.04)	6.13 (4.37-8.35)	6.79 (4.70-9.34)
3-day	2.07 (1.78-2.44)	2.34 (2.00-2.75)	2.80 (2.39-3.30)	3.22 (2.73-3.81)	3.84 (3.18-4.74)	4.36 (3.51-5.44)	4.91 (3.82-6.28)	5.50 (4.11-7.22)	6.33 (4.55-8.54)	7.00 (4.89-9.53)
4-day	2.21 (1.91-2.59)	2.48 (2.14-2.90)	2.95 (2.53-3.46)	3.38 (2.88-3.97)	4.00 (3.33-4.90)	4.52 (3.67-5.61)	5.07 (3.98-6.44)	5.66 (4.26-7.38)	6.49 (4.70-8.69)	7.16 (5.03-9.68)
7-day	2.53 (2.20-2.91)	2.84 (2.47-3.28)	3.38 (2.93-3.91)	3.84 (3.31-4.46)	4.50 (3.77-5.41)	5.03 (4.12-6.13)	5.58 (4.42-6.96)	6.16 (4.68-7.89)	6.95 (5.09-9.15)	7.57 (5.39-10.1)
10-day	2.80 (2.46-3.20)	3.16 (2.77-3.62)	3.76 (3.29-4.32)	4.27 (3.71-4.92)	4.98 (4.19-5.91)	5.53 (4.55-6.66)	6.09 (4.85-7.52)	6.67 (5.11-8.46)	7.45 (5.50-9.71)	8.05 (5.79-10.7)
20-day	3.66 (3.25-4.12)	4.13 (3.67-4.65)	4.90 (4.33-5.52)	5.52 (4.86-6.26)	6.38 (5.44-7.43)	7.04 (5.87-8.31)	7.69 (6.21-9.30)	8.34 (6.48-10.4)	9.20 (6.88-11.7)	9.84 (7.19-12.8)
30-day	4.39 (3.93-4.89)	4.96 (4.44-5.52)	5.86 (5.23-6.55)	6.59 (5.85-7.40)	7.58 (6.50-8.72)	8.32 (6.99-9.71)	9.04 (7.36-10.8)	9.76 (7.65-12.0)	10.7 (8.07-13.5)	11.4 (8.40-14.6)
45-day	5.32 (4.80-5.87)	6.01 (5.42-6.64)	7.10 (6.39-7.86)	7.97 (7.13-8.86)	9.12 (7.87-10.4)	9.96 (8.43-11.5)	10.8 (8.83-12.7)	11.5 (9.12-14.0)	12.5 (9.54-15.6)	13.2 (9.85-16.8)
60-day	6.11 (5.55-6.69)	6.92 (6.28-7.58)	8.18 (7.40-8.99)	9.17 (8.25-10.1)	10.4 (9.06-11.7)	11.4 (9.67-13.0)	12.2 (10.1-14.3)	13.0 (10.3-15.7)	14.0 (10.7-17.3)	14.7 (11.0-18.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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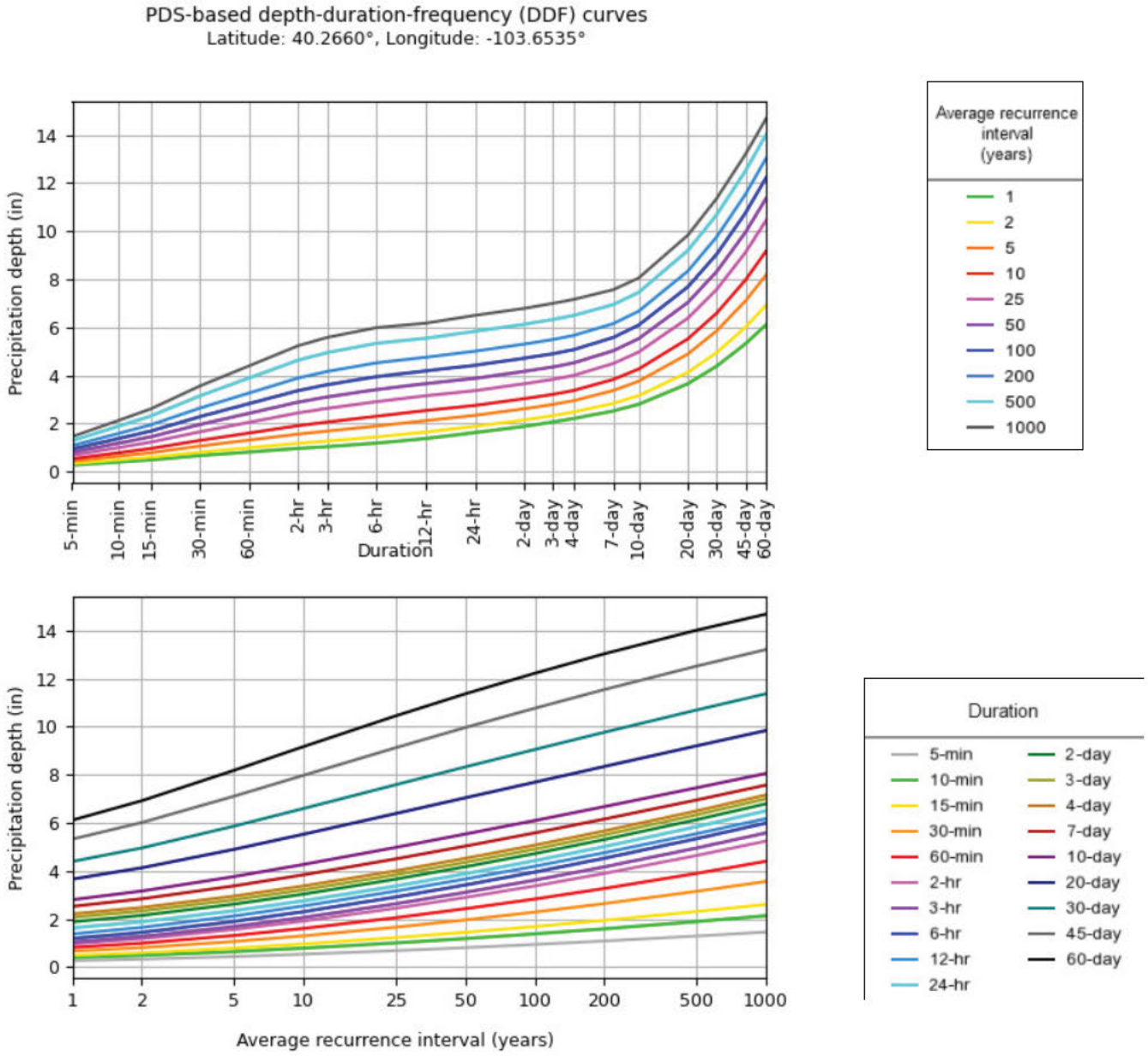
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Thu Jun 13 17:10:53 2024

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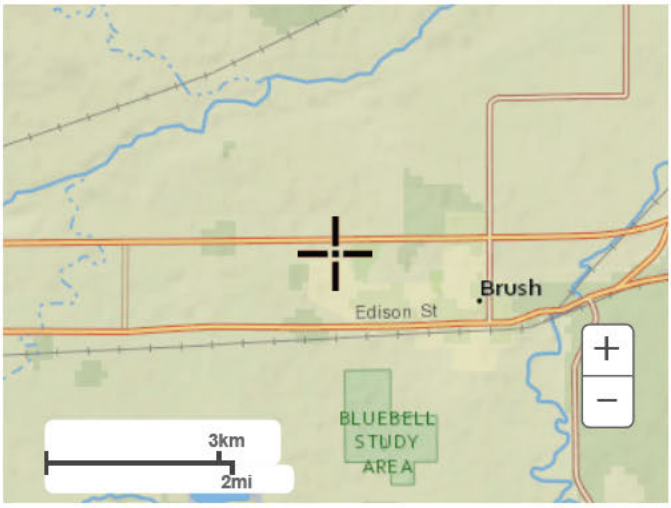
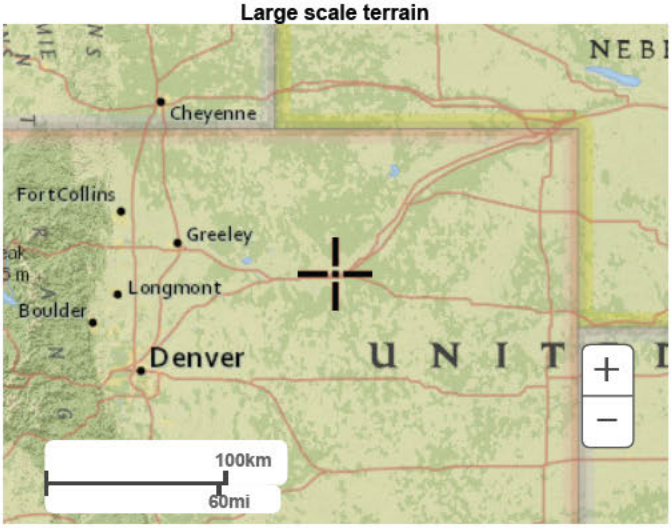
Maps & aerials

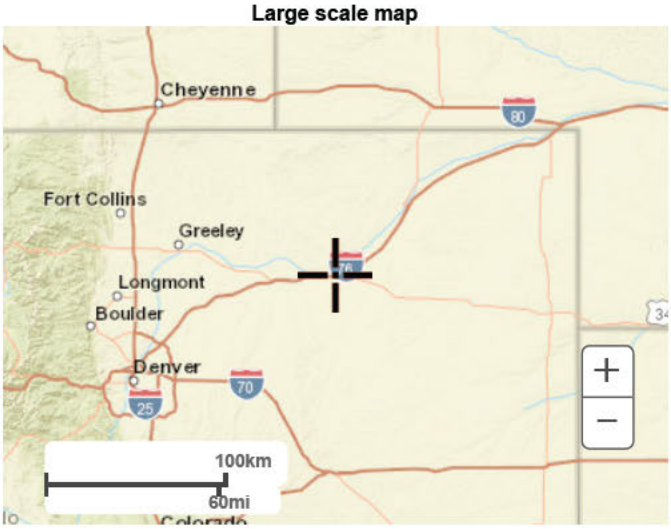
Small scale terrain



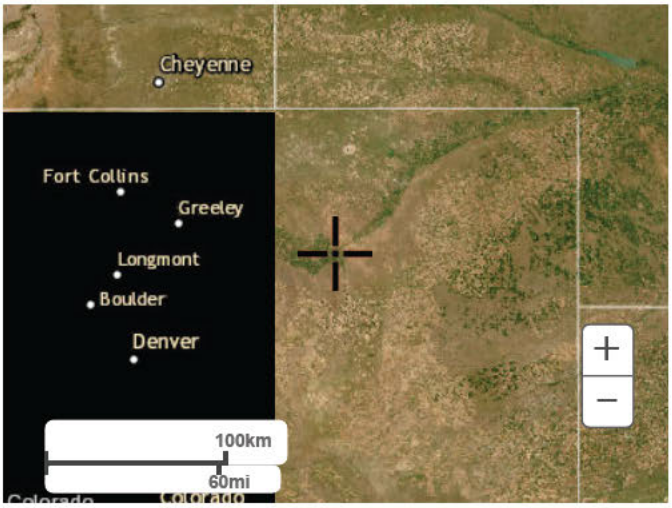
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Calculation of Peak Runoff using Rational Method

Designer: Andrea McDaniel
Company: Lamp Rynearson
Date: 6/14/2024
Project: Pivot Solar Array PS 71
Location: Brush CO

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$

$t_i = \frac{L_i}{60K\sqrt{S_i}} = \frac{L_i}{60V_i}$

Computed $t_c = t_i + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$

$t_{minimum}$= 5 (urban)
$t_{minimum}$= 10 (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

1-hour rainfall depth, P1 (in) =	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
	0.83	1.09	1.33	1.62	2.43	2.83	3.88

Rainfall Intensity Equation Coefficients =	a	b	c
$I(in/hr) = \frac{a + P_1}{(b + t_c)^c}$	28.50	10.00	0.786

$Q(cfs) = CIA$

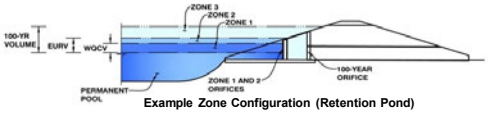
Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
P1	6.80	A	25.0	0.14	0.15	0.16	0.19	0.24	0.30	0.42	300.00			0.031	20.52	430.00	4239.00	4228.00	0.026	7	1.12	6.40	26.92	25.33	25.33	1.43	1.89	2.30	2.80	4.20	4.89	6.71	1.34	1.88	2.48	3.55	6.82	10.14	18.95
Existing 1	6.80	A	5.0	0.02	0.02	0.02	0.03	0.07	0.15	0.29	300.00			0.031	23.28	430.00			0.028	5	0.84	8.57	31.84	29.57	29.57	1.31	1.72	2.10	2.56	3.85	4.48	6.14	0.15	0.22	0.31	0.53	1.77	4.54	11.95
P2	4.80	A	25.0	0.14	0.15	0.16	0.19	0.24	0.30	0.42	170.00			0.030	15.62	150.00	4239.00	4236.00	0.020	7	0.99	2.53	18.14	23.16	18.14	1.71	2.25	2.75	3.35	5.03	5.85	8.03	1.13	1.59	2.09	2.99	5.75	8.56	16.00
Existing 2	4.80	A	5.0	0.02	0.02	0.02	0.03	0.07	0.15	0.29	170.00			0.030	17.71	150.00	4239.00	4236.00	0.020	5	0.71	3.54	21.25	26.97	21.25	1.57	2.08	2.53	3.09	4.63	5.39	7.39	0.13	0.19	0.26	0.45	1.50	3.85	10.16

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Pivot PS 71 Solar Array

Basin ID: EXISTING DEPRESSION



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	RP	
Watershed Area =	6.80	acres
Watershed Length =	730	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.013	ft/ft
Watershed Imperviousness =	25.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	12.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.061	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.161	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1 in.) =	0.079	acre-feet	1.00	inches
5-yr Runoff Volume (P1 = 1.33 in.) =	0.125	acre-feet	1.33	inches
10-yr Runoff Volume (P1 = 1.62 in.) =	0.167	acre-feet	1.62	inches
25-yr Runoff Volume (P1 = 2.06 in.) =	0.323	acre-feet	2.06	inches
50-yr Runoff Volume (P1 = 2.43 in.) =	0.475	acre-feet	2.43	inches
100-yr Runoff Volume (P1 = 2.83 in.) =	0.683	acre-feet	2.83	inches
500-yr Runoff Volume (P1 = 3.88 in.) =	1.241	acre-feet	3.88	inches
Approximate 2-yr Detention Volume =	0.085	acre-feet		
Approximate 5-yr Detention Volume =	0.120	acre-feet		
Approximate 10-yr Detention Volume =	0.158	acre-feet		
Approximate 25-yr Detention Volume =	0.224	acre-feet		
Approximate 50-yr Detention Volume =	0.276	acre-feet		
Approximate 100-yr Detention Volume =	0.363	acre-feet		

Define Zones and Basin Geometry

Select Zone 1 Storage Volume (Required) =		acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =		acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

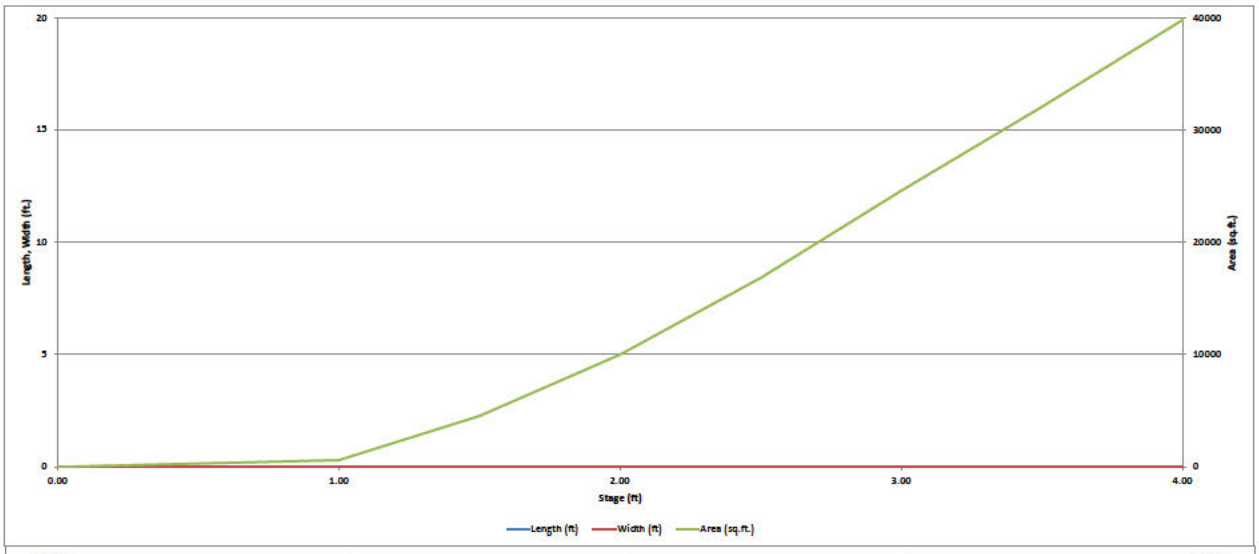
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

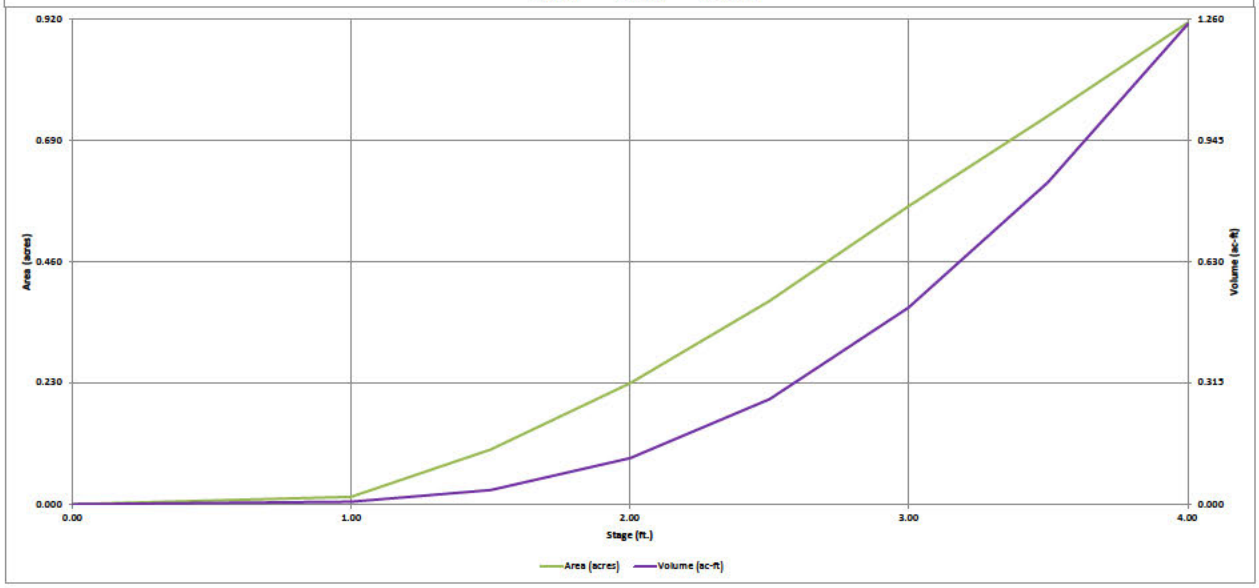
Depth Increment = 0.50 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Permanent Pool	--	0.00	--	--	--	0	0.000		
4228	--	1.00	--	--	--	584	0.013	292	0.007
4228.5	--	1.50	--	--	--	4,536	0.104	1,572	0.036
4229	--	2.00	--	--	--	10,000	0.230	5,206	0.120
4229.5	--	2.50	--	--	--	16,814	0.386	11,909	0.273
4230	--	3.00	--	--	--	24,621	0.565	22,268	0.511
4230.5	--	3.50	--	--	--	32,070	0.736	36,441	0.837
4231	--	4.00	--	--	--	39,840	0.915	54,418	1.249

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





At least one year prior to the end of project life or within three months after operations are terminated if the operations are terminated prior to the end of the project life, whichever is sooner, an updated detailed decommissioning plan for the property, including specific timeframes for decommissioning activities & contact information, will be provided to the County.

Pivot Solar 71 LLC ("Pivot") is submitting a Decommissioning plan to the Department of Planning Services as part of the Special Use Review approval process for a solar energy facility. Pivot has estimated that the decommissioning costs will be around ~$37,700/MWac. ***This estimate will be updated (and will include the calculation of cost minus salvage value) at least one year prior to the end of the project life, if not sooner.***

The useful life of the solar facility is expected to be at least 20 years. At the end of the project's useful life, Pivot will suspend operations and decommission the plant, which will include any necessary demolition, removal of above and below-ground equipment, and site reclamation efforts. Pivot's obligation under the Solar Lease Agreement is to return the site to the landowner in substantially the same condition that the property was in prior to the improvements being made.

This document establishes a detailed plan for decommissioning and reclamation activities once the project reaches the end of its useful life. The proposed activities will likely need to be refined throughout the project's life to reflect future best practices of the solar industry.

Pivot has assumed the planning process will be initiated one to two years prior to the anticipated end of commercial operation. The final plans will be developed in consultation with Morgan County and any other applicable agencies that have jurisdiction of activities in the decommissioning process.

1. Decommissioning Project Elements and Milestones

The key tasks of project decommissioning are divided into related activities that represent milestones in the process. Each activity is described in further detail below. The decommissioning schedule reflects the conceptual timing of the milestones and overall process.

The individual project components to be decommissioned will either be 1) recycled or reused to the maximum extent practicable, or 2) removed from the site and disposed of at an appropriately licensed disposal facility. The general decommissioning approach will be the same whether a portion of, or the entire Project is decommissioned.

The activities involved in the facility closure will depend on the expected future use of the site. Certain facility equipment and features may be left in place at the property owner's request, such as transmission facilities, roads, and drainage features. At the time of decommissioning, a plan will be submitted to the County proposing the equipment that will be removed and, if applicable, equipment that will remain, based on expected future use of the site.

Pre-closure activities include final closure and reclamation planning, which identifies measures to be taken to restore the site to near pre-construction conditions. This includes but is not limited to the following:

- Complete an analysis of the project materials and their composition to identify those specific components that may be recycled, re-used, scrapped, or sent to disposal sites; as well as identifying specific recycling facilities and disposal sites for materials.
- Coordinate with local officials to obtain permits and develop plans for the transportation of materials and equipment to and from the site.
- Develop specifications for demolition and reclamation, which will serve as the basis for contractor bids for decommissioning the project and establish the scope of demolition and reclamation, including developing reclamation plans in compliance with local, state, and federal regulations

During the planning process Pivot will brief the County and other applicable agencies on the decommissioning process and plans. All necessary permits and approvals required for the decommissioning will be obtained prior to commencing operations.

The first step in the decommissioning process will be assessing existing site conditions and preparing the site for demolition. Site decommissioning and equipment removal is expected to take up to one year, **or the maximum time is allowed by Morgan County, whichever is lesser**. Therefore, access roads, fencing, some electrical power, and other facilities will temporarily remain in place for use by the decommissioning workers until no longer needed. Demolition debris will be placed in temporary onsite storage areas pending final transportation and disposal and/or recycling according to the procedures listed below.

A plan will be implemented for de-energizing portions of the facility to allow safe decommissioning and formal lock out and tag out procedures. This will ensure all electrical components are placed and maintained in a safe condition for demolition activities prior to the start of work.

PV Module and Tracker Removal and Recycling

During decommissioning, project components that are no longer needed will be removed from the site and recycled, reused or disposed of at an appropriately licensed disposal facility. The first operation is to disconnect and remove modules from the tracker assemblies.

Next, the tracker and mounting structures, DC wiring materials, and combiner boxes will all be assembled and segregated for disposal or salvage. Steel piles that support the PV racking system will be removed and either re- used or recycled to the maximum amount possible. Below ground portions of the supports will either be removed or cut off at least two feet below ground surface and left in place.

The demolition debris and removed equipment will be safely removed from the premises and transported to an appropriately licensed disposal facility or recycling center. Photovoltaic modules will either be re-used, recycled or disposed of in accordance with applicable laws at the time of decommissioning.

Roads

Onsite access roads will remain in place during the decommissioning process. The roads may remain intact after decommissioning if the property owner deems them beneficial for the future use of the site. Roads that will not be used after the solar project's decommissioning will be removed at the end of the process.

Fencing
Project site perimeter fencing will be removed at the end of the decommissioning project, unless it may be utilized for future use of the site and the property owner requests the fence remain in place. This includes the removal of all posts, fencing material, gates, etc. to return the site to pre-project condition.

Transportation and clean up
During the disassembly and demolition process, materials will be segregated and temporarily placed in gathering areas for transportation. Various materials including, but not limited to, concrete, steel, aluminum, and copper will be temporarily stockpiled at or near a designated processing location pending transport to an appropriate offsite recycling facility. All such materials will then be transported from the site to approved designated facilities for recycling, scrapping or disposal. All metals will be recycled to the extent practical given the recycling options available at the time of decommissioning.

In general, the decommissioning will be undertaken using traditional heavy construction equipment including, but not limited to, front end loaders, cranes, track mounted and rubber-tired excavators, bull dozers, and scrapers.

Areas where excavation is required will be backfilled with natural material and compacted. Any voids left from the removal of foundations will be backfilled with surrounding subsoil and topsoil and fine graded to ensure suitable drainage and reclamation of natural grades.

Soil management and re-contouring operations will be conducted to minimize the surface area disturbance and implement the activities in the safest and most efficient manner and in accordance with applicable local requirements. Major earthwork is not anticipated as construction of the site will not alter the general grade across the site.

To account for post-decommissioning dust control, areas of exposed soils will be revegetated, consistent with the expected future use of the site and State or County requirements. The native dry grass vegetation will be re-established to prevent the spread of weeds. Mulching or palliatives may be used for temporary dust control until vegetation is established.

Monitoring Site Restoration
Upon completion of the decommissioning process, a one-year restoration monitoring period will begin. Monitoring will ensure that grading and drainage implemented is successful in stabilizing water flow patterns and that the cover vegetation (native dry grass vegetation or other depending on land use) will be reestablished to prevent the spread of weeds. Corrective actions will be implemented if such monitoring determines adverse conditions are present because of an inadequate restoration.

2. Decommissioning/ Reclamation Cost Estimates

Pivot's engineering department has reviewed and approved the following cost estimate, which will include all costs associated with the dismantling, recycling, and safe disposal of facility parts and site reclamation activates and consider the salvage value of the facility.

Initial cost estimate (2024):

Fencing	$2,000
Structures	$27,000
Modules	$20,000
Electrical	$10,000
Site Restoration	$9,000
Total	**$68,000 or ~$37,700/MWac**

The scope includes:

- Electrical permit fees
- Removal and disposal of wildlife-friendly game fence
- Removal of racking and foundations
- Removal of modules
- Removal of electrical equipment (transformers, pads, etc.)
- Removal of electrical DC string wiring and AC underground wiring
- Site restoration and reclamation
- Waste disposal fees
- Temporary restrooms and necessary facilities for workers
- Safety and protection equipment

3. Contact Information

- [redacted]
- Attention: Operations and Maintenance Department
- [redacted]

CTL|THOMPSON

Founded in 1971

GEOTECHNICAL INVESTIGATION

PIVOT SOLAR 71
SOUTHWEST OF INTERSTATE 76 AND HOSPITAL ROAD
BRUSH, MORGAN COUNTY, COLORADO

Prepared for:

PIVOT ENERGY DEVELOPMENT, LLC
1601 Wewatta Street, Suite 700
Denver, Colorado 80202

Attention:
Kyle Sundman

Project No. DN52,284.000-125-R1

August 21, 2024

Table of Contents

SCOPE

This report presents the results of our Geotechnical Investigation for the Pivot Solar 71 facility planned on a vacant parcel located southwest of Interstate 76 and Hospital Road in the SW ¼ of S33, T4N, R56W in Brush, Morgan County, Colorado (Fig. 1). The purpose of our investigation was to evaluate the subsurface conditions and provide geotechnical design and construction criteria for the project. Our scope was described in our Proposal No. DN-24-0146 dated April 2, 2024.

This report is based on conditions found in our exploratory borings, results of field and laboratory tests, engineering analysis of field and laboratory data and our experience. It contains descriptions of the subsurface conditions found in our exploratory borings, and recommended design and construction criteria for site development, foundations, slabs-on-grade, gravel roads and surface drainage. The recommendations presented in the report are based on the construction as currently planned. Revisions to the planned construction could affect our recommendations. If the construction will differ from the descriptions herein, we should be contacted to review our recommendations and determine if revisions are needed. A summary of our conclusions and recommendations follows, with more detailed design criteria presented in the report.

SUMMARY OF CONCLUSIONS

1. Strata encountered in our exploratory borings consisted of clean to silty, clayey sand to the maximum depth explored of 25 feet.

2. Groundwater was encountered during drilling in three borings at depths of about 12 to 24 feet below the existing ground surface. When checked after drilling on June 21, 2024, groundwater was measured in five borings at depths of about 12 to 22 feet. Groundwater was not encountered in boring TH-5. Groundwater levels may fluctuate seasonally and rise in response to precipitation, irrigation, and changes in land-use.

3. We understand steel H-piles are the desired foundation system. H-piles should be installed to a minimum of seven feet. Site soils are judged to have low corrosion potential according to electrical resistivity test results. Design and construction criteria for H-pile foundations are presented in the report.

4. Conventional footings and slab-on-grade floors can be used for lightly loaded equipment buildings or pads with reasonable expected performance.

5. For gravel drives, we recommended the use of at least 8 inches of crushed rock (such as ASTM C33 No. 57, No. 67, or No. 467) or CDOT Class 5 or 6 Aggregate Base Course.

6. Surface drainage should be designed, constructed, and maintained to promote runoff of water away from foundations and pavements. Water should not be allowed to pond adjacent to structures.

SITE CONDITIONS AND PROPOSED CONSTRUCTION

The Pivot Solar 71 site is located southwest of Interstate 76 and Hospital Road in the SW ¼ of S33, T4N, R56W in Brush, Morgan County, Colorado (Fig. 1 and Photo 1). The parcel consists of approximately 11.5 acres and is bordered by a residential development to the south, Interstate 76 to the north, existing solar arrays to the west, and a golf course to the east. Based on review of historical Google Earth imagery, the site has remained relatively unchanged dating back to the earliest visibly resolute image from 1989. The ground surface consists primarily of grass and weeds. The property slopes gently to the northwest with total topographic relief of approximately 10 to 15 feet.

Photo 1 – Google Earth© Aerial Site Photo, September 2023.

We understand the site is planned for construction for ground-mounted panels utilizing pole-type foundations. Based on experience from previous Pivot Solar projects, the rows of solar panels and motors will be installed on a series of driven H-piles with rows spaced about 20 feet apart. We understand loads are relatively light and that W6x9, W6x12 or W6x15 piles are normally used. We assume existing grades are near construction grades. Gravel access drives, equipment buildings, equipment pads, and parking and storage areas may be constructed around the perimeter and between arrays.

INVESTIGATION

We investigated subsurface conditions on June 18, 2024, by drilling and sampling six exploratory borings at the approximate locations shown on Fig. 1. We determined the approximate boring locations and elevations with limited precision using a Leica GS18 GPS unit referencing the North American Datum of 1983 (NAD83). Prior to drilling, we contacted the Utility Notification Center of Colorado and local sewer and water districts to identify locations of buried utilities. The borings were drilled to depths of 20 to 25 feet below existing grades using 4-inch diameter, continuous-flight, solid-stem auger and a truck-mounted CME-45 drill rig.

Samples of the soil were obtained at approximate 2 to 5-foot intervals using 2.5-inch diameter (O.D.) modified California barrel samplers driven by blows from a 140-pound automatic hammer falling 30 inches. Bulk samples of the surficial soils were also obtained from auger cuttings. Our field representatives were present to observe drilling operations, log the strata encountered and obtain samples. Graphical summary logs of the exploratory borings, with results of field penetration resistance tests and a portion of the laboratory data, are presented in Appendix A.

Samples were returned to our laboratory where they were examined and assigned testing. Laboratory tests included moisture content, dry density, swell-consolidation, particle-size analysis, Atterberg limits, Standard Proctor (ASTM D 698/AASHTO T99), thermal resistivity (ASTM D 5334), redox (ASTM G200), pH, chloride, sulfide, and water-soluble sulfate concentration. Results of laboratory tests are presented in Appendix B and summarized in Table B-I.

SUBSURFACE CONDITIONS

Strata encountered in our exploratory borings consisted of clean to silty, clayey sand to the maximum depth explored of 25 feet. The sand was very loose to dense based on field penetration resistance tests. One sand sample compressed 1.3 percent when wetted. The compression is likely due to sample disturbance during sampling and laboratory preparation. Thirteen samples contained 5 to 50 percent silt and clay-sized particles (passing the No. 200 sieve) percent fines and one exhibited moderate plasticity.

Bulk samples from the upper 5 feet were collected from TH-1, 3 & 5. The bulk samples were combined and contained 16 percent fines. The sample had a maximum Proctor dry density of 109.5 pounds per cubic foot (pcf) and optimum moisture content of 12 percent. The sample was tested for corrosivity which is discussed further in later sections of the report.

Groundwater

Groundwater was encountered during drilling in three borings at depths of about 12 to 24 feet below the existing ground surface. When checked after drilling on June 21, 2024, groundwater was measured in five borings at depths of about 12 to 22 feet. Groundwater was not encountered in boring TH-5. Groundwater levels may fluctuate seasonally and rise in response to precipitation, irrigation, and changes in land-use.

Seismicity

According to the USGS, Colorado's Front Range and eastern plains are considered low seismic hazard zones. The earthquake hazard exhibits higher risk in western Colorado compared to other parts of the state. The Denver Metropolitan area has experienced earthquakes within the past 100 years, shown to be related to deep drilling, liquid injection, and oil/gas extraction. Naturally occurring earthquakes along faults due to tectonic shifts are rare in this area.

The soil at this site is not expected to respond unusually to seismic activity. The 2021 International Building Code (Section 1613.2.2) defers the estimation of Seismic Site Classification to ASCE 7-16, as outlined in the table below.

ASCE7-16 SITE CLASSIFICATION CRITERIA

Seismic Site Class	$\bar{s}_u$, Average Undrained Shear Strength (lb/ft²)	$\bar{N}$, Average Standard Penetration Resistance (blows/ft)	$\bar{v}_s$, Average Shear Wave Velocity (ft/s)
A. Hard Rock	N/A	N/A	>5,000
B. Rock	N/A	N/A	2,500 to 5,000
C. Very Dense Soil and Soft Rock	>2,000	>50 blows/ft	1,200 to 2,500
D. Stiff Soil	1,000 to 2,000	15 to 50 blows/ft	600 to 1,200
E. Very Loose Sand or Soft Clay Soil	<1,000	<15 blows/ft	<600
F. Soils requiring Site Response Analysis	See Section 20.3.1	See Section 20.3.1	See Section 20.3.1

Based on the results of our investigation, we judge a Seismic Site Classification of D. The field penetration test results imply that shear-wave velocity seismic tests to directly measure $\bar{v}_s$ may result in a better Seismic Site Classification. The subsurface conditions indicate low susceptibility to liquefaction from a materials and groundwater perspective.

SITE GEOLOGY

The site geology was investigated through review of the Geology and Ground Water Resources of the Lower South Platte River Valley Between Hardin, Colorado, and Paxton, Nebraska (Bjorklund, L.J., and Brown, R.F., USGS, Water-Supply Paper 1378, Plate 1, Sheet 2, 1957). The surficial soils consist of dune sand (sand, silt, and clay) from the Pleistocene era. Soils encountered in our investigation conform with this description. No active faults are known in this area.

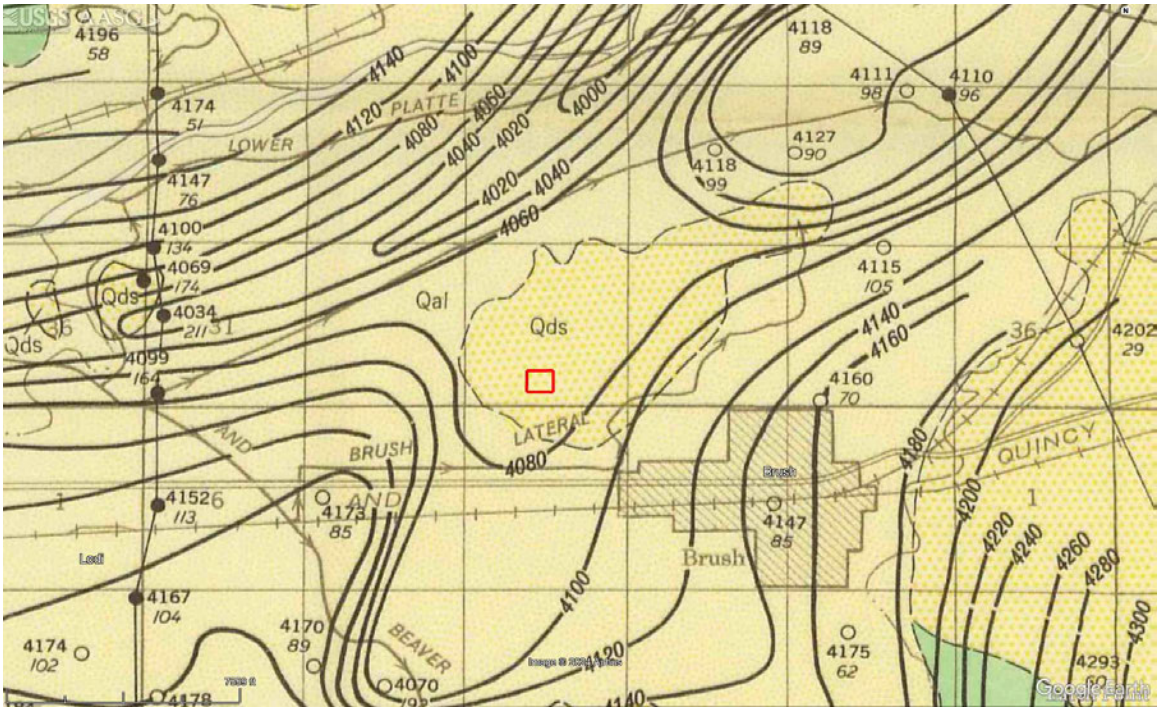


Photo 2 – Snippet of Water-Supply Paper 1378, Plate 1, Sheet 2 (Bjorklund, L.J., and Brown, R.F., 1957)

SITE DEVELOPMENT

Fill and Backfill

The on-site soils are suitable for reuse as new fill, provided they are free of debris, vegetation/organics and other deleterious materials. Soil particles larger than about 3 inches in diameter should not be used for fill unless broken down. Imported fill should have a maximum particle size of 3 inches, between 20 and 60 percent passing the No. 200 sieve, a liquid limit less than 40 and a plasticity index less than 20. Import soils consisting of material similar to those found on-site may also be considered. Potential fill materials should be submitted to our office for approval prior to import.

Prior to fill placement, the ground surface should be scarified to a depth of at least 8 inches, moisture conditioned, and compacted to the criteria below. Subsequent fill should be placed in thin (8 inches or less) loose lifts, moisture conditioned to within 2 percent of opti-

mum moisture content for sand and between optimum moisture and 3 percent above optimum for clay, and compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698).

We recommend utility trench backfill be placed and compacted as outlined above. Our experience indicates use of self-propelled compactors results in more reliable performance compared to fill compacted by an attachment on a backhoe or trackhoe. The upper portion of the trenches should be widened to allow the use of a self-propelled compactor. The placement and compaction of fill and backfill should be observed and tested by a representative of our firm during construction.

Our experience indicates fill and backfill can settle, even if properly compacted to criteria provide above. Factors that influence the amount of settlement are depth of fill, material type, degree of compaction, amount of wetting and time. The degree of compression of properly compacted fill under its own weight may be about 1 to 2 percent of the fill depth.

If loose or soft fill/soils are encountered during construction, they should be removed and replaced with compacted fill or stabilized. Stabilization can likely be accomplished by crowding 1.5-inch to 3-inch nominal size crushed rock into the soft subsoils until the base of the excavation does not deform significantly when compactive effort (a full-sized loader with full load) is applied.

FOUNDATIONS

We understand steel H-piles are the desired foundation system. We encountered loose to medium dense sand at depths likely to support piles. H-piles are considered appropriate provided they are installed to a minimum depth of seven feet.

Design and construction criteria for driven steel H-piles are provided below. The criteria were developed from analysis of field and laboratory data and our experience.

1. For the anticipated range of pile sizes, the H-pile tip capacity can be evaluated based on an allowable end pressure of 3,000 psf. Skin resistance below frost depth (36 inches) can be taken as 40 percent of the overburden pressure (ultimate). For instance, a friction zone between 3 and 7 feet of depth based on a bulk soil density of 120 pcf would have an average overburden pressure of 600 psf and an ultimate friction capacity can be calculated based on 40 percent of the product of overburden pressure and pile side area. The upper 36 inches of the pile in ground should be neglected for load capacity. The **Laterally Loaded Piles** section gives soil data input for LPILE software. Vertical and lateral load tests can be performed to verify pile capacity.

2. Piles should be installed a minimum of seven feet below grade. We should be notified if practical refusal occurs shallower than the design pile installation depth. We define “practical” refusal at this site as an average penetration of 0.25-inch per blow for the final one foot of pile penetration with a hammer delivering at least 20,000-foot pounds of energy per blow. The manufacturer's rated energy output of the hammer should be between 1,000 and 2,000 foot-pounds per square inch of steel section. The hammer for pile driving should be operated at manufacturers recommended stroke and speed when "practical refusal" is measured.

3. The maximum allowable pile capacity should not exceed the rated working stress for the chosen steel H-pile section.

4. The efficiency of the hammer and impact should be monitored during driving. The contractor should select a driving hammer and cushion combination which is capable of installing the selected piles without over-stressing the pile. The contractor should submit the pile driving plan and the pile hammer/cushion combination to the engineer for evaluation of the driving stress in advance of the pile installation.

5. Piles should be driven plumb to within plan tolerance or battered as detailed by the structural engineer.

6. Groups of piles required to support concentrated loads will require an appropriate reduction of the estimated bearing capacity based on the effective envelope area of the pile group. This reduction can be avoided by spacing piles a distance of at least 3 diameters center-to-center. The following section **Closely-Spaced Pile Reduction Factors** contains detailed discussion of this issue.

7. CTL|Thompson, Inc. should observe pile driving and keep the records of driving penetration resistance, pile length, and other factors that affect the performance of a pile foundation. This will permit us to confirm the piles are “driving” as we anticipated from our boring information.

Laterally Loaded Piles

Lateral load analysis of piles can be performed with the software analysis package LPILE by Ensoft, Inc. We believe this method of analysis is appropriate for piles with a pile length to diameter ratio of seven or greater. Suggested criteria for LPILE analysis are presented in the following table. The ε_{50} represents the strain corresponding to 50 percent of the maximum principal stress difference.

SOIL INPUT DATA FOR "LPILE"

Soil Type	Sand
Soil Model Type	Reese Sand
Effective Unit Weight, (pcf)	120
Cohesive Strength, c (psf)	-
Friction Angle, ø (degree)	34
Soil Strain, ε 50 (in/in)	-
p-y Modulus, K_s (pci)	90 (60 below water)
p-y Modulus, K_c (pci)	-

Closely-Spaced Pile Reduction Factors

For axial loading, no reduction is needed for a minimum spacing of three diameters (center-to-center). At one diameter (piles touching), the skin friction reduction factor for both piles would be 0.5. End pressure values would not be reduced provided the bases of the piles are at similar elevations. Interpolation can be used between one and three diameters.

For lateral loading, no reduction is needed for piles in-line with the direction of lateral loads with a minimum spacing of six diameters (center-to-center) based upon the larger pile. If a closer spacing is required, the modulus of subgrade reaction for initial and trailing piles should be reduced. At a spacing of three diameters, the effective modulus of subgrade reaction of the first pile can be estimated by multiplying the given modulus by 0.6; for trailing piles in a line at three-diameter spacing, the factor is 0.4. Linear interpolation can be used for spacing between three and six diameters.

Reductions to the modulus of subgrade reaction can be accomplished in LPILE by inputting the appropriate modification factors for p-y curves. Reducing the modulus of subgrade reaction in trailing piles will result in greater computed deflections on these piles. In practice, a grade beam can force deflections of all piles to be equal. Load-deflection graphs can be generated for each pile by using the appropriate p-multiplier values. The sum of the piles lateral load resistance at selected deflections can be used to develop a total lateral load versus deflection graph for the system of piles.

For lateral loads perpendicular to the line of piles, a minimum spacing of three diameters can be used with no capacity reduction. At one diameter (piles touching) the piles should be analyzed as one unit. Interpolation can be used for intermediate conditions.

Foundations for Light Buildings

We understand light structures may be built to house equipment for the solar facility. These may consist of outdoor pads or metal buildings. Structural loads are anticipated to be relatively light. Our borings indicate the surficial soils will consist of clean to silty, clayey sand. Footing foundations can be used with reasonable expected performance. Recommended design and construction criteria for footings are presented below. Lateral earth pressures can be calculated using the data summarized in the table below.

1. Footings should be constructed on moisture conditioned, compacted fill or firm sand subgrade. If soft or loose soils are exposed in footing excavations, these soils should be removed and recompacted as recommended in **SITE DEVELOPMENT**.

2. Footings should be designed for a maximum allowable soil pressure of 2,000 psf.

3. Minimum footing width of 16 inches is recommended and frost burial should be at least 36 inches.

LATERAL EQUIVALENT FLUID DENSITIES AND
COEFFICIENT OF SLIDING FRICTION*

Soil Type	Sand
Passive Equivalent Fluid Density (ultimate)	425
At-Rest Equivalent Fluid Density (ultimate)	55
Active Equivalent Fluid Density (ultimate)	35
Coefficient of Sliding Friction (ultimate)	0.45

*Ultimate values; appropriate safety factors should be used in design.

SLABS-ON-GRADE

We understand that slab-on-grade floors may be used for equipment buildings or pads. Our borings indicate the surficial soils consist of clean to silty, clayey sand. Based on the results of our investigation, a conventional slab-on-grade floor may be used with reasonable expected performance. We recommend slabs be placed on moisture conditioned, compacted fill or firm natural soils. If soft/loose material is exposed in the excavation, it should be scarified and re-worked or stabilized as discussed in **SITE DEVELOPMENT**.

We recommend the following design and construction criteria for slabs-on-grade. These recommendations will not prevent movement. Rather, they tend to reduce damage if movement occurs.

1. Plumbing and utilities, if necessary, that pass through the slabs should be isolated from the slabs and constructed with flexible couplings. Utilities, as well as electrical and mechanical equipment should be constructed with sufficient flexibility to allow for movement.

2. The American Concrete Institute (ACI) recommends frequent control joints be provided in slabs to reduce problems associated with shrinkage cracking and curling. Panels that are approximately square perform better than rectangular areas. To reduce curling, the concrete mix should have a high aggregate content and a low slump. If desired, a shrinkage compensating admixture could be added to the concrete to reduce the risk of shrinkage cracking. We can perform a mix design or assist the design team in selecting a pre-existing mix.

RESISTIVITY

Electrical Resistivity

Electrical resistivity testing was conducted according to ASTM G57, the Wenner 4-Pin Method, with both E-W and N-S traverses across the parcel. Electrode spacings of 1, 2.5, 5, 10, 15, 20, 40, and 60 feet were requested.

Traverse	Pin Spacing, a (ft)	Pin Penetration Depth (in)	Wenner Spacing Factor (2π*(a*30.48))	Meter Resistance (ohms)	Apparent Resistivity (ohm-cm)
N-S	1	0.6	191.5	129.5	24,799
	2.5	1.5	478.75	44.3	21,209
	5	3	957.5	28.9	27,672
	10	6	1915	4.118	7,886
	15	9	2872.5	2.97	8,531
	20	12	3830	1.63	6,243
	40	24	7660	1.139	8,725
	60	36	11490	0.889	10,215
	Resistivity Average				14,400
E-W	1	0.6	191.5	92.6	17,733
	2.5	1.5	478.75	53.7	25,709
	5	3	957.5	13.687	13,105
	10	6	1915	3.592	6,879
	15	9	2872.5	1.682	4,832
	20	12	3830	1.308	5,010
	40	24	7660	1.042	7,982
	60	36	11490	0.996	11,444
	Resistivity Average				11,600

The Denver Water Department, over a period of years, has established apparent resistivity versus corrosion potential of the subsoils for their underground pipelines. They concluded from their studies that apparent resistivity of less than 1,000 ohm-cm indicates severe corrosion potential for metal pipes; 1,000 ohm-cm to 2,500 ohm-cm indicates moderate corrosion potential; and greater than 2,500 ohm-cm indicates low corrosion potential. Using these guidelines, the near-surface soils can be considered to have low corrosion potential.

Thermal Resistivity

Thermal resistivity testing was performed in conformance with ASTM D 5334 on a bulk sample. Samples were tested at various remolded densities and moisture contents. The test data is presented in the tables below as noted.

Boring(s)	Depth (feet)	Remolded Dry Density (pcf)	Moisture Content (%)	Sample Temperature (degrees)	Thermal Resistivity	Correlation Coefficient
TH-1, 3 & 5	0-5	107.3	7.1	22.04 C^O	147.1 $\frac{^oC \cdot cm}{W}$	0.0266
			Oven Dried	39.35 C^O	314.3 $\frac{^oC \cdot cm}{W}$	0.0305
		108.2	9.0	20.68 C^O	131.3 $\frac{^oC \cdot cm}{W}$	0.0146
			Oven Dried	42.50 C^O	225.1 $\frac{^oC \cdot cm}{W}$	0.0206
		109.0	11.2	20.51 C^O	127.9 $\frac{^oC \cdot cm}{W}$	0.0279
		108.6	12.8	20.18 C^O	262.5 $\frac{^oC \cdot cm}{W}$	0.0538
		104.1	15.0	19.64 C^O	124.6 $\frac{^oC \cdot cm}{W}$	0.00685

CORROSIVITY

Laboratory tests for pH, chloride, sulfide, redox and sulfate concentrations were conducted. Test results are presented in the table below. These results can be used along with electrical resistivity (see **RESISTIVITY** section) to provide a basis to estimate the corrosive potential of the on-site soils.

Boring(s)	Depth (feet)	pH	Chloride Content (%)	Sulfide	Redox (mV vs. Ag/AgCl)	Soluble Sulfate Content (%)
TH-1, 3 & 5	0-5	7.3	0.0011	ND (Not Detected)	112	0.08

The test results indicate a potentially corrosive environment for buried metallic structures. A corrosion professional should be consulted to design corrosion protection.

GRAVEL ROADS

We understand gravel roads are planned around and possibly between arrays. We assume that the gravel drives will have light traffic. We recommend the use of at least 8 inches of crushed rock (such as ASTM C33 No. 57, No. 67, or No. 467) or CDOT Class 5 or 6 aggregate base course for the gravel drive. Recycled crushed asphalt or concrete that meets CDOT Class 5 or 6 Aggregate Base Course Specifications may also be used. The recycled asphalt may reduce dust from traffic compared to other crushed stone or recycled concrete material.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations of less than 0.01 and 0.08 percent in two samples. As indicated in our tests and ACI 318-19, the sulfate exposure class is *Not Applicable* or *S0*.

SULFATE EXPOSURE CLASSES PER ACI 318-19

Exposure Classes		Water-Soluble Sulfate (SO_4) in Soil [A] (%)
Not Applicable	S0	< 0.10
Moderate	S1	0.10 to 0.20
Severe	S2	0.20 to 2.00
Very Severe	S3	> 2.00

A) Percent sulfate by mass in soil determined by ASTM C1580

For this level of sulfate concentration, ACI 318-19 *Code Requirements* indicates there are no cement type requirements for sulfate resistance as indicated in the table below.

CONCRETE DESIGN REQUIREMENTS FOR SULFATE EXPOSURE PER ACI 318-19

Exposure Class		Maximum Water/ Cement Ratio	Minimum Compressive Strength (psi)	Cementitious Material Types A			Calcium Chloride Admixtures
				ASTM C150/C150M	ASTM C595/C595M	ASTM C1157/C1157M	
S0		N/A	2500	No Type Restrictions	No Type Restrictions	No Type Restrictions	No Restrictions
S1		0.50	4000	II[B]	Type with (MS) Designation	MS	No Restrictions
S2		0.45	4500	V[B]	Type with (HS) Designation	HS	Not Permitted
S3	Option 1	0.45	4500	V + Pozzolan or Slag Cement[C]	Type with (HS) Designation plus Pozzolan or Slag Cement[C]	HS + Pozzolan or Slag Cement[C]	Not Permitted
S3	Option 2	0.4	5000	V[D]	Type with (HS) Designation	HS	Not Permitted

A) Alternate combinations of cementitious materials shall be permitted when tested for sulfate resistance meeting the criteria in section 26.4.2.2(c).
B) Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.
C) The amount of the specific source of pozzolan or slag to be used shall not be less than the amount that has been determined by service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slab to be used shall not be less than the amount tested in accordance with ASTM C1012 and meeting the criteria in section 26.4.2.2(c) of ACI 318.
D) If Type V cement is used as the sole cementitious material, the optional sulfate resistance requirement of 0.040 percent maximum expansion in ASTM C150 shall be specified.

Superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete should have a total air content of 6 percent ± 1.5 percent. We advocate damp-proofing of all foundation walls and grade beams in contact with the subsoils.

SURFACE DRAINAGE

Performance of foundations, flatwork, and gravel roads is dependent to a large degree on subsoil moisture conditions. The risk of wetting the subsoils can be reduced by carefully planned and maintained surface grading. The ground surface below the panels should slope to promote good drainage away from foundations. Positive surface drainage should be provided away from improvements.

CONSTRUCTION OBSERVATIONS

This report has been prepared for the exclusive use of Pivot Energy Development, LLC and your design team for the purpose of providing geotechnical design and construction criteria for the proposed development. The information, conclusions, and recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structures proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice evolve in geotechnical engineering. The recommendations provided are appropriate for about three years. If the project is not constructed within about three years, we should be contacted to determine if we should update this report. The recommendations presented in this report are based on the construction as currently planned. Revisions in the planned construction could affect our recommendations. We should be contacted if plans change to review and revise our recommendations, if necessary.

We recommend that CTL|Thompson, Inc. provide construction observation services to allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation, primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structure and improvements will perform satisfactorily. It is critical that all recommendations in this report are followed during construction. Owners or property managers must assume responsibility for maintaining the structure and use appropriate

practices regarding drainage, landscaping and maintenance. Improvements after construction should be completed in accordance with recommendations provided in this report and may require additional soil investigation and consultation.

LIMITATIONS

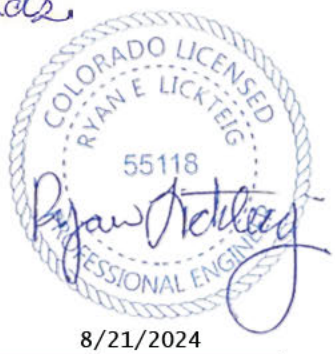
Our borings were spaced to obtain a reasonably accurate picture of subsurface conditions at this site. The borings are representative of conditions encountered only at the location drilled. Subsurface variations not indicated by the borings are possible.

We believe this investigation was conducted in a manner consistent with the level of care and skill ordinarily used by geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report, or in the analysis of the influence of the subsurface conditions on the design of the structures or any other aspect of the proposed construction, please call.

CTL|THOMPSON, INC.

Sharone Richards
Staff Engineer

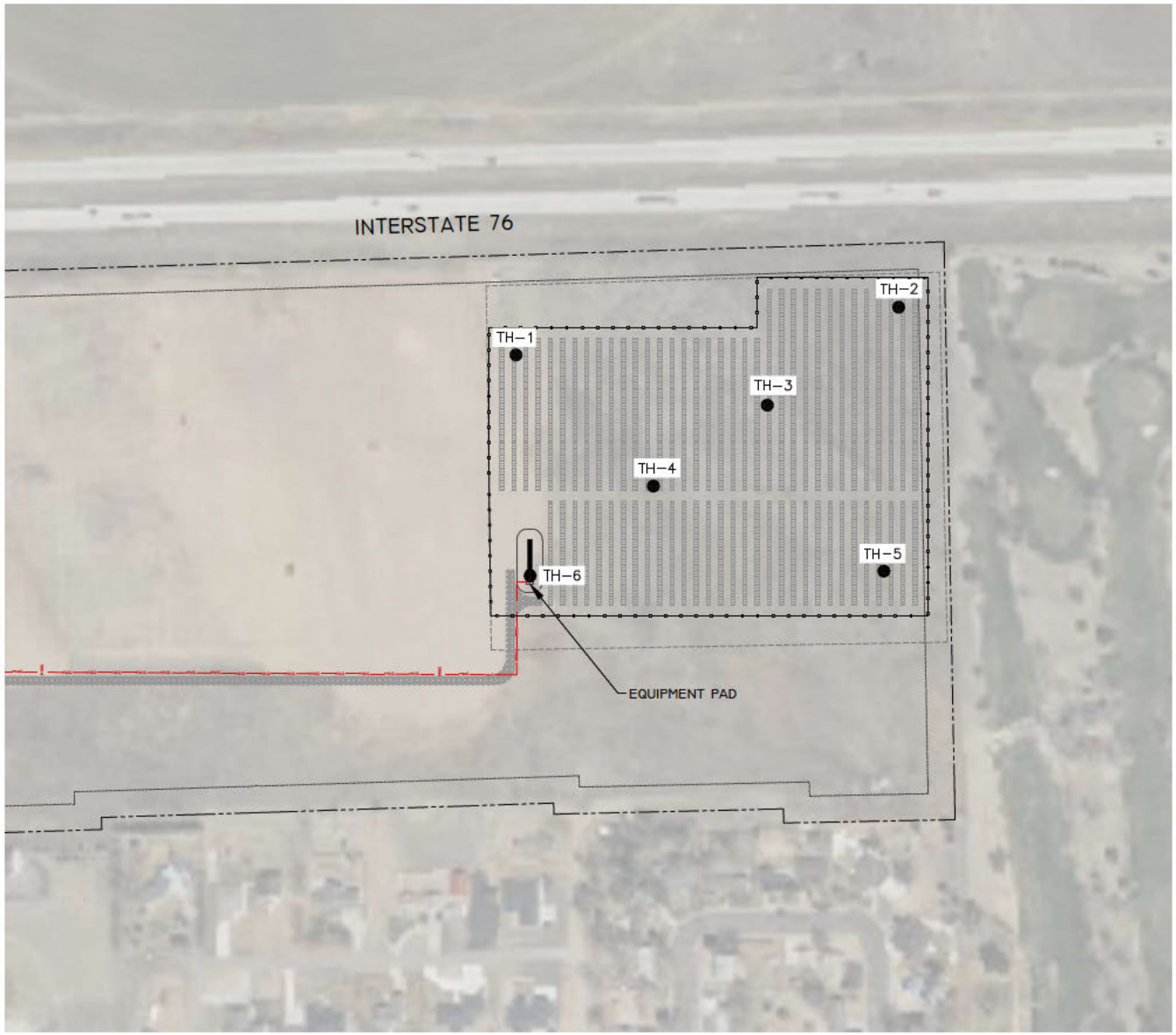
Reviewed by:

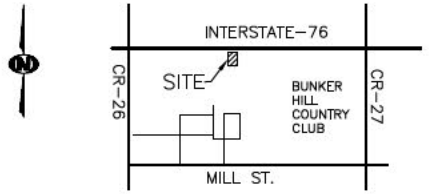


8/21/2024

Ryan Lickteig, P.E.
Associate Engineer

Via e-mail: [redacted]





VICINITY MAP
NOT TO SCALE

LEGEND:

TH–1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING

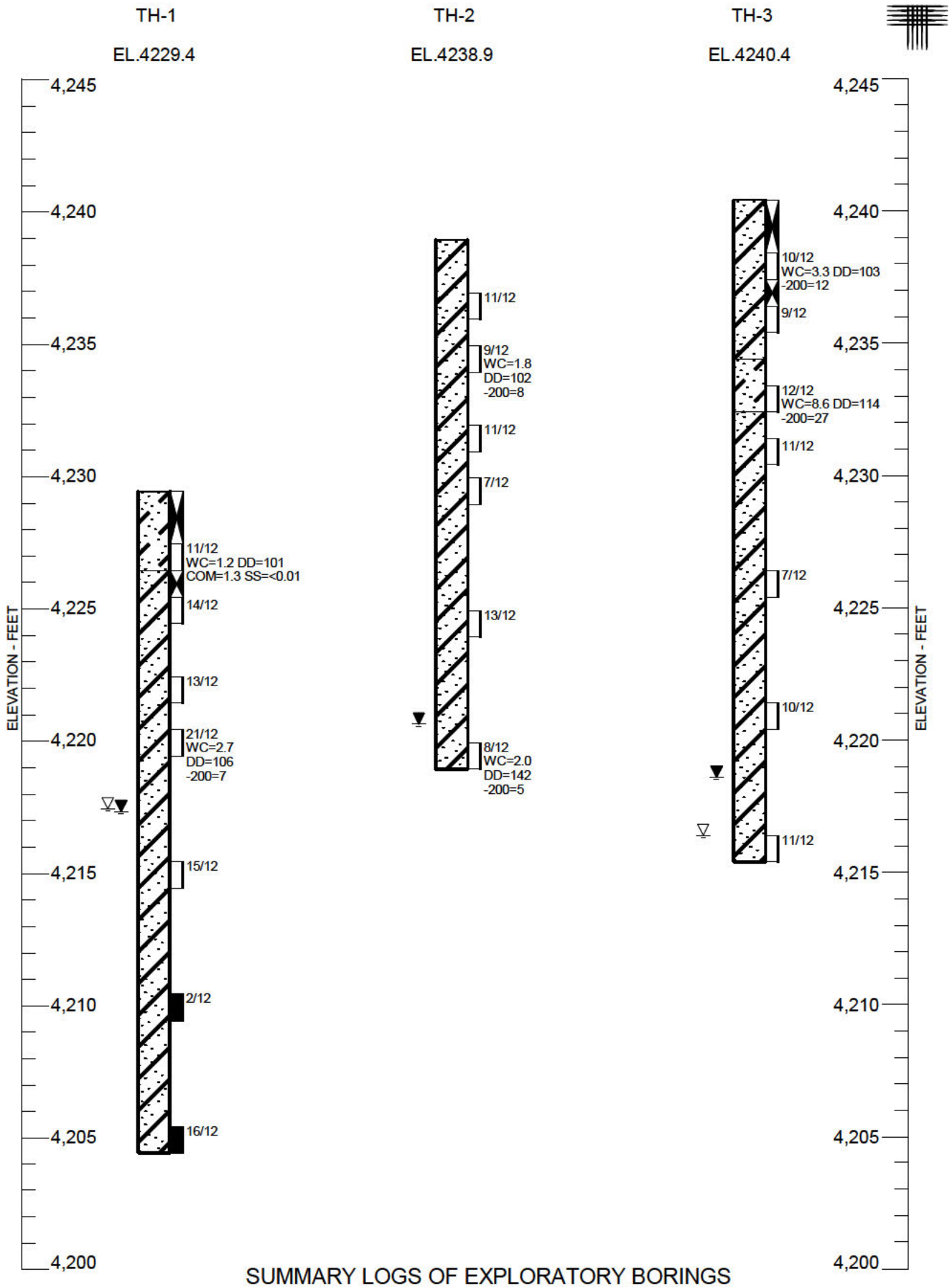
PIVOT ENERGY DEVELOPMENT, LLC
PIVOT SOLAR 71
CTL|T Project No. DN52,284-125-R1

Locations of Exploratory Borings

Fig. 1

APPENDIX A

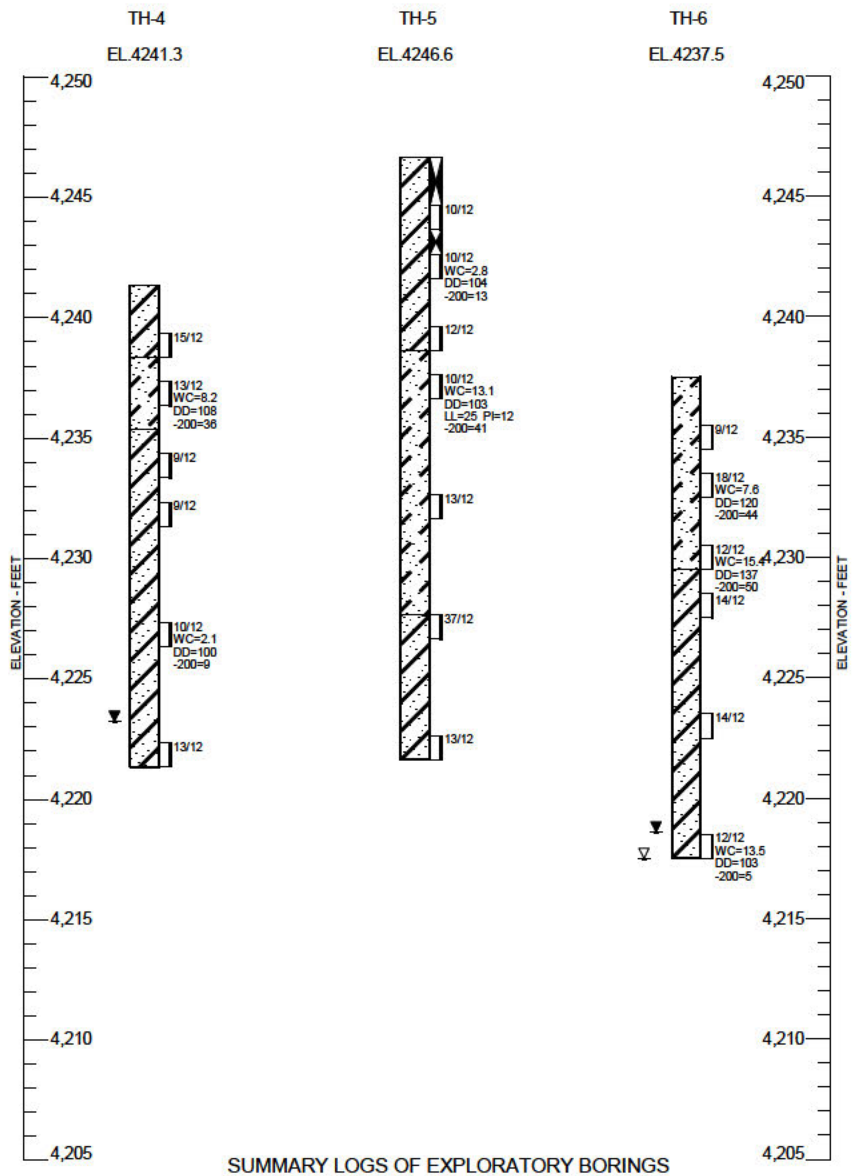
SUMMARY LOGS OF EXPLORATORY BORINGS



SUMMARY LOGS OF EXPLORATORY BORINGS

PIVOT ENERGY DEVELOPMENT, LLC
PIVOT SOLAR 71
CTL|T PROJECT NO. DN52,284-125-R1

FIG. A-1



SUMMARY LOGS OF EXPLORATORY BORINGS

PIVOT ENERGY DEVELOPMENT, LLC
PIVOT SOLAR 71
CTL|T PROJECT NO. DN52,284-125-R1

LEGEND:

SAND, VERY CLAYEY, LOOSE TO MEDIUM DENSE, MOIST, BROWN, LIGHT BROWN (SC).

SAND, SILTY, VERY LOOSE TO DENSE, MOIST TO VERY MOIST, BROWN (SP, SM, SP-SM).

DRIVE SAMPLE. THE SYMBOL 11/12 INDICATES 11 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

DRIVE SAMPLE. THE SYMBOL 2/12 INDICATES 2 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.0-INCH O.D. SAMPLER 12 INCHES.

BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.

WATER LEVEL MEASURED AT TIME OF DRILLING.

WATER LEVEL MEASURED AFTER DRILLING ON JUNE 21, 2024.

NOTES:

1. THE BORINGS WERE DRILLED JUNE 18TH, 2024 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND TRUCK-MOUNTED CME-45 DRILL RIG.

2. BORING LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY A REPRESENTATIVE OF OUR FIRM USING A LEICA GS18 GPS UNIT REFERENCING THE NORTH AMERICAN DATUM OF 1983 (NAD83).

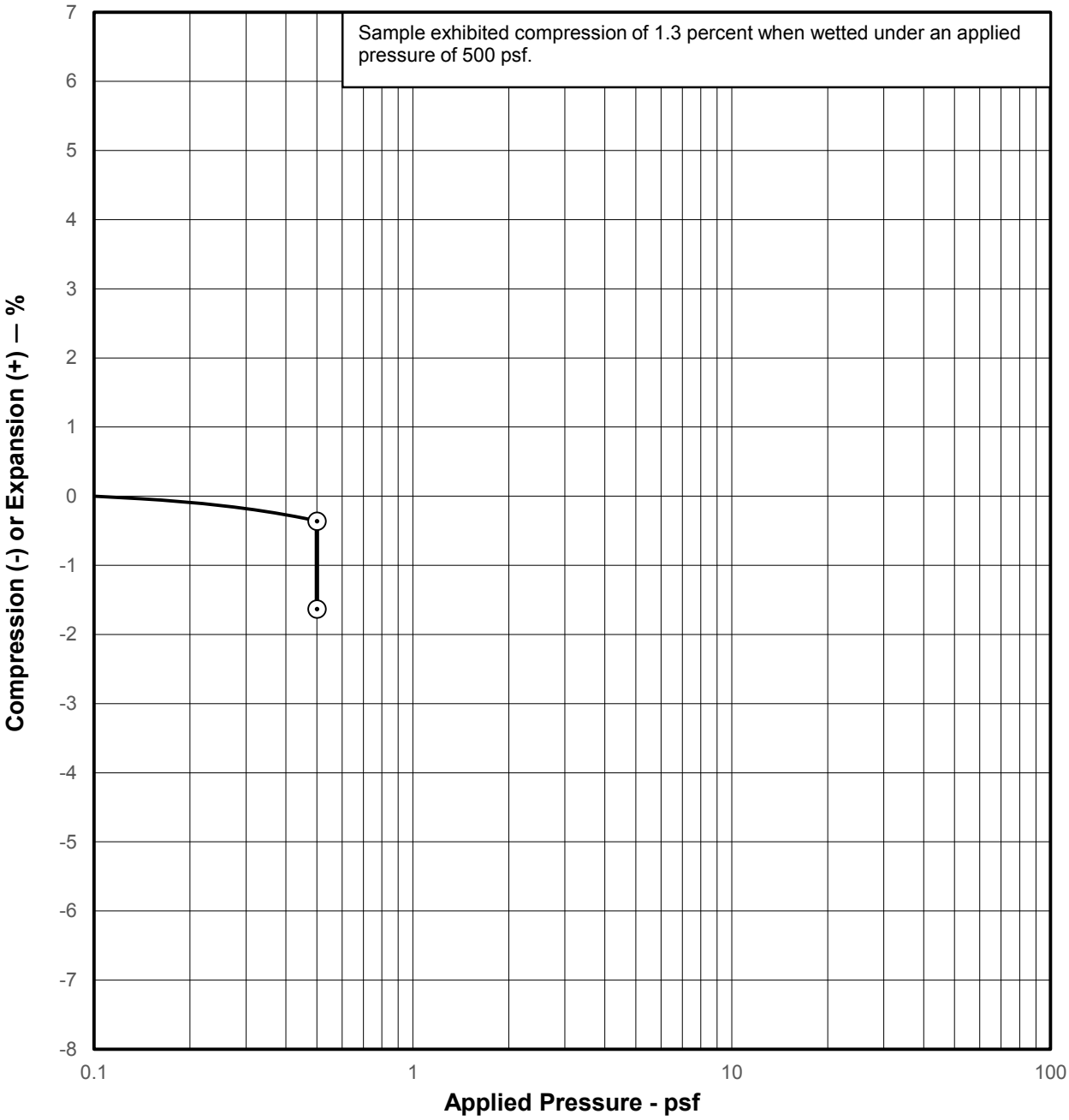
3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).

4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.

FIG. A-2

APPENDIX B

LABORATORY TEST RESULTS AND TABLE B-I



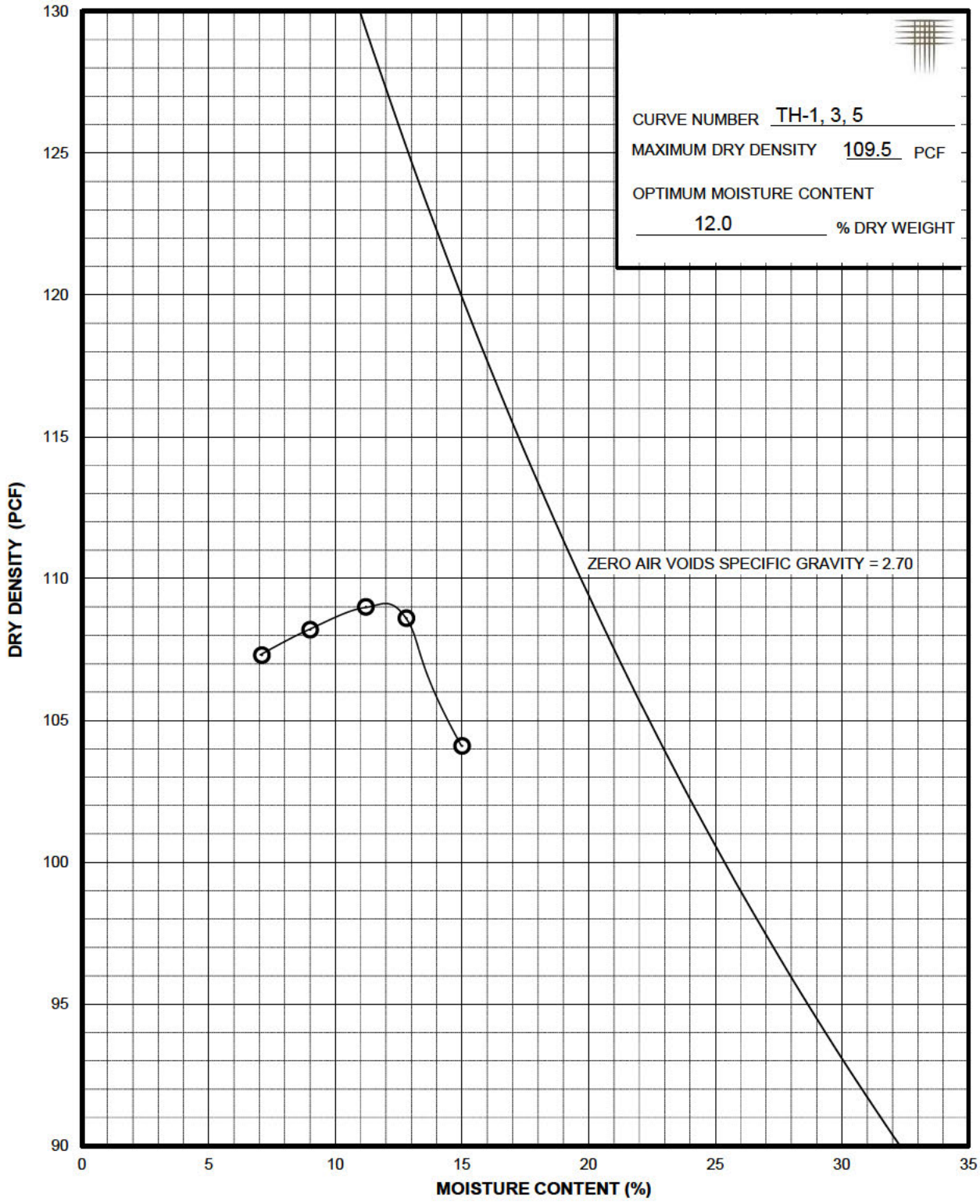
SAMPLE OF: SAND, CLAYEY (SC)

FROM: TH-1 AT 2 FEET

MOISTURE CONTENT:	1.2 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	101 pcf	PLASTICITY INDEX:		SOIL SUCTION:	psf

PIVOT ENERGY DEVELOPMENT LLC
PIVOT SOLAR 71
CTL|T PROJECT NO. DN52284.000E-125-R1

Swell Consolidation Test Results



SAMPLE DESCRIPTION	SAND, SILTY (SM)	LIQUID LIMIT	NL
		PLASTICITY INDEX	NP
LOCATION	BULK, 0-5'	GRAVEL	%
		SAND	%
COMPACTION TEST PROCEDURE	ASTM D698-12 METHOD A	SILT AND CLAY	16 %

PIVOT ENERGY DEVELOPMENT, LLC
PIVOT SOLAR 71
CTL|T PROJECT NO. DN52,284-125-R1

Laboratory Compaction Test Results FIG. B-2

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH	MOISTURE CONTENT	DRY DENSITY	SWELL TEST DATA			ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT	PASSING NO. 200 SIEVE	pH	SOIL TYPE
				SWELL	COMPRESSION	APPLIED PRESSURE	LIQUID LIMIT	PLASTICITY INDEX				
	(ft)	(%)	(pcf)	(%)	(%)	(psf)			(%)	(%)		
TH-1	2	1.2	101		1.3	500			<0.01			SAND, CLAYEY (SC)
TH-1	9	2.7	106							7		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-2	4	1.8	102							8		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-2	19	2.0	142							5		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-3	2	3.3	103							12		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-3	7	8.6	114							27		SAND, CLAYEY (SC)
TH-4	4	8.2	108							36		SAND, CLAYEY (SC)
TH-4	14	2.1	100							9		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-5	4	2.8	104							13		SAND, SILTY (SM)
TH-5	9	13.1	103				25	12		41		SAND, CLAYEY (SC)
TH-6	4	7.6	120							44		SAND, CLAYEY (SC)
TH-6	7	15.4	137							50		SAND, CLAYEY (SC)
TH-6	19	13.5	103							5		SAND, CLEAN TO SLIGHTLY SILTY (SP-SM)
TH-1,3,5	0-5								0.08	16	7.3	SAND, SILTY (SM)

NORTHERN COLORADO TITLE SERVICES CO., INC.
130 W. KIOWA AVENUE
FORT MORGAN, CO 80701
TELEPHONE (970)867-0233 * FAX (970)867-7750**

DATE: May 9, 2024
ORDER NO.: NCT24844
PROPERTY ADDRESS: VACANT, CO

OWNER/PURCHASER: THE TERRY L. LARSEN TRUST, DATED MAY 14, 2017 and THE ANNA M. LARSEN TRUST, DATED MAY 14, 2014
TO BE DETERMINED

PLEASE DELIVER TO THE FOLLOWING CUSTOMERS:

_____ To: PIVOT ENERGY
[redacted]

ATTN: BRADLEY THOMAS
Fax No.:

_____ To: LAND TITLE GUARANTEE COMPANY
[redacted]

ATTN: TOM KIMBALL
GEORGE RIETSCH
Fax No.:

ATTACHED PLEASE FIND THE FOLLOWING ITEM(S) IN CONNECTION WITH THE ABOVE CAPTIONED ORDER. SHOULD YOU HAVE ANY QUESTIONS REGARDING THE ATTACHED DOCUMENTATION, PLEASE CONTACT LINDA, BROOKE, LISA OR SHERYL. FOR CLOSING ASSISTANCE, PLEASE CONTACT LINDA OR LISA. WE APPRECIATE YOUR BUSINESS VERY MUCH AND LOOK FORWARD TO SERVING YOU IN THIS TRANSACTION.

E-MAIL ADDRESS FOR CLOSING DOCUMENTS: closing@ncts.com
HAVE A WONDERFUL DAY!!!

X	COMMITMENT AMT DUE IS ON SCHEDULE A (INVOICE)	_____	OWNERS TITLE POLICY
_____	PROPERTY REPORT AMT DUE IS ON PROPERTY REPORT (INVOICE)	_____	MORTGAGEES TITLE POLICY
_____	MORTGAGE/FORECOSURE GUARANTY	_____	DOCUMENTS
_____	SURVEY / ILC	_____	OTHER / INVOICE

ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021)

ISSUED BY
STEWART TITLE GUARANTY COMPANY

NOTICE

IMPORTANT - READ CAREFULLY: THIS COMMITMENT IS AN OFFER TO ISSUE ONE OR MORE TITLE INSURANCE POLICIES. ALL CLAIMS OR REMEDIES SOUGHT AGAINST THE COMPANY INVOLVING THE CONTENT OF THIS COMMITMENT OR THE POLICY MUST BE BASED SOLELY IN CONTRACT.

THIS COMMITMENT IS NOT AN ABSTRACT OF TITLE, REPORT OF THE CONDITION OF TITLE, LEGAL OPINION, OPINION OF TITLE, OR OTHER REPRESENTATION OF THE STATUS OF TITLE. THE PROCEDURES USED BY THE COMPANY TO DETERMINE INSURABILITY OF THE TITLE, INCLUDING ANY SEARCH AND EXAMINATION, ARE PROPRIETARY TO THE COMPANY, WERE PERFORMED SOLELY FOR THE BENEFIT OF THE COMPANY, AND CREATE NO EXTRACONTRACTUAL LIABILITY TO ANY PERSON, INCLUDING A PROPOSED INSURED.

THE COMPANY'S OBLIGATION UNDER THIS COMMITMENT IS TO ISSUE A POLICY TO A PROPOSED INSURED IDENTIFIED IN SCHEDULE A IN ACCORDANCE WITH THE TERMS AND PROVISIONS OF THIS COMMITMENT. THE COMPANY HAS NO LIABILITY OR OBLIGATION INVOLVING THE CONTENT OF THIS COMMITMENT TO ANY OTHER PERSON.

COMMITMENT TO ISSUE POLICY

Subject to the Notice; Schedule B, Part I - Requirements; Schedule B, Part II - Exceptions; and the Commitment Conditions, STEWART TITLE GUARANTY COMPANY, a Texas corporation (the "Company"), commits to issue the Policy according to the terms and provisions of this Commitment. This Commitment is effective as of the Commitment Date shown in Schedule A for each Policy described in Schedule A, only when the Company has entered in Schedule A both the specified dollar amount as the Proposed Amount of Insurance and the name of the Proposed Insured.

If all of the Schedule B, Part I - Requirements have not been met within six months after the Commitment Date, this Commitment terminates and the Company's liability and obligation end.

STEWART TITLE GUARANTY COMPANY INCORPORATED 1908 TEXAS

Frederick H. Eppinger
President and CEO

David Hisey
Secretary

This page is only a part of a 2021 ALTA® Commitment for Title Insurance. This Commitment is not valid without the Notice; the Commitment to Issue Policy; the Commitment Conditions; Schedule A; Schedule B, Part I - Requirements; and Schedule B, Part II - Exceptions; and a countersignature by the Company or its issuing agent that may be in electronic form.

COMMITMENT CONDITIONS

1. DEFINITIONS

a. "Discriminatory Covenant": Any covenant, condition, restriction, or limitation that is unenforceable under applicable law because it illegally discriminates against a class of individuals based on personal characteristics such as race, color, religion, sex, sexual orientation, gender identity, familial status, disability, national origin, or other legally protected class.
b. "Knowledge" or "Known": Actual knowledge or actual notice, but not constructive notice imparted by the Public Records.
c. "Land": The land described in Item 5 of Schedule A and improvements located on that land that by State law constitute real property. The term "Land" does not include any property beyond that described in Schedule A, nor any right, title, interest, estate, or easement in any abutting street, road, avenue, alley, lane, right-of-way, body of water, or waterway, but does not modify or limit the extent that a right of access to and from the Land is to be insured by the Policy.
d. "Mortgage": A mortgage, deed of trust, trust deed, security deed, or other real property security instrument, including one evidenced by electronic means authorized by law.
e. "Policy": Each contract of title insurance, in a form adopted by the American Land Title Association, issued or to be issued by the Company pursuant to this Commitment.
f. "Proposed Amount of Insurance": Each dollar amount specified in Schedule A as the Proposed Amount of Insurance of each Policy to be issued pursuant to this Commitment.
g. "Proposed Insured": Each person identified in Schedule A as the Proposed Insured of each Policy to be issued pursuant to this Commitment.
h. "Public Records": The recording or filing system established under State statutes in effect at the Commitment Date under which a document must be recorded or filed to impart constructive notice of matters relating to the Title to a purchaser for value without Knowledge. The term "Public Records" does not include any other recording or filing system, including any pertaining to environmental remediation or protection, planning, permitting, zoning, licensing, building, health, public safety, or national security matters.
i. "State": The state or commonwealth of the United States within whose exterior boundaries the Land is located. The term "State" also includes the District of Columbia, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, and Guam.
j. "Title": The estate or interest in the Land identified in Item 3 of Schedule A.

2. If all of the Schedule B, Part I - Requirements have not been met within the time period specified in the Commitment to Issue Policy, this Commitment terminates and the Company's liability and obligation end.

3. The Company's liability and obligation is limited by and this Commitment is not valid without:

a. the Notice;
b. the Commitment to Issue Policy;
c. the Commitment Conditions;
d. Schedule A;
e. Schedule B, Part I - Requirements;
f. Schedule B, Part II - Exceptions; and
g. a countersignature by the Company or its issuing agent that may be in electronic form.

4. COMPANY'S RIGHT TO AMEND

The Company may amend this Commitment at any time. If the Company amends this Commitment to add a defect, lien, encumbrance, adverse claim, or other matter recorded in the Public Records prior to the Commitment Date, any liability of the Company is limited by Commitment Condition 5. The Company is not liable for any other amendment to this Commitment.

5. LIMITATIONS OF LIABILITY

a. The Company's liability under Commitment Condition 4 is limited to the Proposed Insured's actual expense incurred in the interval between the Company's delivery to the Proposed Insured of the Commitment and the delivery of the amended Commitment, resulting from the Proposed Insured's good faith reliance to:
   i. comply with the Schedule B, Part I - Requirements;
   ii. eliminate, with the Company's written consent, any Schedule B, Part II - Exceptions; or
   iii. acquire the Title or create the Mortgage covered by this Commitment.

b. The Company is not liable under Commitment Condition 5.a. if the Proposed Insured requested the amendment or had Knowledge of the matter and did not notify the Company about it in writing.

c. The Company is only liable under Commitment Condition 4 if the Proposed Insured would not have incurred the expense had the Commitment included the added matter when the Commitment was first delivered to the Proposed Insured.

d. The Company's liability does not exceed the lesser of the Proposed Insured's actual expense incurred in good faith and described in Commitment Condition 5.a. or the Proposed Amount of Insurance.

e. The Company is not liable for the content of the Transaction Identification Data, if any.

f. The Company is not obligated to issue the Policy referred to in this Commitment unless all of the Schedule B, Part I - Requirements have been met to the satisfaction of the Company.

g. The Company's liability is further limited by the terms and provisions of the Policy to be issued to the Proposed Insured.

6. LIABILITY OF THE COMPANY MUST BE BASED ON THIS COMMITMENT; CHOICE OF LAW AND CHOICE OF FORUM

a. Only a Proposed Insured identified in Schedule A, and no other person, may make a claim under this Commitment.

b. Any claim must be based in contract under the State law of the State where the Land is located and is restricted to the terms and provisions of this Commitment. Any litigation or other proceeding brought by the Proposed Insured against the Company must be filed only in a State or federal court having jurisdiction.

c. This Commitment, as last revised, is the exclusive and entire agreement between the parties with respect to the subject matter of this Commitment and supersedes all prior commitment negotiations, representations, and proposals of any kind, whether written or oral, express or implied, relating to the subject matter of this Commitment.

d. The deletion or modification of any Schedule B, Part II—Exception does not constitute an agreement or obligation to provide coverage beyond the terms and provisions of this Commitment or the Policy.

e. Any amendment or endorsement to this Commitment must be in writing and authenticated by a person authorized by the Company.

f. When the Policy is issued, all liability and obligation under this Commitment will end and the Company's only liability will be under the Policy.

7. IF THIS COMMITMENT IS ISSUED BY AN ISSUING AGENT

The issuing agent is the Company's agent only for the limited purpose of issuing title insurance commitments and policies. The issuing agent is not the Company's agent for closing, settlement, escrow, or any other purpose.

8. PRO-FORMA POLICY

The Company may provide, at the request of a Proposed Insured, a pro-forma policy illustrating the coverage that the Company may provide. A pro-forma policy neither reflects the status of Title at the time that the pro-forma policy is delivered to a Proposed Insured, nor is it a commitment to insure.

9. CLAIMS PROCEDURES

This Commitment incorporates by reference all Conditions for making a claim in the Policy to be issued to the Proposed Insured. Commitment Condition 9 does not modify the limitations of liability in Commitment Conditions 5 and 6.

10. CLASS ACTION

ALL CLAIMS AND DISPUTES ARISING OUT OF OR RELATING TO THIS COMMITMENT, INCLUDING ANY SERVICE OR OTHER MATTER IN CONNECTION WITH ISSUING THIS COMMITMENT, ANY BREACH OF A COMMITMENT PROVISION, OR ANY OTHER CLAIM OR DISPUTE ARISING OUT OF OR RELATING TO THE TRANSACTION GIVING RISE TO THIS COMMITMENT, MUST BE BROUGHT IN AN INDIVIDUAL CAPACITY. NO PARTY MAY SERVE AS PLAINTIFF, CLASS MEMBER, OR PARTICIPANT IN ANY CLASS OR REPRESENTATIVE PROCEEDING. ANY POLICY ISSUED PURSUANT TO THIS COMMITMENT WILL CONTAIN A CLASS ACTION CONDITION.

11. ARBITRATION (INTENTIONALLY DELETED)

STEWART TITLE GUARANTY COMPANY

All notices required to be given the Company and any statement in writing required to be furnished the Company shall be addressed to it at: Stewart Title Guaranty Company, P.O. Box 2029, Mail Code: Policies 187, Houston, TX 77036.

ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021)
SCHEDULE A

ISSUED BY
STEWART TITLE GUARANTY COMPANY

Transaction Identification Data, for which the Company assumes no liability as set forth in Commitment Condition 5.e.:
Issuing Agent: **Northern Colorado Title Services Co., Inc.**
Issuing Office: **130 W. Kiowa Avenue, Fort Morgan, CO 80701**
Issuing Office's ALTA® Registry ID: **0044474**
Commitment No.: **NCT24844**
Issuing Office File No.: **NCT24844**
Property Address: **VACANT, CO**
Revision No.: **1**

1. Commitment Date: **May 7, 2024 at 08:00 AM**

2. Policy or Polices to be issued:

	AMOUNT:	PREMIUM:
ALTA Owner's Policy (2021)	**TBD**	**$200.00**

Proposed Insured: **TO BE DETERMINED**

Other Charges:

TOTAL DUE: **$200.00**

NOTE: A Minimum Fee of $115.00 will be charged if file is cancelled.

3. The estate or interest in the Land at the Commitment Date is:

Fee Simple

4. The Title is, at the Commitment Date, vested in:

THE TERRY L. LARSEN TRUST, DATED MAY 14, 2017 and THE ANNA M. LARSEN TRUST, DATED MAY 14, 2014

SCHEDULE A
(Continued)

5. The Land is described as follows:

   The N1/2SW1/4 of Section 33, Township 4 North, Range 56 West of the 6th P.M., Morgan County, Colorado, EXCEPT that parcel conveyed to The Department of Highways, State of Colorado recorded in Book 589 at page 499.

   and commonly known as (for informational purposes only): **VACANT, CO**

stewart
title guaranty company

Northern Colorado Title Services Co., Inc.

Linda L. Reding, Authorized Signatory

STEWART TITLE GUARANTY COMPANY INCORPORATED 1908 TEXAS

Frederick H. Eppinger
President and CEO

Denise Carraux
Secretary

This page is only a part of a 2021 ALTA® Commitment for Title Insurance. This Commitment is not valid without the Notice; the Commitment to Issue Policy; the Commitment Conditions; Schedule A; Schedule B, Part I - Requirements; and Schedule B, Part II - Exceptions; and a countersignature by the Company or its issuing agent that may be in electronic form.

ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021)
SCHEDULE B PART I

ISSUED BY
STEWART TITLE GUARANTY COMPANY

Requirements

File No.: NCT24844

All of the following Requirements must be met:

1. The Proposed Insured must notify the Company in writing of the name of any party not referred to in this Commitment who will obtain an interest in the Land or who will make a loan on the Land. The Company may then make additional Requirements or Exceptions.

2. Pay the agreed amount for the estate or interest to be insured.

3. Pay the premiums, fees, and charges for the Policy to the Company.

4. Documents satisfactory to the Company that convey the Title or create the Mortgage to be insured, or both, must be properly authorized, executed, delivered, and recorded in the Public Records.

    a. Proper Deed from THE TERRY L. LARSEN TRUST, DATED MAY 14, 2017 and THE ANNA M. LARSEN TRUST, DATED MAY 14, 2014 to TO BE DETERMINED, conveying the land described herein.

    b. Dollar amount of Policy coverage must be provided to the Company.

    c. The Company reserves the right to assert additional requirements or exceptions regarding the Grantee(s) when they are designated.

        NOTE: Statement of Authority for TERRY L. LARSEN TRUST, dated May 14, 2014 recorded OCTOBER 16, 2014 at Reception No. 890032, discloses the following person(s) have the authority to execute documents affecting title on behalf of the entity: TERRY L. LARSEN and ANNA M. LARSEN, Trustees.

        NOTE: Statement of Authority for ANNA M. LARSEN TRUST, dated May 14, 2014 recorded OCTOBER 16, 2014 at Reception No. 890034, discloses the following person(s) have the authority to execute documents affecting title on behalf of the entity: ANNA M. LARSEN and TERRY L. LARSEN, Trustees.

Valid as a Commitment for an ALTA Policy only if attached to a countersigned Commitment for Title Insurance, a Schedule A, a Schedule B - Section II and a Schedule C (if applicable) with matching Commitment Numbers.

ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021)
SCHEDULE B PART II

ISSUED BY
STEWART TITLE GUARANTY COMPANY

Exceptions

File No.: NCT24844

Some historical land records contain Discriminatory Covenants that are illegal and unenforceable by law. This Commitment and the Policy treat any Discriminatory Covenant in a document referenced in Schedule B as if each Discriminatory Covenant is redacted, repudiated, removed, and not republished or recirculated. Only the remaining provisions of the document will be excepted from coverage.

The Policy will not insure against loss or damage resulting from the terms and conditions of any lease or easement identified in Schedule A, and will include the following Exceptions unless cleared to the satisfaction of the Company:

1. Any defect, lien, encumbrance, adverse claim, or other matter that appears for the first time in the Public Records or is created, attaches, or is disclosed between the Commitment Date and the date on which all of the Schedule B, Part I - Requirements are met.

2. Any facts, rights, interests or claims which are not shown by the Public Records, but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.

3. Easements, or claims of easements, not shown by the Public Records.

4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.

5. Any lien, or right to a lien, for services, labor or material theretofore or hereafter furnished, imposed by law and not shown in the Public Records.

6. Taxes or special assessments which are a lien or due and payable; or which are not shown as existing liens by the public records; and any tax, special assessments, or charges or liens imposed for water or sewer service, or any other special taxing district, and any unredeemed tax sales.

7. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water; (d) Minerals of whatsoever kind, subsurface and surface substances, in, on, under and that may be produced from the Land, together with all rights, privileges, and immunities relating thereto, whether or not the matters excepted under (a), (b), (c) or (d) are shown by the Public Records or listed in Schedule B.

8. Subject to any vested and accrued water rights for mining, agricultural, manufacturing or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local customs, laws and decisions or as provided by law, as contained in Colorado State Patent recorded FEBRUARY 29, 1896 in Book 32 at page 39.

SCHEDULE B PART II
(Continued)

9. Right of way for ROAD purposes as specified in ROAD PETITION recorded JANUARY 31, 1883 in Book 15 at Page 228, said road to be not less than 60 feet in width.

10. Easement and right of way for ELECTRIC TRANSMISSION purposes as granted by FRANK G. SCHWANKE to THE UNITED STATES OF AMERICA as contained in instrument recorded JULY 12, 1940 in Book 385 at Page 113, the location of said easement and right of way are more specifically defined in said document.

11. Each and every right of access to and from any part of the right of way for Colorado State Highway No. 2 BYPASS, as conveyed to the Department of Highways, State of Colorado by Deed recorded in Book 589 at Page 501.

12. Easement and right of way for COMMUNICATION purposes as granted by INEZ MARIE SCHWANKE to THE MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY as contained in instrument recorded JUNE 21, 1990 in Book 923 at Page 384, the location of said easement and right of way are more specifically defined in said document.

13. An undivided 1/2 interest in all oil, gas and other mineral rights, as reserved by INEZ MARIE SCHWANKE in the instrument to TERRY L. LARSEN and ANNA M. LARSEN recorded FEBRUARY 27, 1991 in Book 929 at Page 829, and any and all assignments thereof or interests therein.

14. All oil, gas and other mineral rights presently owned by them in and to the subject property as conveyed in Deed from BETTY ANN LARSEN to TERRY LARSEN TRUST and ANNA LARSEN TRUST, recorded FEBRUARY 17, 2021 at Reception No. 930824, and any and all assignments thereof or interests therein.

15. Terms, conditions, provisions, agreements, burdens and obligations as contained in unrecorded Solar Lease dated September 28, 2020 between the Terry L. Larsen Trust and the Anna M. Larsen Trust, Lessor, and Pivot Solar 2 LLC now known as Vestal PS2 Solar LLC, Lessee, as evidenced of record by that certain Short Form Solar Lease executed by the Terry L. Larsen Trust, dated May 14, 2014 and the Anna M. Larsen Trust, dated May 14, 2014, as Lessor, to Pivot Solar 2 LLC now known as Vestal PS2 Solar LLC, as Lessee, dated March 1, 2021 and recorded March 1, 2021 at Reception No. 931072 and re-recorded March 18, 2021 at Reception No. 931519 and re-recorded April 14, 2021 at Reception No. 932160, Amendment to Solar Lease recorded March 10, 2023 at Reception No. 945328, Short Form of Solar Lease, First Amendment recorded March 10, 2023 at Reception No. 945331 and re-recorded April 7, 2023 at Reception No. 945726.

16. Terms, conditions, provisions, agreements, burdens and obligations as contained in unrecorded Solar Lease dated September 28, 2020 between the Terry L. Larsen Trust and the Anna M. Larsen Trust, Lessor, and Pivot Solar 14 LLC now known as Vestal PS14 Solar LLC, Lessee, as evidenced of record by that certain Short Form Solar Lease executed by the Terry L. Larsen Trust, dated May 14, 2014 and the Anna M. Larsen Trust, dated May 14, 2014, as Lessor, to Pivot Solar 14 LLC now known as Vestal PS14 Solar LLC, as Lessee, dated March 1, 2021 and recorded March 1, 2021 at Reception No. 931073 and re-recorded March 18, 2021 at Reception No. 931520 and re-recorded April 14, 2021 at Reception No. 932161, Amendment to Solar lease recorded March 10, 2023 at Reception No. 945329, short form First Amendment to recorded March 10, 2023 at Reception No. 945332 and re-recorded April 7, 2023 at Reception No. 945727.

SCHEDULE B PART II
(Continued)

17. Terms, conditions, provisions, agreements, burdens and obligations as contained in unrecorded Solar Lease dated September 28, 2020 between the Terry L. Larsen Trust and the Anna M. Larsen Trust, Lessor, and Pivot Solar 15 LLC now known as Vestal PS15, LLC, Lessee, as evidenced of record by that certain Short Form Solar Lease executed by the Terry L. Larsen Trust, dated May 14, 2014 and the Anna M. Larsen Trust, dated May 14, 2014, as Lessor, to Pivot Solar 15 LLC now known as Vestal PS15, LLC, as Lessee, dated March 1, 2021 and recorded March 1, 2021 at Reception No. 931074 and re-recorded March 18, 2021 at Reception No. 931521 and re-recorded April 14, 2021 at Reception No. 932162, Amendment to Solar Lease Recorded March 10, 2023 at Reception No 945330, Amendment to Short Form lease recorded March 10, 2023 at Reception No. 945333 and re-recorded April 7, 2023 at Reception No. 945728.

18. Terms, conditions, provisions, agreements, burdens and obligations as contained in RESOLUTION 2021 BCC 19 recorded MAY 18, 2021 at Reception No. 932916.

19. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF LEASE between the Terry L. Larsen Trust, dated May 14, 2014 and the Anna M. Larsen Trust, dated May 14, 2014, Lessor, and Pivot Energy Development LLC, Lessee, dated AUGUST 3, 2023 and recorded AUGUST 4, 2023 at Reception No. 947510.

20. Easement and right of way for UTILITY LINES purposes as granted by THE ANNA M. LARSEN TRUST, DATED MAY 14, 2014 and the TERRY L. LARSEN TRUST, DATED MAY 14, 2014 to PUBLIC SERVICE COMPANY OF COLORADO as contained in instrument recorded APRIL 18, 2024 at Reception No. 950864, the location of said easement and right of way are more specifically defined in said document.

21. Burdens, obligations, terms, conditions, stipulations and restrictions of any and all unrecorded LEASES AND TENANCIES.

22. Right of way and rights incidental thereto for County Roads 30 feet on either side of Section and Township lines as established by the Board of County Commissioners of Morgan County, Colorado, in instrument recorded May 6, 1907 in Book 62 at page 109.

23. NOTE: The following notices pursuant to CRS 9-1.5 103 concerning underground facilities have been filed with the Clerk and Recorder. These statements are general and do not necessarily give notice of underground facilities within the subject property: (A) MOUNTAIN BELL TELEPHONE COMPANY RECORDED OCTOBER 2, 1981 IN BOOK 821 AT PAGE 502; (B) PUBLIC SERVICE COMPANY OF COLORADO RECORDED OCTOBER 2, 1981 IN BOOK 821 AT PAGE 514; AND (C) MORGAN COUNTY RURAL ELECTRIC ASSOCIATION RECORDED JANUARY 22, 1982 IN BOOK 825 AT PAGE 656.

STEWART TITLE GUARANTY COMPANY
PRIVACY NOTICE

This Stewart Title Guaranty Company Privacy Notice ("Notice") explains how Stewart Title Guaranty Company and its subsidiary title insurance companies (collectively, "Stewart") collect, use, and protect personal information, when and to whom we disclose such information, and the choices you have about the use and disclosure of your information. Pursuant to Title V of the Gramm-Leach Bliley Act ("GLBA") and other Federal and state laws and regulations applicable to financial institutions, consumers have the right to limit some, but not all sharing of their personal information. Please read this Notice carefully to understand how Stewart uses your personal information.

The types of personal information Stewart collects, and shares depends on the product or service you have requested.

Stewart may collect the following categories of personal and financial information from you throughout your transaction:

1. Identifiers: Real name, alias, online IP address if accessing company websites, email address, account name, unique online identifier, social security number, driver's license number, passport number, or other similar identifiers;
2. Demographic Information: Marital status, gender, date of birth.
3. Personal Information and Personal Financial Information: Name, signature, social security number, physical characteristics or description, address, telephone number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, credit reports, or any other information necessary to complete the transaction.

Stewart may collect personal information about you from:

1. Publicly available information from government records.
2. Information we receive directly from you or your agent(s), such as your lender or real estate broker;
3. Information about your transactions with Stewart, our affiliates, or others; and
4. Information we receive from consumer reporting agencies and/or governmental entities, either directly from these entities or through others.

Stewart may use your personal information for the following purposes:

1. To provide products and services to you or in connection with a transaction.
2. To improve our products and services.
3. To communicate with you about our, our affiliates', and others' products and services, jointly or independently.

Stewart may use or disclose the personal information we collect for one or more of the following purposes:

a. To fulfill or meet the reason for which the information is provided.
b. To provide, support, personalize, and develop our website, products, and services.
c. To create, maintain, customize, and secure your account with Stewart.
d. To process your requests, purchases, transactions, and payments and prevent transactional fraud.
e. To prevent and/or process claims.
f. To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
g. As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
h. To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
i. To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
j. To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
k. Auditing for compliance with federal and state laws, rules and regulations.
l. Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments.
m. To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal information or use the personal information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

<u>Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties</u>

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a non-affiliated third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter in a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

a. Non-affiliated service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
b. To enable Stewart to prevent criminal activity, fraud, material misrepresentation, or nondisclosure.
c. Stewart's affiliated and subsidiary companies.
d. Non-affiliated third-party service providers with whom we perform joint marketing, pursuant to an agreement with them to jointly market financial products or services to you.
e. Parties involved in litigation and attorneys, as required by law.
f. Financial rating organizations, rating bureaus and trade associations.
g. Federal and State Regulators, law enforcement and other government entities to law enforcement or authorities in connection with an investigation, or in response to a subpoena or court order.

The law does not require your prior authorization or consent and does not allow you to restrict the disclosures described above. Additionally, we may disclose your information to third parties for whom you have given us authorization or consent to make such disclosure. We do not otherwise share your Personal Information or Browsing Information with non-affiliated third parties, except as required or permitted by law.

Right to Limit Use of Your Personal Information

You have the right to opt-out of sharing of your personal information among our affiliates to directly market to you. To opt-out of sharing to our affiliates for direct marketing, you may send an "opt out" request to Privacyrequest@stewart.com, or contact us through other available methods provided under "Contact Information" in this Notice. We do not share your Personal Information with nonaffiliates for their use to direct market to you without your consent.

How Stewart Protects Your Personal Information

Stewart maintains physical, technical and administrative safeguards and policies to protect your personal information.

Contact Information

If you have questions or comments about this Notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under law, please do not hesitate to contact us at:

Phone: Toll Free at 1-866-571-9270

Email: Privacyrequest@stewart.com

Postal Address: Stewart Information Services Corporation
Attn: Mary Thomas, Chief Compliance and Regulatory Officer
1360 Post Oak Blvd., Ste. 100, MC #14-1
Houston, TX 77056

Effective Date: January 1, 2020
Updated: January 1, 2023

Privacy Notice at Collection for California Residents

Pursuant to the California Consumer Privacy Act of 2018 ("CCPA") and the California Privacy Rights Act of 2020, effective January 1, 2023 ("CPRA"), Stewart Information Services Corporation and its subsidiary companies (collectively, "Stewart") are providing this **Privacy Notice at Collection for California Residents** ("CCPA and CPRA Notice"). This CCPA and CPRA Notice supplements the information contained in Stewart's existing privacy notice and applies solely to all visitors, users, and consumers and others who reside in the State of California or are considered California Residents as defined in the CCPA and CPRA ("consumers" or "you"). All terms defined in the CCPA and CPRA have the same meaning when used in this Notice.

Personal and Sensitive Personal Information Stewart Collects

- Publicly available information from government records.
- Deidentified or aggregated consumer information.
- Certain personal information protected by other sector-specific federal or California laws, including but not limited to the Fair Credit Reporting Act (FCRA), Gramm Leach Bliley Act (GLBA) and California Financial Information Privacy Act (FIPA).

Specifically, Stewart has collected the following categories of **personal and sensitive personal information** from consumers within the last twelve (12) months:

Category	Examples	Collected
A. Identifiers	A real name, alias, postal address, unique personal identifier, online identifier, Internet Protocol address, email address, account name, Social Security number, driver's license number, passport number, or other similar identifiers.	YES
B. Personal information categories listed in the California Customer Records statute (Cal. Civ. Code § 1798.80(e)).	A name, signature, Social Security number, physical characteristics or description, address, telephone number, passport number, driver's license or state identification card number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, or any other financial information, medical information, or health insurance information. Some personal information included in this category may overlap with other categories.	YES
C. Protected classification characteristics under California or federal law.	Age (40 years or older), race, color, ancestry, national origin, citizenship, religion or creed, marital status, medical condition, physical or mental disability, sex (including gender, gender identity, gender expression, pregnancy or childbirth and related medical conditions), sexual orientation, veteran or military status, genetic information (including familial genetic information).	YES
D. Commercial information.	Records of personal property, products or services purchased, obtained, or considered, or other purchasing or consuming histories or tendencies.	YES
E. Biometric information.	Genetic, physiological, behavioral, and biological characteristics, or activity patterns used to extract a template or other identifier or identifying information, such as, fingerprints, faceprints, and voiceprints, iris or retina scans, keystroke, gait, or other physical patterns, and sleep, health, or exercise data.	YES
F. Internet or other similar network activity.	Browsing history, search history, information on a consumer's interaction with a website, application, or advertisement.	YES
G. Geolocation data.	Physical location or movements.	YES
H. Sensory data.	Audio, electronic, visual, thermal, olfactory, or similar information.	YES
I. Professional or employment related information.	Current or past job history or performance evaluations.	YES
J. Non-public education information (per the Family Educational Rights and Privacy Act(20 U.S.C. Section 1232g, 34 C.F.R. Part 99)).	Education records directly related to a student maintained by an educational institution or party acting on its behalf, such as grades, transcripts, class lists, student schedules, student identification codes, student financial information, or student disciplinary records.	YES
K. Inferences drawn from other personal information.	Profile reflecting a person's preferences, characteristics, psychological trends, predispositions, behavior, attitudes, intelligence, abilities, and aptitudes.	YES

Stewart obtains the categories of personal and sensitive information listed above from the following categories of sources:

- Directly and indirectly from customers, their designees, or their agents (For example, realtors, lenders, attorneys, brokers, etc.)
- Directly and indirectly from activity on Stewart's website or other applications.
- From third-parties that interact with Stewart in connection with the services we provide.

Use of Personal and Sensitive Personal Information

Stewart may use or disclose the personal or sensitive information we collect for one or more of the following purposes:

a. To fulfill or meet the reason for which the information is provided.
b. To provide, support, personalize, and develop our website, products, and services.
c. To create, maintain, customize, and secure your account with Stewart.
d. To process your requests, purchases, transactions, and payments and prevent transactional fraud.
e. To prevent and/or process claims.
f. To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
g. As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
h. To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
i. To personalize your website experience and to deliver content and product and service offerings relevant to your interests, including targeted offers and ads through our website, third-party sites, and via email or text message (with your consent, where required by law).
j. To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
k. To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
l. Auditing for compliance with federal and state laws, rules and regulations.
m. Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing advertising or marketing services or other similar services.
n. To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal or sensitive information or use the personal or sensitive information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter into a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

a. Service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
b. Affiliated Companies.
c. Parties involved in litigation and attorneys, as required by law.
d. Financial rating organizations, rating bureaus and trade associations.
e. Federal and State Regulators, law enforcement and other government entities

In the preceding twelve (12) months, Stewart has disclosed the following categories of personal information for a business purpose:

Category A: Identifiers
Category B: California Customer Records personal information categories
Category C: Protected classification characteristics under California or federal law
Category D: Commercial Information
Category E: Biometric Information
Category F: Internet or other similar network activity
Category G: Geolocation data
Category H: Sensory data
Category I: Professional or employment-related information
Category J: Non-public education information
Category K: Inferences

Your Consumer Rights and Choices Under CPPA and CPRA

Your Rights Under CCPA

The CCPA provides consumers (California residents as defined in the CCPA) with specific rights regarding their personal information. This section describes your CCPA rights and explains how to exercise those rights.

Access to Specific Information and Data Portability Rights

You have the right to request that Stewart disclose certain information to you about our collection and use of your personal information over the past 12 months. Once we receive and confirm your verifiable consumer request, Stewart will disclose to you:

- The categories of personal information Stewart collected about you.
- The categories of sources for the personal information Stewart collected about you.
- Stewart's business or commercial purpose for collecting that personal information.
- The categories of third parties with whom Stewart shares that personal information.
- The specific pieces of personal information Stewart collected about you (also called a data portability request).
- If Stewart disclosed your personal data for a business purpose, a listing identifying the personal information categories that each category of recipient obtained.

Deletion Request Rights

You have the right to request that Stewart delete any of your personal information we collected from you and retained, subject to certain exceptions. Once we receive and confirm your verifiable consumer request, Stewart will delete (and direct our service providers to delete) your personal information from our records, unless an exception applies.

Stewart may deny your deletion request if retaining the information is necessary for us or our service providers to:

1. Complete the transaction for which we collected the personal information, provide a good or service that you requested, take actions reasonably anticipated within the context of our ongoing business relationship with you, or otherwise perform our contract with you.

2. Detect security incidents, protect against malicious, deceptive, fraudulent, or illegal activity, or prosecute those responsible for such activities.

3. Debug products to identify and repair errors that impair existing intended functionality.

4. Exercise free speech, ensure the right of another consumer to exercise their free speech rights, or exercise another right provided for by law.

5. Comply with the California Electronic Communications Privacy Act (Cal. Penal Code § 1546 seq.).

6. Engage in public or peer-reviewed scientific, historical, or statistical research in the public interest that adheres to all other applicable ethics and privacy laws, when the information's deletion may likely render impossible or seriously impair the research's achievement, if you previously provided informed consent.

7. Enable solely internal uses that are reasonably aligned with consumer expectations based on your relationship with us.

8. Comply with a legal obligation.

9. Make other internal and lawful uses of that information that are compatible with the context in which you provided it.

Your Rights Under CPRA

CPRA expands upon your consumer rights and protections offered by the CCPA. This section describes your CPRA rights and explains how to exercise those rights.

Opt-Out of Information Sharing and Selling

Stewart does not share or sell information to third parties, as the terms are defined under the CCPA and CPRA. Stewart only shares your personal information as commercially necessary and in accordance with this CCPA and CPRA Notice.

Correction of Inaccurate Information

You have the right to request that Stewart correct any inaccurate information maintained about.

Limit the Use of Sensitive Personal Information

You have the right to limit how your sensitive personal information, as defined in the CCPA and CPRA is disclosed or shared with third parties.

Exercising Your Rights Under CCPA and CPRA

To exercise the access, data portability, deletion, opt-out, correction, or limitation rights described above, please submit a verifiable consumer request to us by the available means provided below:

1. Calling us Toll Free at 1-866-571-9270; or

2. Emailing us at Privacyrequest@stewart.com; or

3. Visiting http://stewart.com/ccpa.

Only you, or someone legally authorized to act on your behalf, may make a verifiable consumer request related to your personal information. You may also make a verifiable consumer request on behalf of your minor child, if applicable.

To designate an authorized agent, please contact Stewart through one of the methods mentioned above.

You may only make a verifiable consumer request for access or data portability twice within a 12-month period. The verifiable consumer request must:

- Provide sufficient information that allows us to reasonably verify you are the person about whom we collected personal information or an authorized representative.

- Describe your request with sufficient detail that allows us to properly understand, evaluate, and respond to it.

Stewart cannot respond to your request or provide you with personal information if we cannot verify your identity or authority to make the request and confirm the personal information relates to you.

Making a verifiable consumer request does not require you to create an account with Stewart.

Response Timing and Format

We endeavor to respond to a verifiable consumer request within forty-five (45) days of its receipt. If we require more time (up to an additional 45 days), we will inform you of the reason and extension period in writing.

A written response will be delivered by mail or electronically, at your option.

Any disclosures we provide will only cover the 12-month period preceding the verifiable consumer request's receipt. The response we provide will also explain the reasons we cannot comply with a request, if applicable. For data portability requests, we will select a format to provide your personal information that is readily useable and should allow you to transmit the information from one entity to another entity without hindrance.

Stewart does not charge a fee to process or respond to your verifiable consumer request unless it is excessive, repetitive, or manifestly unfounded. If we determine that the request warrants a fee, we will tell you why we made that decision and provide you with a cost estimate before completing your request.

Non-Discrimination

Stewart will not discriminate against you for exercising any of your CCPA and CPRA rights. Unless permitted by the CCPA or CPRA, we will not:

- Deny you goods or services.
- Charge you a different prices or rates for goods or services, including through granting discounts or other benefits, or imposing penalties.
- Provide you a different level or quality of goods or services.
- Suggest that you may receive a different price or rate for goods or services or a different level or quality of goods or services.

Record Retention

Your personal information will not be kept for longer than is necessary for the business purpose for which it is collected and processed. We will retain your personal information and records based on established record retention policies pursuant to California law and in compliance with all federal and state retention obligations. Additionally, we will retain your personal information to comply with applicable laws, regulations, and legal processes (such as responding to subpoenas or court orders), and to respond to legal claims, resolve disputes, and comply with legal or regulatory recordkeeping requirements

Changes to This CCPRA and CPRA Notice

Stewart reserves the right to amend this CCPA and CPRA Notice at our discretion and at any time. When we make changes to this CCPA and CPRA Notice, we will post the updated Notice on Stewart's website and update the Notice's effective date.

Link to Privacy Notice

Stewarts Privacy Notice can be found on our website at https://www.stewart.com/en/privacy.html.

Contact Information

If you have questions or comments about this notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under California law, please do not hesitate to contact us at:

Phone: Toll Free at 1-866-571-9270

Website: http://stewart.com/ccpa

Email: Privacyrequest@stewart.com

Postal Address: Stewart Information Services Corporation
Attn: Mary Thomas, Chief Compliance and Regulatory Officer
1360 Post Oak Blvd., Ste. 100, MC #14-1
Houston, TX 77056

Official Records of Morgan County, CO 890032
10/16/2014 02:24:55 PM Pgs: 1
R: 11.00 D: $ Clerk - Connie Ingmire

STATEMENT OF AUTHORITY

The undersigned, as trustees of the Terry L. Larsen Trust dated May 14, 2014 hereby issue this statement of authority pursuant to Colorado Revised Statutes §38-30-108.5 and §38-30-172.

1. The Terry L. Larsen Trust is a revocable living trust formed under the laws of the State of Colorado.

2. The trustees and mailing addresses for the trust are:

Terry L. Larsen 18712 County Road 26 Brush, CO 80723	Anna M. Larsen 18712 County Road 26 Brush, CO 80723

3. The acting trustee or trustees of the trust are the only persons authorized to execute instruments conveying, encumbering, or otherwise affecting title to real property on behalf of the trust. There are no limitations on the authority of the trustee or trustees of the trust concerning the manner in which the trust deals with any interest in real property.

Signed and dated this 14th day of May, 2014.

Terry L. Larsen - Trustee

Anna M. Larsen - Trustee

STATE OF COLORADO)
) ss
COUNTY OF Morgan)

Subscribed to and sworn before me by Terry L. Larsen and Anna M. Larsen, as trustees of the Terry L. Larsen Trust, on the 14 day of May, 2014.

Witness my hand and official seal.

BRIAN BUDMAN NOTARY PUBLIC STATE OF COLORADO

Notary Public

My Commission expires: Jan 7, 2015

Official Records of Morgan County, CO 890034
10/16/2014 02:24:55 PM Pgs: 1
R: 11.00 D: $ Clerk - Connie Ingmire

STATEMENT OF AUTHORITY

The undersigned, as trustees of the Anna M. Larsen Trust dated May 14, 2014 hereby issue this statement of authority pursuant to Colorado Revised Statutes §38-30-108.5 and §38-30-172.

1. The Anna M. Larsen Trust is a revocable living trust formed under the laws of the State of Colorado.

2. The trustees and mailing addresses for the trust are:

Anna M. Larsen 18712 County Road 26 Brush, CO 80723	Terry L. Larsen 18712 County Road 26 Brush, CO 80723

3. The acting trustee or trustees of the trust are the only persons authorized to execute instruments conveying, encumbering, or otherwise affecting title to real property on behalf of the trust. There are no limitations on the authority of the trustee or trustees of the trust concerning the manner in which the trust deals with any interest in real property.

Signed and dated this 14th day of May, 2014.

Anna M. Larsen
Anna M. Larsen - Trustee

Terry L. Larsen
Terry L. Larsen - Trustee

STATE OF COLORADO)
) ss
COUNTY OF Morgan)

Subscribed to and sworn before me by Anna M. Larsen and Terry L. Larsen, as trustees of the Anna M. Larsen Trust, on the 14 day of May, 2014.

Witness my hand and official seal.

BRIAN BUDMAN NOTARY PUBLIC STATE OF COLORADO

Notary Public

My Commission expires: Jan 7, 2015

STATEMENT OF AUTHORITY (FOR A TRUST OR CORPORATE ENTITY)

1. This Statement of Authority relates to an entity named: Pivot Solar 71 LLC.

2. The type of entity is a limited liability company. *(Trust, corporation, etc.).*

3. The entity is formed under the law of Delaware (*state*).

4. The mailing address for the entity is: 1601 Wewatta St #700, Denver, CO 80202.

5. The name and position of each person authorized to execute instruments conveying, encumbering, or otherwise affecting title to real property on behalf of the entity is:

Jonathan Fitzpatrick	Authorized Representative
Kyle Sundman	Authorized Representative
Thomas Hunt	Authorized Representative

This Statement of Authority is executed on behalf of the entity pursuant to the provisions of Colorado Revised Statute Section 38-30-172(2).

Executed this 17th day of July, 2024.

By: _____ Title: Authorized Representative

STATE OF Colorado)

) ss.

COUNTY OF Denver)

The foregoing instrument was acknowledged before me this 17th day of July, 2024 by Jonathan Fitzpatrick.

Witness my hand and official seal.

My Commission Expires: 10/10/2027.

BRADLEY THOMAS
NOTARY PUBLIC - STATE OF COLORADO
NOTARY ID 20234038396
MY COMMISSION EXPIRES OCT 10, 2027

_____
Notary Public

Official Records of Morgan County, CO 950864
04/18/2024 08:53:56 AM Page 1 of 3
Rec Fee: 23.00 State Documentary Fee:
Clerk: Kevin Strauch

STR: SEC33, T4N, R56	Grantor: The Anna M. Larsen Trust, Dated May 14, 2014 and the Terry L. Larsen Trust, Dated May 14, 2014	Doc No.: 534949
County: Morgan	Address/Intersection: 18712 County Road 26 Brush, CO 80723	Reception Number:
Division-City/Town: Brush	Dist./Tran.: Distribution	Surveyor: Monte L. Sudbeck
Division Agent: Lynette Muncy	Contract Agent/Co: HDR-N.Wysocki	Survey Company: SEH
LAT & LONG GPS	LAT: 40.3489456° N	LONG: 103.6966647° W

PUBLIC SERVICE COMPANY OF COLORADO EASEMENT

The undersigned Grantor hereby acknowledges receipt of good and valuable consideration from PUBLIC SERVICE COMPANY OF COLORADO (Company), 1800 Larimer Street, Suite 1100, Denver, CO 80202, in consideration of which Grantor(s) hereby grants unto said Company, its successors and assigns, a non-exclusive easement to construct, operate, maintain, repair, and replace utility lines and all fixtures and devices, used or useful in the operation of said lines, through, over, under, across, and along a course as said lines may be hereafter constructed in **A PARCEL OF LAND,** in the N1/2 SW1/4 of Section **33**, Township **4 North**, Range **56 West** of the Sixth Principal Meridian in the County of Morgan, State of Colorado, the easement being described as follows:

SEE " EXHIBIT A" ATTACHED HERETO AND MADE A PART HEREOF.

The easement is 10 feet in width.

Together with the right to enter upon said premises, to survey, construct, maintain, operate, repair, replace, control, and use said utility lines and related fixtures and devices, and to remove objects interfering therewith, including the trimming of trees and bushes, and together with the right to use so much of the adjoining premises of Grantor during surveying, construction, maintenance, repair, removal, or replacement of said utility lines and related fixtures and devices as may be required to permit the operation of standard utility construction or repair machinery. The Grantor reserves the right to use and occupy the easement for any purpose consistent with the rights and privileges above granted and which will not interfere with or endanger any of the said Company's facilities therein or use thereof. Such reservations by the Grantor shall in no event include the right to erect or cause to be erected any buildings or structures upon the easement granted or to locate any mobile home or trailer units thereon. In case of the permanent abandonment of the easement, all right, privilege, and interest granted shall terminate.

The work of installing and maintaining said lines and fixtures shall be done with care; the surface along the easement area and any adjoining premises used by Company shall be restored substantially to its original level and condition.

Signed this 7th day of February, ~~2023~~ 2024

GRANTOR: **The ~~Anna M.~~ Larsen Trust, Dated May 14, 2014 and the Terry L. Larsen Trust, Dated May 14, 2014**

BY: _____
Terry L. Larsen, Trustee

BY: Anna M. Larsen
Anna M. Larsen, Trustee

CHEYNA FELZIEN
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20144013934
MY COMMISSION EXPIRES 03/28/2026

STATE OF COLORADO,)
) §
COUNTY OF Morgan)

The foregoing instrument was acknowledged before me this 7th day of February, ~~2023~~ 2024 by Terry L. Larsen & Anna M. Larsen as Trustee of The Anna M. Larsen Trust, Dated May 14, 2014 the Terry L. Larsen Trust, Dated May 14, 2014.

Witness my hand and official seal.

My commission Expires 3/28/2026

_____
Notary Public

SEH

EXHIBIT A
PARCEL A

A 10 foot wide strip of land lying in the north one-half of the southwest one-quarter (N1/2 SW1/4) of Section 33, Township 4 North, Range 56 West, of the 6th Principal Meridian, County of Morgan, State of Colorado, being a portion of that Tract of land described in Reception Number 890035, Morgan County Records, lying 5 feet on each side of the following described line:

Beginning on the east line of County Road 26, from which the southwest corner of the north one-half of the southwest one-quarter (N1/2 SW1/4) of said Section 33, bears S02°10'58"W, 507.39 feet;

thence N88°47'35"E, 79.74 feet;
thence N03°20'23"W, 135.07 feet;
thence N76°04'11"E, 12.46 feet;
thence N19°51'30"E, 5.55 feet;
thence S89°56'42"E, 41.60 feet;
thence S86°56'21"E, 41.90 feet;
thence N22°49'20"E, 13.33 feet;
thence N86°55'59"E, 149.28 feet;
thence N89°07'20"E, 285.25 feet;
thence S88°41'49"E, 159.78 feet;
thence N56°25'34"E, 9.93 feet;
thence N88°05'46"E, 68.84 feet;
thence N53°52'56"E, 15.39 feet;
thence N88°18'51"E, 548.87 feet;
thence N30°56'40"E, 18.45 feet;
thence N01°56'04"W, 8.00 feet, to the Point of Terminus.

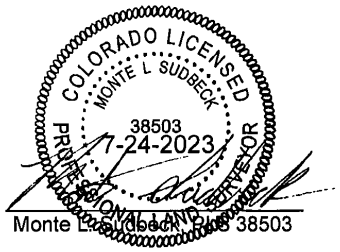
The sidelines of said 10 foot wide strip are to be lengthened or shortened to terminate on said east line.

Containing 15,934 square feet (0.366 acres) more or less.

All lineal distances shown hereon are in U.S. Survey Feet.

For the purposes of this description, bearings are based on the west line of the north one-half of the southwest one-quarter (N1/2 SW1/4), which is assumed to bear N01°12'25"W.

The author of this description is Monte L. Sudbeck, PLS 38503, prepared on behalf of SEH, 2000 S. Colorado Blvd, Suite 6000, Denver, CO 80222, on July 12, 2023, under Job No. 173893-13.0, for Public Service Company of Colorado, and is not to be construed as representing a monumented land survey.



Monte L. Sudbeck, PLS 38503

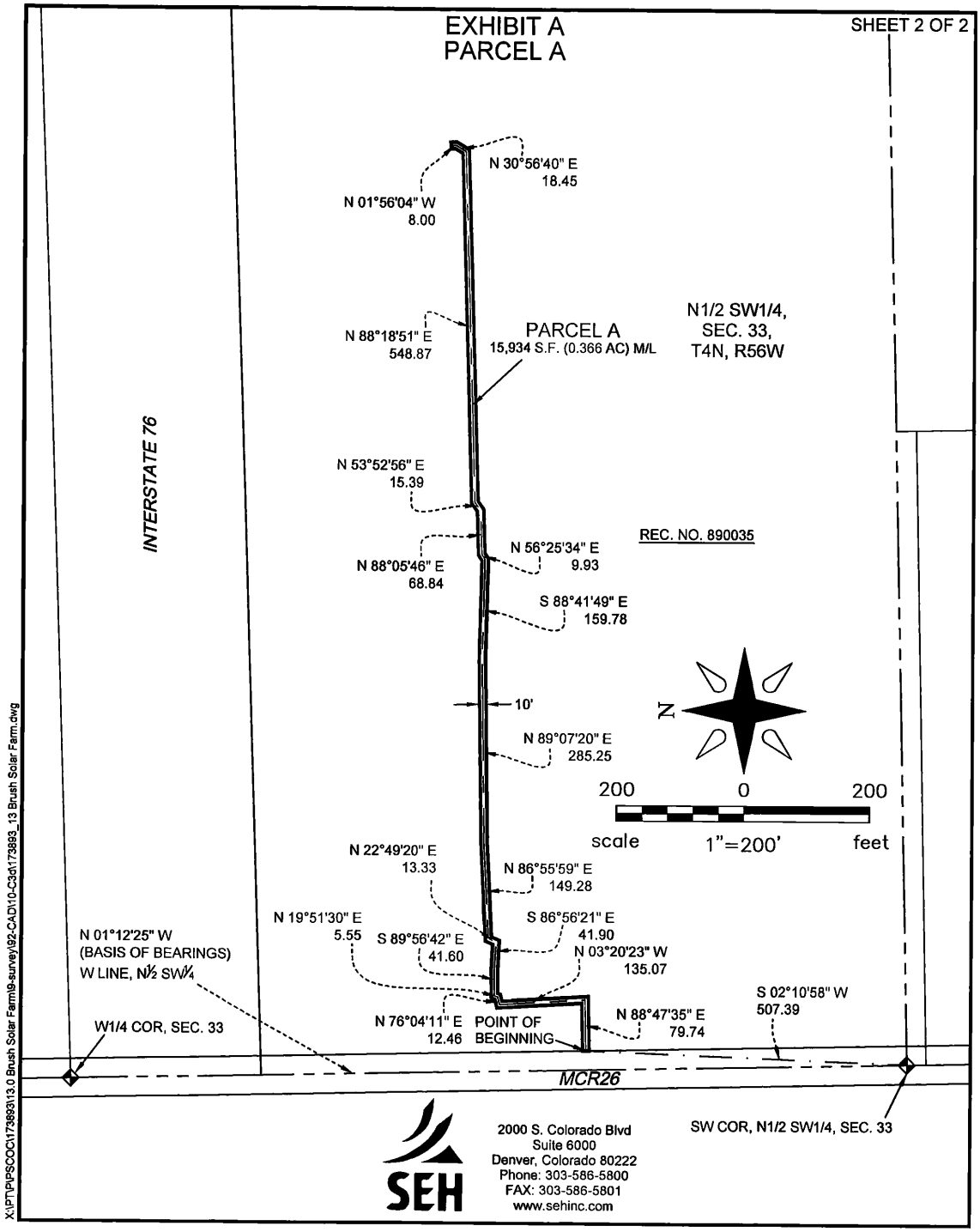


EXHIBIT A
PARCEL A
SHEET 2 OF 2
N 30°56'40" E
18.45
N 01°56'04" W
8.00
N 88°18'51" E
548.87
PARCEL A
15,934 S.F. (0.366 AC) M/L
N1/2 SW1/4,
SEC. 33,
T4N, R56W
INTERSTATE 76
N 53°52'56" E
15.39
REC. NO. 890035
N 56°25'34" E
9.93
N 88°05'46" E
68.84
S 88°41'49" E
159.78
10'
N 89°07'20" E
285.25
N
200
0
200
scale
1"=200'
feet
N 22°49'20" E
13.33
N 86°55'59" E
149.28
N 19°51'30" E
5.55
S 89°56'42" E
41.60
S 86°56'21" E
41.90
N 03°20'23" W
135.07
N 01°12'25" W
(BASIS OF BEARINGS)
W LINE, N½ SW¼
W1/4 COR, SEC. 33
N 76°04'11" E
12.46
POINT OF
BEGINNING
N 88°47'35" E
79.74
S 02°10'58" W
507.39
MCR26
SW COR, N1/2 SW1/4, SEC. 33
SEH
2000 S. Colorado Blvd
Suite 6000
Denver, Colorado 80222
Phone: 303-586-5800
FAX: 303-586-5801
www.sehinc.com
X:\PT\PUPSCOC\173893\13.0 Brush Solar Farm\9-survey\92-CAD\10-Cad\173893_13 Brush Solar Farm.dwg

STATE OF DELAWARE
CERTIFICATE OF FORMATION
OF LIMITED LIABILITY COMPANY

The undersigned authorized person, desiring to form a limited liability company pursuant to the Limited Liability Company Act of the State of Delaware, hereby certifies as follows:

1. The name of the limited liability company is Pivot Solar 71 LLC .

2. The Registered Office of the limited liability company in the State of Delaware is located at 108 w. 13th St Suite 100 (street), in the City of Wilmington , Zip Code 19801 . The name of the Registered Agent at such address upon whom process against this limited liability company may be served is Vcorp Agent Services, Inc. .

By: _____
Authorized Person

Name: Louis Minion
Print or Type

State of Delaware
Secretary of State
Division of Corporations
Delivered 01:19 PM 09/20/2023
FILED 01:19 PM 09/20/2023
SR 20233537840 - File Number 2384095

Official Records of Morgan County, CO 951804
06/18/2024 03:48:02 PM Page 1 of 6
Rec Fee: 38.00 State Documentary Fee:
Clerk: Kevin Strauch

Execution Version

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Pivot Energy Inc.
Attention: Title Department
1601 Wewatta Street, Suite 700
Denver, CO 80202

(Space above this line for Recorder's use only)

ASSIGNMENT AND ASSUMPTION AGREEMENT

This ASSIGNMENT OF SOLAR LEASE (this "**Assignment**") is made and entered on June 18, 2024 ("**Effective Date**"), by and between PIVOT ENERGY DEVELOPMENT LLC, a Colorado limited liability company, whose address is 1601 Wewatta Street, Suite 700, Denver, CO 80202 ("**Assignor**"), and PIVOT SOLAR 71 LLC, a Delaware limited liability company, whose address is 1601 Wewatta Street, Suite 700, Denver, CO 80202 ("**Assignee**") (Assignor and Assignee may jointly be referred to herein as the "**Parties**" and each a "**Party**").

RECITALS

WHEREAS, Assignor and The Terry L. Larsen Trust, Dated May 14, 2014 & The Anna M. Larsen Trust, Dated May 14, 2024 ("**Owner**") entered into that certain Solar Lease, dated as of August 3, 2023, as evidenced by that certain Memorandum of Lease, recorded as of August 4, 2023 as Instrument #947510 in the Morgan County, Colorado recorder's office (as amended, restated, supplemented or otherwise modified from time to time, the "**Agreement**"), whereby Assignor leased from Owner that certain piece of land more particularly described on Exhibit A attached hereto for the development, collection, conversion, generation, transmission and distribution of solar energy;

WHEREAS, Assignor wishes to assign all of its right, title, and interest in and to the Agreement to Assignee, and Assignee wishes to assume all of Assignor's right, title, and interest in and to the Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the mutual promises set forth in this Assignment and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree:

1. **Assignment.** As of the Effective Date, Assignor hereby assigns, conveys, grants, and transfers the Agreement to Assignee, including all of Assignor's right, title, and interest in, to and under the Agreement and any and all related rights and benefits arising under and pursuant to the Agreement.

2. **Assumption.** As of the Effective Date, Assignee hereby accepts the foregoing assignment and agrees to assume all of Assignor's right, title and interest in, to and under the Agreement, and

agrees to perform, abide by, and be bound by all of the duties and obligations of Assignor arising after the Effective Date under the Agreement.

3. **Sole Responsibility**. As of the Effective Date, Assignee shall be solely responsible to Owner for fulfillment of responsibilities under the Agreement and shall be the sole lessee under the Agreement.

4. **No Representations**. No representations or warranties are made regarding the Agreement pursuant to this Assignment.

5. **Miscellaneous.**

   a. Binding Effect. This Assignment shall be binding upon and inure to the benefit of each Party and its successors and assigns.

   b. Enforcement. If any portion of this Assignment shall be determined to be invalid or unenforceable, it shall be modified rather than voided, if possible, in order to carry out the intent of this Assignment. In any event, the remainder of this Assignment shall be valid and enforceable to the fullest extent possible.

   c. Entire Agreement. This Assignment embodies the entire understanding of the parties hereto and there are no other agreements or understandings written or oral in effect between the parties relating to the subject matter hereof unless expressly referred to by reference herein. This Assignment may be amended or modified only by a writing executed by the Parties.

   d. Counterparts. This Assignment may be executed in multiple counterparts, each of which shall constitute an original and all of which when taken together shall together constitute one and the same instrument.

   e. Governing Law. This Assignment shall be governed by and construed in accordance with the internal laws of the State in which the Property is located without giving effect to any choice or conflict of law provision or rule that would cause the application of laws of any jurisdiction other than those of the State in which the Property is located.

[SIGNATURE PAGES FOLLOW]

SIGNATURE PAGE TO
ASSIGNMENT AND ASSUMPTION AGREEMENT

IN WITNESS WHEREOF, the Parties have executed this Assignment as of the Effective Date.

ASSIGNOR:

PIVOT ENERGY DEVELOPMENT LLC,
a Colorado limited liability company

By: _____
Name: Jonathan Fitzpatrick
Its: Authorized Representative

STATE OF Colorado)
)ss.
COUNTY OF Denver)

On June 18 2024, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Jonathan Fitzpatrick personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the within instrument.

WITNESS my hand and official seal.

_____
Notary Public
Commission Expires: 10/10/2027

BRADLEY THOMAS
NOTARY PUBLIC - STATE OF COLORADO
NOTARY ID 20234038396
MY COMMISSION EXPIRES OCT 10, 2027

SIGNATURE PAGE TO
ASSIGNMENT AND ASSUMPTION AGREEMENT

IN WITNESS WHEREOF, the Parties have executed this Assignment as of the Effective Date.

ASSIGNEE:

PIVOT SOLAR 71 LLC,
a Delaware limited liability company

By: _____
Name: Jonathan Fitzpatrick
Its: Authorized Representative

STATE OF Colorado)
)ss.
COUNTY OF Denver)

On June 18 2024, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Jonathan Fitzpatrick personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the within instrument.

WITNESS my hand and official seal.

_____
Notary Public
Commission Expires: 10/10/2027

BRADLEY THOMAS
NOTARY PUBLIC - STATE OF COLORADO
NOTARY ID 20234038396
MY COMMISSION EXPIRES OCT 10, 2027

Execution Version

Exhibit A

Description of Leased Area

EXHIBIT A

DESCRIPTION OF THE LAND

OWNER'S LAND:

THAT CERTAIN REAL PROPERTY LOCATED IN MORGAN COUNTY, COLORADO, DESCRIBED AS:

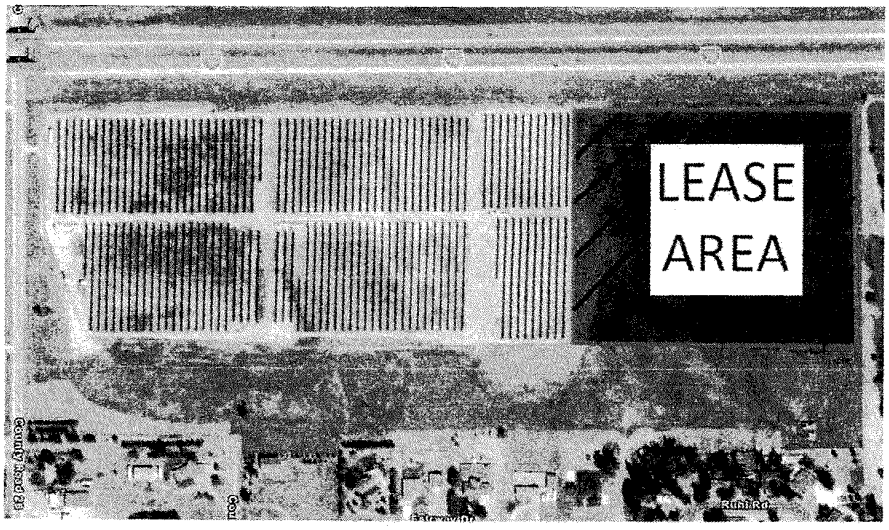
Parcel	Total Parcel Acreage
103733300001	63.24

For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890031.

For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890035.

LEASED AREA:

Total Acreage of Lease Area is fourteen (14) Acres.



Situs Address
Account Type 4000 - AG
Neighborhood
Tax Area 220 - RE 2J
Parcel Number 1037-333-00-001
Legal Summary S 33 T 4 R 56 N1/2SW1/4 EX HWY B717 P585
Sibling Acc. Number P017260

Owner Name LARSEN TERRY L & ANNA M TRUSTS
Owner Address 18712 CO RD 26
BRUSH CO 80723

Actual Value (2023) $1,910
Assessed $510
Tax Area: 220 Mill Levy 92.419000

Type	Actual	Assessed	Acres
Improvement	$250	$70	
Land	$1,660	$440	65.480

Official Records of Morgan County, CO 947510
08/04/2023 02:44:17 PM Page 1 of 8
Rec Fee: 48.00 State Documentary Fee:
Clerk: Kevin Strauch

EXHIBIT C

FORM OF
MEMORANDUM OF LEASE

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Pivot Energy Inc.
Attention: Title Department
1601 Wewatta St., Suite 700
Denver CO 80202

(Space above this line for Recorder's use only)

MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE is made and entered into as of August 3, 2023, by and between The Terry L. Larsen Trust, Dated May 14, 2014 & The Anna M. Larsen Trust, Dated May 14, 2014 whose residence/mailing address is 18712 County Road 26, Brush, CO 80723 ("**Owner**"), and Pivot Energy Development LLC, a Colorado limited liability company, whose address is 1601 Wewatta St., Suite 700, Denver CO 80202 ("**Company**") (Owner and Company the "Parties" and each a "Party"), and provides as follows:

This Memorandum of Lease provides notice of the Solar Lease Agreement dated August 3, 2023, (the "***Lease***") in which Company will construct, operate and maintain a solar facility (the "**Project**").

LESSOR/OWNER:	The Terry L. Larsen Trust, Dated May 14, 2014 & The Anna M. Larsen Trust, Dated May 14, 2014
LESSEE/COMPANY:	Pivot Energy Development LLC
DESCRIPTION OF PROPERTY:	Company is leasing a portion of the Owner's Land, as more particularly described in the attached Exhibit A ("**Leased Area**") as well as in and to any easements, rights-of-way, and other rights and benefits relating or appurtenant to the Land (collectively "**Property**"). The Lease also restricts certain uses of and grants certain interests in and to the Property. For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890031.

For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890035.

LEASE COMMENCEMENT DATE: as of August 3, 2023 (the "**Effective Date**").

TERM OF LEASE: The Term of the Lease consists of a Development Term and Operations Term.

The Development Term is five (5) years from the Effective Date.

The Operations Term starts on the earlier of: (a) Company's notice to Owner of the start of the Operations Term; (b) the date that is twelve (12) months after the date of the start of construction of the Project as set forth in a notice from Company to Owner; or, (c) the commercial operations date of the Project and continuing thereafter until the date that is twenty-one (21) years after this date subject to extensions as detailed below.

RIGHTS OF EXTENSION: Company has the option to extend the Operation Term of the Lease for two (2) additional and successive ten-year terms, as provided in the Lease.

NO FIXTURE: The Project, as defined in the Lease, installed and operated by Company at the Property shall not be deemed a fixture. The Project is Company's personal property and Owner has no right, title or interest in the Project. Further, Owner has waived all right of levy for rent, all claims and demands against the Project and all rights it may have to place a lien on the Project.

EASEMENTS:

Company has acquired the following Easements. The term of the Easements is co-extensive with the term of the Lease. The Easements are more particularly described in Exhibit B attached hereto.

(i) A non-exclusive right of pedestrian, vehicular and equipment access to the Project across the Land or through Owner's remaining property at all times, which is necessary or convenient for ingress and egress to the Project;

(ii) an exclusive right on Owner's Land and Owner's adjacent property to construct, operate, maintain, reconstruct, relocate, remove, and/or repair the electric utility service infrastructure and associated wires, lines and poles and other infrastructure necessary and

convenient to interconnect the Project to the Utility electrical distribution system, the location of which the Utility will determine before the Commercial Operations Date;

(iii) a negative solar easement, upon which Owner shall not construct buildings or structures, or plant new trees or vegetation of any type, or allow any trees or other vegetation on the Property which now or hereafter, in Company's reasonable opinion, may be a hazard to the Project, overshadow or otherwise block or interfere with sunlight access to the Project and/or interfere with Company's exercise of its rights hereunder (the "**Solar Easement**"). Company may (but shall not be obligated to) remove, at Owner's cost, any vegetation, buildings or other structures which violate this easement. Notwithstanding anything herein to the contrary, Owner shall reimburse Company for removal costs as an abatement of Rent. The Solar Easement is measured at angles of three hundred sixty (360) degrees horizontally and three hundred sixty (360) degrees vertically from the boundaries of the Land; and

(iv) a non-exclusive easement to be located at a mutually acceptable location on the Land for temporary (A) storage and staging of tools, materials and equipment, (B) construction laydown, (C) parking of construction crew vehicles and temporary construction trailers, and (D) placement and use of other facilities reasonably necessary to construct, erect, install, expand, modify or remove the Project.

All Easements shall burden the Property and shall run with the land for the benefit of Company, its successors and assigns (including any permitted assignees of Company's rights under the Lease), and their respective agents, contractors, subcontractors and licensees.

The Parties have executed and recorded this Memorandum of Lease for the purpose of giving record notice of the Lease, of the exclusive easements, leases, and rights it grants, and of certain restrictions it imposes. The Agreement runs with the Property and includes a quiet enjoyment clause. All of the conditions, covenants, and terms regarding the Lease are more particularly set forth in the Lease, which is incorporated by this reference. In the event of any conflict between the conditions and terms set forth in this Memorandum of Lease and the conditions and terms set forth in the Lease, the conditions and terms of the Lease will control and govern.

SIGNATURE PAGES FOLLOW

OWNER SIGNATURE PAGE TO
MEMORANDUM OF LEASE

IN WITNESS WHEREOF, the Parties have executed this MEMORANDUM OF LEASE as of the date set forth above.

OWNER

The Terry L. Larsen Trust, Dated May 14, 2014

By: _____
Name: Terry L. Larsen
Title: Authorized Representative

STATE OF Colorado)
)ss.
COUNTY OF Morgan)

On August 3 2023, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Terry L. Larsen personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the within instrument.

WITNESS my hand and official seal.

_____
Notary Public
Commission Expires:

Diego Lopez-Duran
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20214042224
MY COMMISSION EXPIRES October 27, 2025

OWNER SIGNATURE PAGE TO
MEMORANDUM OF LEASE

IN WITNESS WHEREOF, the Parties have executed this MEMORANDUM OF LEASE as of the date set forth above.

OWNER

The Anna M. Larsen Trust, Dated May 14, 2014

By: Anna M Larsen
Name: Anna M Larsen
Title: Authorized Representative

STATE OF Colorado)
)ss.
COUNTY OF Morgan)

On August 3 2023, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Anna M Larsen personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the within instrument.

WITNESS my hand and official seal.

Diego Lopez-Duran
Notary Public
Commission Expires:

Diego Lopez-Duran
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20214042224
MY COMMISSION EXPIRES October 27, 2025

COMPANY SIGNATURE PAGE TO
MEMORANDUM OF LEASE

IN WITNESS WHEREOF, the Parties have executed this MEMORANDUM OF LEASE as of the date set forth above.

COMPANY

Pivot Energy Development LLC

By: _____
Name: Jonathan Fitzpatrick
Title: Authorized Representative

ACKNOWLEDGEMENT

STATE OF COLORADO)
)ss.
COUNTY OF DENVER)

On August 1, 2023, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Jonathan Fitzpatrick, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the within instrument.

WITNESS my hand and official seal.

_____
Notary Public
Commission Expires:

Diego Lopez-Duran
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20214042224
MY COMMISSION EXPIRES October 27, 2025

EXHIBIT A TO
MEMORANDUM OF LEASE

DESCRIPTION OF THE LAND

OWNER'S LAND:

THAT CERTAIN REAL PROPERTY LOCATED IN MORGAN COUNTY, COLORADO, DESCRIBED AS:

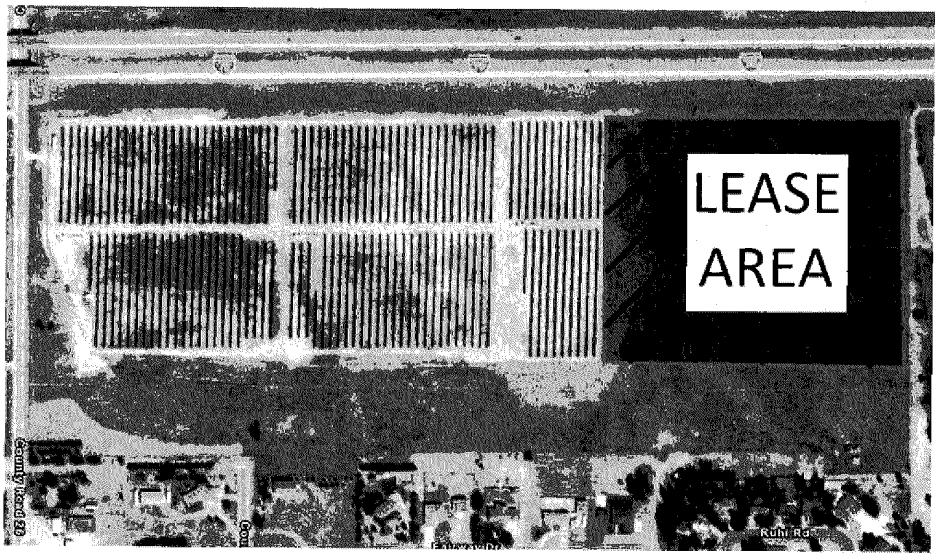
Parcel	Total Parcel Acreage
103733300001	63.24

For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890031.

For Owner's title to the Land, reference is herein made to a deed dated May 14, 2014, and recorded at the Morgan County Registry of Deeds at Reception Number: 890035.

LEASED AREA:

Total Acreage of Lease Area is fourteen (14) Acres.



Situs Address
Account Type 4000 - AG
Neighborhood
Tax Area 220 - RE 2J
Parcel Number 1037-333-00-001
Legal Summary S 33 T 4 R 56 N1/2SW1/4 EX HWY B717 P585
Sibling Acc. Number P017260

Owner Name LARSEN, TERRY L & ANNA M TRUSTS
Owner Address 18712 CO RD 26
BRUSH, CO 80723

Actual Value (2023) $1,910
Assessed $510
Tax Area: 220 **Mill Levy** 92.419000

Type	Actual	Assessed	Acres
Improvement	$250	$70	
Land	$1,660	$440	65.480

EXHIBIT B TO
MEMORANDUM OF LEASE

DESCRIPTION OF THE EASEMENTS

EASEMENTS:

[Insert Legal Description]

ZEREN
LAND SERVICES
OIL AND GAS TITLE

P.O. Box 336337
Greeley, CO 80633-0606

Phone (970) 351-0733
Fax (970) 351-0867

LIST OF MINERAL OWNERS AND MINERAL LESSEES for NOTIFICATION
(Terry L. Larsen Trust and Anna M. Larsen Trust Property)

Subject Property:

Township 4 North, Range 56 West, 6th P.M., Morgan County, CO (PS71)
Section 33: N½SW¼, EXCEPT that parcel conveyed to The Department of Highways, Sate of Colorado, recorded in Book 589 at Page 499

Zeren Land Services, an oil and gas title research company, states that to the best of its knowledge the following is a true and accurate list of the names and addresses of the mineral owners and mineral leasehold owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, et seq. in the Subject Property based upon the records of the Morgan County Assessor and Clerk Recorder as of December 27, 2023 at 7:45 a.m.:

Mineral Owners:

None (entitled to notice)

Mineral Leasehold Owners:

None (entitled to notice)

Dated this 28th day of December, 2023.

ZEREN LAND SERVICES

By: Cynthia A. E. Zeren, CPL
Certified Professional Landman #4044

At the request of **Pivot Energy** ("Client"), Zeren Land Services, an independent land consulting firm, has prepared the foregoing list of mineral estate owners entitled to notice under the Surface Development Notification Act, Colorado Revised Statutes §24-65.5-101, et seq.

Zeren Land Services, searched (i) the records of the Morgan County Assessor relating to the Subject Property for persons identified therein as mineral estate owners, and (ii) the records of the Morgan County Clerk and Recorder relating to the Subject Property for recorded requests for notification in the form specified in the Surface Development Notification Act. The results of these searches are set forth above in this List of Mineral Owners Entitled to Notice. At the date of the search, the records of the Assessor and the Clerk and Recorder were posted through December 27, 2023 at 7:45 A.M.

Zeren Land Services, agreed to prepare this listing for the Client only if the Client agreed that the liability of Zeren Land Services, would be strictly limited to the amount paid by the Client for such services. Zeren Land Services, makes no warranty, express, implied or statutory, in connection with the accuracy, completeness or sufficiency of such listing of mineral estate owners. In the event the listing proves to be inaccurate, incomplete, insufficient or otherwise defective in any way whatsoever or for any reason whatsoever, **the liability of Zeren Land Services, shall never exceed the actual amount paid by Client to Zeren Land Services**, for the listing.

In order to induce Zeren Land Services, to provide such services, **Client further agreed to indemnify and hold Zeren Land Services, its managers, members and employees, harmless from and against all claims by all persons (including, but not limited to Client) of whatever kind or character arising out of the preparation and use of each such listing of mineral estate owners, to the extent that such claims exceed the actual amount paid to Client by Zeren Land Services, for such listing.** Client specifically intends that both the foregoing limitation on liability and foregoing indemnification shall be binding and effective without regard to the cause of the claim, inaccuracy or defect, including, but not limited to, breach of representation, warranty or duty, any theory of tort or of breach of contract, or the fault or negligence of any party (including Zeren Land Services) of any kind or character (regardless of whether the fault or negligence is sole, joint, concurrent, simple or gross). **Client's use of this listing evidences Client's acceptance of, and agreement with, this limitation on liability and the indemnification.**

ZEREN LAND SERVICES

Date: December 28, 2023

By: _____
Cynthia A. E. Zeren, as President

Morgan County Treasurer
Statement of Taxes Due

Account Number R015243
Parcel 103733300001

Assessed To
LARSEN, TERRY L & ANNA M TRUSTS
18712 CO RD 26
BRUSH, CO 80723

Legal Description
S: 33 T: 4 R: 56 N1/2SW1/4 EX HWY B717 P585

Situs Address

Year	Tax	Interest	Fees	Payments	Balance
Tax Charge					
2023	$47.00	$0.00	$0.00	($47.00)	$0.00
Total Tax Charge					$0.00
Grand Total Due as of 05/02/2024					**$0.00**

Tax Billed at 2023 Rates for Tax Area 220 - 220 - RE 2J

Authority	Mill Levy	Amount
COUNTY GENERAL FUND	19.5530000	$9.98
ROAD AND BRIDGE FUND	7.5000000	$3.82
SOCIAL SERVICES FUND	2.0000000	$1.02
BRUSH RURAL FIRE DIST	3.3790000*	$1.72
E MORGAN COUNTY HOSPITAL	4.5000000	$2.29
E MORGAN COUNTY LIBRARY	3.5000000	$1.78
LOWER S PLATTE WATER CD	0.9770000*	$0.50
MORGAN CO QUALITY WATER	0.8240000	$0.42
NORTHERN COLO WATER CD	1.0000000	$0.51
RE 2-J BRUSH GENERAL FD	27.0000000	$13.77
RE 2-J BRUSH M/L OVRD	9.1930000	$4.69
RE 2-J BRUSH BOND RED	12.7470000	$6.50
Taxes Billed 2023	92.1730000	$47.00

* Credit Levy

Values	Actual	Assessed
GRAZING LAND	$1,660	$440
FARM/RANCH SUPPORT IMPS	$250	$70
Total	$1,910	$510

**********TAX LIEN SALE REDEMPTIONS MUST BE PAID BY CASH OR CASHIER'S CHECK**********

Special taxing districts and the boundaries of such districts may be on file with the County Commissioners, County Clerk, or County Assessor. Unless specifically mentioned, this statement does not include land or improvements assessed under a separate account number, personal property taxes, transfer tax or miscellaneous tax collected on behalf of other entities, special or local improvement district assessments, or manufactured homes.

ROBERT A SAGEL, MORGAN COUNTY TREASURER
231 Ensign St, PO Box 593, Fort Morgan, CO 80701
Phone: 970-542-3518, Email: esale@co.morgan.co.us
Website: morgancounty.colorado.gov

1800 Larimer Street
Denver, CO 80202

June 10, 2024

Pivot Energy
1601 Wewatta St., Suite #700
Denver, CO 80202

To Whom it May Concern:

The Solar Application Identification (ID), Solar*Rewards Off-Site Producer/Application Operator: Account Name, Application Name, and Awarded Nameplate Capacity for the project referenced in this letter are summarized in the table below. As of the date of this communication, Xcel Energy confirms that each project and Producer listed in the table is currently in good standing with program rules and will be entitled to interconnect under the terms of the Producer Agreement and Xcel Energy's interconnection processes and standards and pursuant to the form of interconnection agreement provided to the Producer listed below. The due date for reaching substantial completion for each project listed is listed in the table below with further extensions available on a project by project basis. The Application Deposit required to be made by the Producer for the project listed below has been made.

We hope these clarifications are helpful in confirming the status of the project.

Application ID	Producer / Application Operator: Account Name	Project Name	Name Plate Capacity (kW DC)	Substantial Completion Deadline	County
05586774	Pivot Solar 71 LLC	Pivot Solar 71	2,452.5	18 months from Interconnection Agreement execution	Morgan

Thank you,

The Solar*Rewards CO Team
Xcel Energy
Interconnection Application Team | Choice and Renewable Programs
1800 Larimer St. Denver, CO 80202
E: [redacted]

LAMP
RYNEARSON

4715 Innovation Dr., Ste. 100
Fort Collins, CO 80525
[redacted]
[F] 970.226.0879
LampRynearson.com

June 17, 2024

Ms. Nicole Hay
Morgan County Planning-Zoning and Building Department
231 Ensign
P.O. Box 596
Fort Morgan, Colorado 80701

RE: Traffic Impact Memo
Conditional Use Review - Pivot Energy Solar Array Morgan PS71/Larsen Trust (Phase 4)
Morgan County, County Road 26 near Brush Colorado

Dear Nicole,

On behalf of Pivot Energy, we would like to convey our appreciation for taking the time and effort to review the provided Traffic Memo and consider this project for approval. This traffic memo will provide the necessary information for staff to understand the traffic impact of the Pivot Energy Solar Array Morgan PS71/Larsen Trust (Phase 4) on the surrounding area and community.

Site Location

The property is located south of HWY 76, west of County Road 26, and east of Hospital Road. The site comprises approximately 11.3 acres of leased land zoned Rural Residential (RR). The proposed development is a portion of Parcel #10373330001 located in the N ½ of the SW ¼ portion of Section 33, Township 4 North, Range 56 West of the 6th P.M., Morgan County, Colorado.

The facility is proposed as a photovoltaic solar facility that will generate electrical power. The land will be leased and the facility will be owned and operated by Pivot Energy.

Site access will be full movement access from County Road 26, which is a two-lane gravel road. Site access to the proposed development is approximately 725 feet south of the I-76 interchange.

The site will consist of a 2MWDC photovoltaic community solar facility and will generally include a tracker system with panels mounted to a torque tube, H-piles driven into the ground, or similar; It is anticipated that the inverters will sit on a concrete pad or skid mounted, an access drive with an emergency turnaround, and perimeter security fencing with an access gate. The proposed fence shall be 8' tall game fence with wood posts.

During Construction *(0 to 3 months)*

During construction, it is anticipated that traffic will generally include semi-trucks and trailers (WB-50) along with light-duty pickup trucks. During the construction phase, the following trip ends are estimated:

- Semi-trucks: 10 trip ends per day
  - 5 deliveries @ 2 trip ends per day
- Employee and sub-contractor vehicles: 20 trip ends per day at peak construction.
  - 5 vehicles @ 4 trip ends per day

Peak trip traffic will be in the AM and PM where delivery trips are expected to occur throughout the day.

Post Construction ***(3 months to 25+ years)***
The facility is designed for unmanned operation. Once in commercial operation, it is anticipated the site will only require quarterly inspections and periodic maintenance, as needed. Site visits are expected to be during scheduled daylight hours. Vehicles accessing the site will generally be light-duty pickup trucks. Once the site is constructed, traffic generated by this site will not have a noticeable increase in traffic to County Road 26 or to the surrounding area.

- Light duty pickup trucks: ±16 trip ends per year
  - 4 quarterly visits for inspections
  - 4 maintenance trips

The majority of traffic generated as a result of solar facility installation will occur during the approx. 3-month installation period. This traffic will generally be site workers' vehicles and construction material deliveries.

Construction hours shall be 7:00 am to 7:00 pm, or daylight hours (whichever is more restrictive), Monday through Friday, unless otherwise approved by Morgan County. Night work is not anticipated.

Traffic Distribution*:*
The designated access/haul route is I-76 east to County Road 24; County Road 24 south to County Road S; County Road S east to County Road 26; and County Road 26 north to the Project Site. Access from County Road 26 to the Project site will be by a new proposed driveway cut. See Exhibit 1 for a depiction of the access/haul route to the project site.

The following is a description of roadways along the haul route.

- **Interstate 76 (I-76)** – In the vicinity of the Project site is a divided 4-lane asphalt-paved highway with on and off-ramps. It is anticipated the speed limit is 65 to 75 mph. It's anticipated that 100% of material deliveries will be from I-76.

- **County Road 24** – This segment of County Road 24 is a 2-lane, paved surface with roadside drainage ditches. The posted speed limit is 55 mph.

- **County Road S** – The western stretch of County Road S is a 2-lane, gravel-surfaced road with roadside drainage ditches. The eastern stretch of County Road S is a 2-lane, paved surface road with roadside drainage ditches. It is anticipated the speed limit is 25 to 35 mph.

- **County Road 26** – This segment of County Road 26 is a 2-lane, gravel-surfaced road with roadside drainage ditches. It is anticipated the speed limit is 25 to 35 mph.

Conclusion
1. Site preparation and solar facility installation are anticipated to begin in 2024 and improvements completed in 2025.
2. The construction phase including site preparation, material delivery, and assembly will have the greatest impact on traffic. This increased traffic is only expected to occur over an approximately 3-month period. Once the facility is constructed only quarterly site visits are anticipated.
3. Traffic is not anticipated to negatively affect the local AM or PM peak traffic periods.

4. A Morgan County Road and Bridge access permit will be obtained for the new driveway access for this development.
5. It is not anticipated that maintenance and periodic site visits will cause any negative impact to the surrounding streets or the community.

Please contact Troy Spraker P.E. [redacted] if you have any questions or require additional information and we look forward to working with County staff to complete a successful solar project.

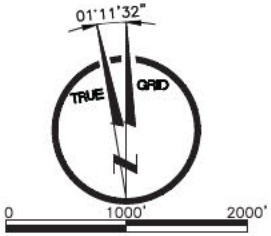
Sincerely,
LAMP RYNEARSON

Prepared by:

Andrea McDaniel, EIT

Reviewed by:

Troy Spraker, PE
Lic# 38538
Senior Project Manager



LEGEND

HAUL ROUTE

PROPOSED SITE

LAMP RYNEARSON

OMAHA, NEBRASKA
NE NUTH NO. CA0132

FORT COLLINS, COLORADO

KANSAS CITY, MISSOURI

LAMPRYNEARSON.COM

1

DESIGNER / DRAFTER	MWB
REVIEWER	TROY SPRAKER
PROJECT NUMBER	0224003.01
DATE	06/13/2024
SURFACE LOCATION	
BOOK AND PAGE	

HAUL ROUTE EXHIBIT

MORGAN COUNTY
Where Prairie Meets The Sky

Road & Bridge Department

8/13/2024

Pivot Energy LLC
ATTN: Bradley Thomas
1601 Wewatta St # 700
Denver, CO, 80202

RE: Driveway Access Permit Application, dated 08/09/2024
Larsen, Terry L. & Anna M. Trusts

To whom it may concern:

Morgan County Road and Bridge Department has reviewed the Application for Driveway Access submitted by Pivot Solar 71 LLC c/o Pivot Energy Inc. related to a special use permit application. The Department has determined that access from Morgan County Road 26 onto property known by Parcel Number 1037-333-00-001 is possible. However, Morgan County Road and Bridge will not issue the actual Driveway Access Permit until such time as that Pivot Solar 71 LLC c/o Pivot Energy Inc. receives an approval of its special use application from the Board of Morgan County Commissioners and will be issued in accordance with that decision.

Best Regards

Bruce Bass
Public Works Director
Morgan County Government

Pivot Solar 71 LLC – Responses to County Comments
7/19/2024

1. page 5 of the application is missing the date after the applicant's signature.
Applicant response: the signature date has been added.

2. #3 of the Project Narrative states that the proposed project will generate energy over its leased term which is expected to last 35 to 40 years but the Decommissioning plan mentions the useful life of the project is 20 years. Applicant response: the decommissioning plan notes that the facility's life is "at least 20 years." The project narrative section stating “between 35 and 40 years” has been corrected to “between 31 and 41 years” to more accurately reflect the terms of the lease agreement, but the phrase “at least 20 years” has been left in the decommissioning plan, as this remains true. The lease is structured as a 21-year term with two optional 10-year extensions for a total of up to 40 years.

3. #5 mentions that their is a contract for a geotechnical study but we will need a preliminary geotechnical report as soon as possible. Applicant response: the geotechnical study is expected to be ready on 7/23/24, and it will be sent to the county as soon as it is available. In the meantime, a soils report has been provided as has been done for past projects.

4. We are requesting a copy of the letter that was sent out to abutters of the property as mentioned in #6 of the Project Narrative. Applicant response: a copy of the letter has been included in the resubmission folder.

5. #6 of the Project Narrative towards the end of the statement has the word construction misspelled, it is spelled constriction. Applicant response: this has been corrected.

6. The first map is labeled Conditional Use Review and should actually be Special Use Review. Applicant response: this has been corrected.

7. #10 of the Project Narrative shows discussion of utilizing existing ROW access. It appears on the site maps that the "Primary Access" will be on southwest portion of the parcel, whereas the existing access to the current solar farm is on the northwest portion of the parcel. Also, a "Secondary Access" is shown on page 5 of 8 in the site maps. This "Secondary Access" is on Hattie Street through the Bunker Hill subdivision. We are not finding this mentioned in the application. The Bunker Hill Estates Subdivision is in the City of Brush's Municipal Boundary and would need approval through them and a copy sent to our office. The "Primary Access" on CO RD 26 will need approval through Morgan

County Road and Bridge and a copy sent to our office. Applicant response: Pivot will work with both Morgan County Road and Bridge and the City of Brush to determine the most appropriate access point during the land use permit process.

8. We need Trust documents or Statements of Authority for the Terry L. Larsen Trust and the Anna M. Larsen Trust. Applicant response: both statements of authority have been included in the resubmission folder. Terry Larsen is listed as a trustee of both Trusts and has been granted signatory authority.

9. We need Statement of Authority for Pivot 71. Applicant response: this has been included in the resubmission folder.

10. We need a copy of the recorded easement document #950864 dated 4/18/24. Applicant response: this has been included in the resubmission folder.

11. We need a copy of the Certificate of Formation of Limited Liability Company. Applicant response: this has been included in the resubmission folder.

12. We need a copy of the current lease #951804. Applicant response: Rec. #951804 is the assignment of the lease agreement to Pivot Solar 71 LLC. This has been included in the resubmission folder (file 12a) along with Rec. #947510, which is the lease itself (file 12b).