Boulder County

Community Planning & Permitting

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BOULDER COUNTY
PLANNING COMMISSION
PUBLIC HEARING

July 19, 2023 at 1:30 p.m.

Boulder County Courthouse, 3rd Floor,
1325 Pearl Street, Boulder
Virtual and in-person

STAFF RECOMMENDATION

STAFF PLANNER: Pete L'Orange, Planner II

Docket SU-23-0005: Harvest Moon Solar Energy Facility

Request:	Special Review to construct an approximately 10.3-acre Solar Energy facility on an approximately 35.5-acre parcel at 9770 Isabelle Road.
Location:	9770 Isabelle Road, approximately 0.4-mile east of the intersection of N. 95th Street and Isabelle Road in Section 21, Township 1N, Range 69W.
Zoning:	Agricultural (A)
Applicants/Owner:	LK Living Trust LLC
Consultant:	Cloudbreak Energy Partners, LLC
Agent:	Zach Brammer, Cloudbreak Energy Partners, LLC

July 12, 2023

PACKET CONTENTS

SUMMARY

The subject application is for a Special Review and Site-Specific Development Plan to construct a solar energy facility with an approximate 10.3-acre area of disturbance on a 35.5-acre property within the Agricultural (A) Zoning District. With the recommended conditions of approval, staff finds the proposal can meet the Special Review Criteria in Article 4-601 of the Boulder County Land Use Code (the Code) and recommends conditional approval to the Planning Commission.

DISCUSSION

The subject property is an approximately 35.5-acre unsubdivided parcel which has been determined to be a legal building lot; the subject parcel is located on the south side of Isabelle Road,

approximately 0.4 miles east of the intersection of N.95th Street and Isabelle Road (see Figure 1 below). It is currently developed with a single-family residence and several agricultural structures, including an approved Agricultural Worker Accessory Dwelling Unit. In addition to the residential and agricultural structures on the subject parcel, there is also an approved telecommunications facility (e.g., cell phone tower) and associated equipment structures (SU-02-0001). The existing structures are generally clustered roughly in the middle of the subject parcel, with the telecommunication facility structures are on the western edge of the parcel (see Figure 2 below).

Figure 1: Aerial photograph of subject parcel

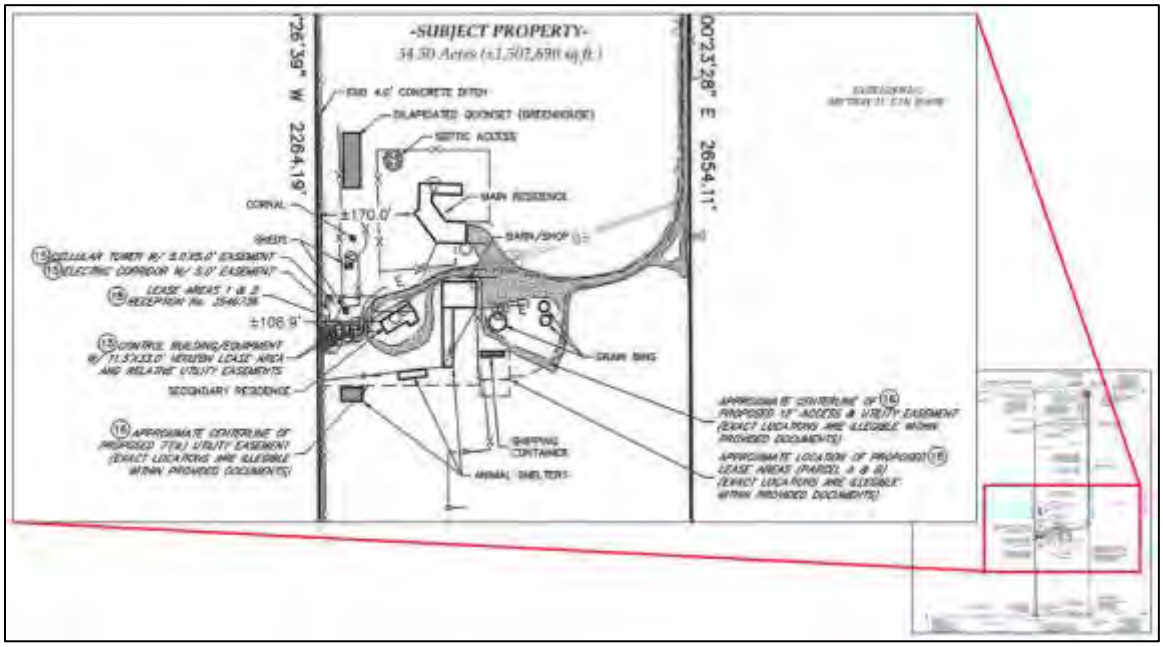

Figure 2. 2017 survey of subject parcel with detail showing existing structures.

The applicants propose to install a solar energy facility on the norther portion of the subject parcel, encompassing an area of disturbance approximately 10.3 acres in size (see Figure 3 below). For the purposes of staff review, the proposal has been addressed under Art. 4-514.M of the Code (which regulates Ground-Mounted Solar Energy Systems). The project is categorized as a Ground-Mounted Solar Energy System because the panels will be mounted on racking or poles that are attached to the ground and are not mounted to parking canopies as defined in Article 4-514.M.1.

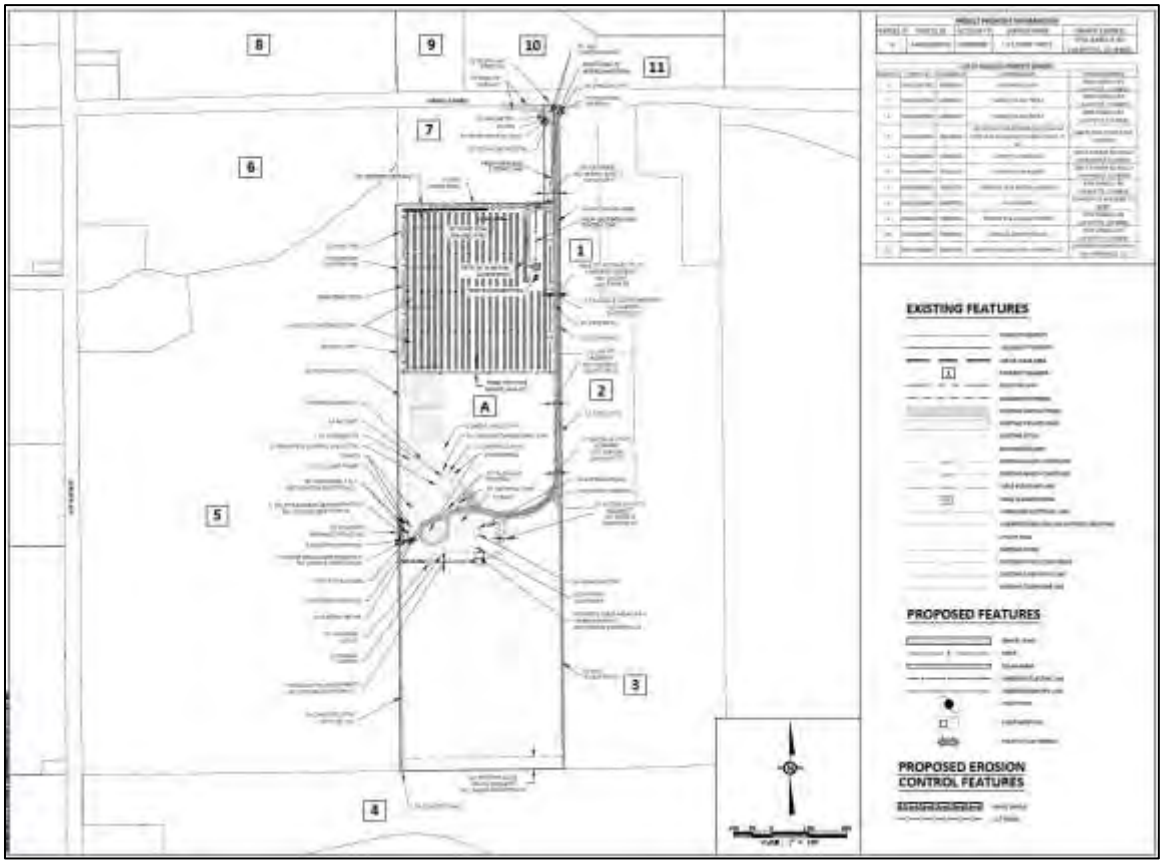

Figure 3. Proposed site plan submitted by the applicants.

The proposed project would include the installation of approximately 78 solar arrays, with multiple solar panels per array, arranged in rows running north/south (see Figure 4 below). The mounting posts would be spaced at 24 feet, 3.5 inch intervals. The rows would be spaced approximately 20 feet apart. The proposed panels would tilt to track the movement of the sun. The edge of proposed panels would be approximately 10 feet, 11 inches above grade when at the steepest pitch; when parallel to the ground, the panels would be approximately 5 feet, 2.5 inches above grade (see Figure 5 below). In addition to the proposed solar arrays, the applicants have proposed to construct a new access drive to the solar facility off of the existing access driveway from Isabelle Road to the existing development on the subject parcel (as shown in Figure 4 below). The solar facility would be surrounded with fencing; the applicants have proposed vegetative screening for a portion of the northern boundary of the project area (see Figure 6 below). Per the application materials submitted, the solar energy facility would be connected to the existing Xcel Energy infrastructure by overhead utility lines running from the project area to Xcel lines along the public right-of-way on Isabelle Road. The project is expected to sunset after 25-35 years, with the site to be remediated back to useful agricultural lands at the end of the useful life of the array.

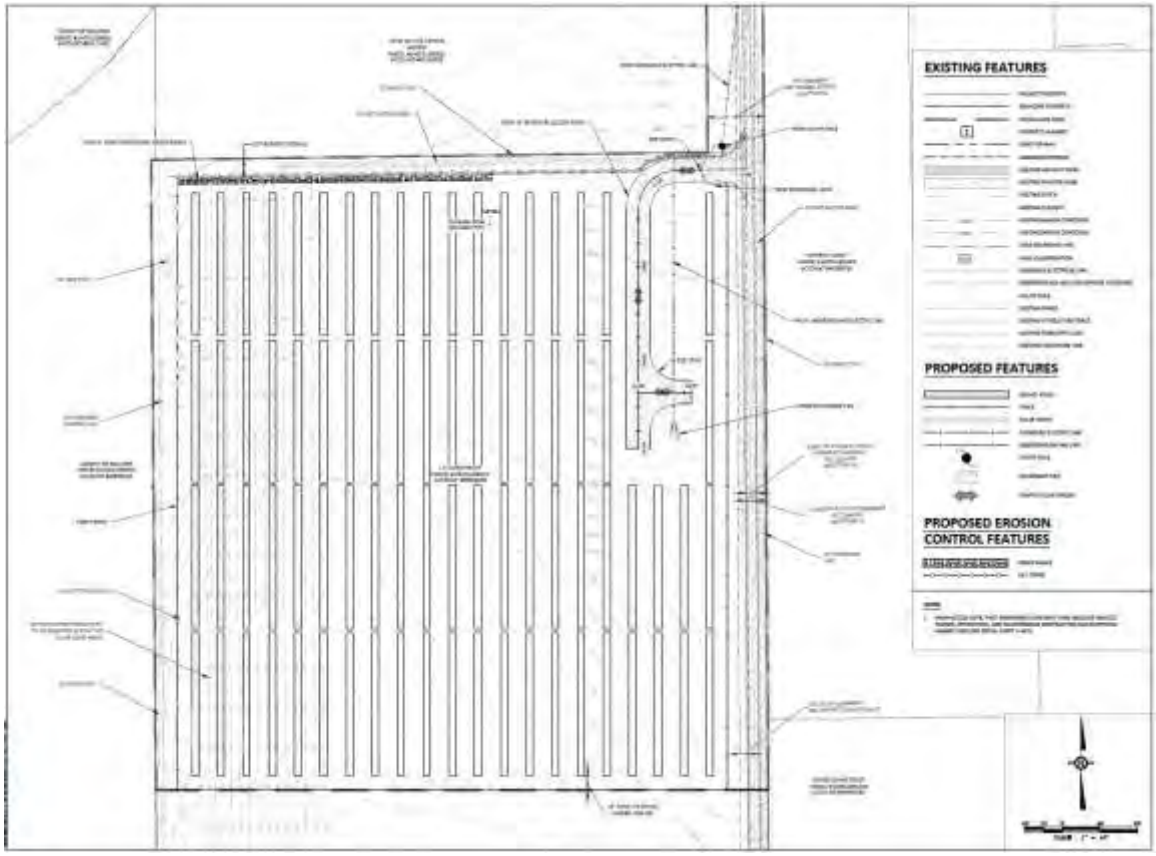

Figure 4. Proposed project area detail submitted by the applicants.

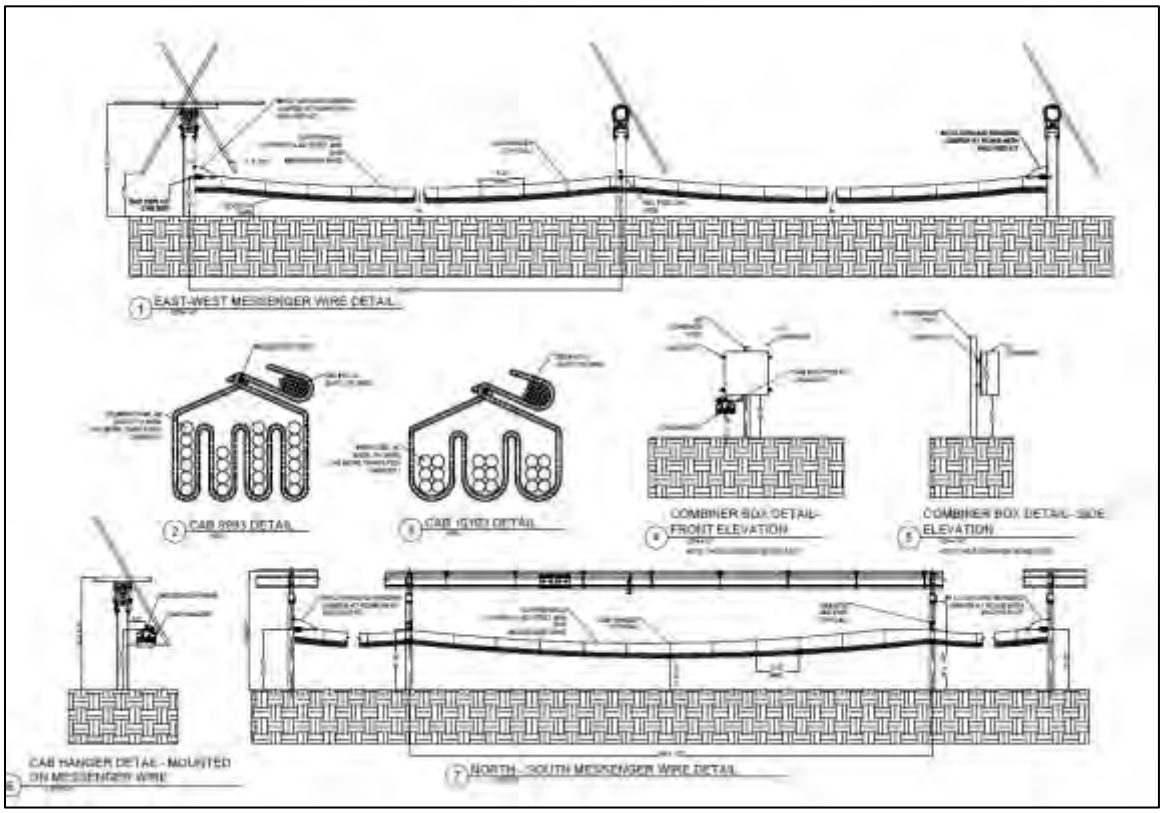

Figure 5. Proposed solar panel array plans submitted by the applicants.

Figure 6. Vegetative screening and fencing plans submitted by the applicants.

Under Article 4-102.F.4 of the Code, no parcel in the Agricultural Zoning District may be used for more than one principal except for allowed Agricultural uses, Forestry uses, Mining uses, or any combination thereof, or per Article 4-102.F.2.e, which allows additional principal uses through the Special Use Review process provided they do not result in an increase in density. Uses which are required to be on legal building lot are considered increases in density as relates to this Code provision; uses which are not required to be located on legal building lots are not considered an increase in density. There are currently two principal uses on the subject parcel: Open Agriculture (as defined in Article 4-502.D of the Code) and a Telecommunication Facility (as defined in Article 4-514.O of the Code).

Open Agriculture (as defined in Art. 4-502.D) is not required to be located on a legal building lot unless it has an associated principal or accessory dwelling. The subject parcel has both a principal dwelling unit and an accessory dwelling unit. As such, the Open Agricultural use on the subject parcel requires legal building lot status. The subject parcel is more than 35 acres in size and meets the definition of legal building lot under Article 9-100.A.2 of the Code. As such, the Open Agriculture, and the associated dwelling are considered the principal use on the subject parcel. In addition, there is an approved Telecommunications Facility on the subject parcel (SU-02-0001). This is considered an additional principal use on the subject parcel; however, per the Code, telecommunication facilities are not required to be located on a legal building lot and, as such, are not considered an increase in density under Article 4-102.F.2.e and are allowed as an additional principal use in the Agricultural Zoning District. Additionally, per Article 4-514-M.5 of the Code, ground-mounted solar energy facilities area explicitly allowed as additional principal use. As the Open Agricultural use is the principal use, the Telecommunication Facility is not required to be located on a building lot and is not considered an increase in density, and Ground-Mounted Solar Facilities are expressly permitted on parcels with existing principal uses, the proposal is allowed under the Code.

Per the Boulder County Comprehensive Plan, the subject parcel is located within Agricultural Lands of National and Statewide Importance. There is also a Viewshed Protection Score for N. 95th Street (west of the subject parcel) ranging from 1.38 to 1.8 out of 5. These resources and the potential impacts on them resulting from the proposed development are discussed in the criteria review below.

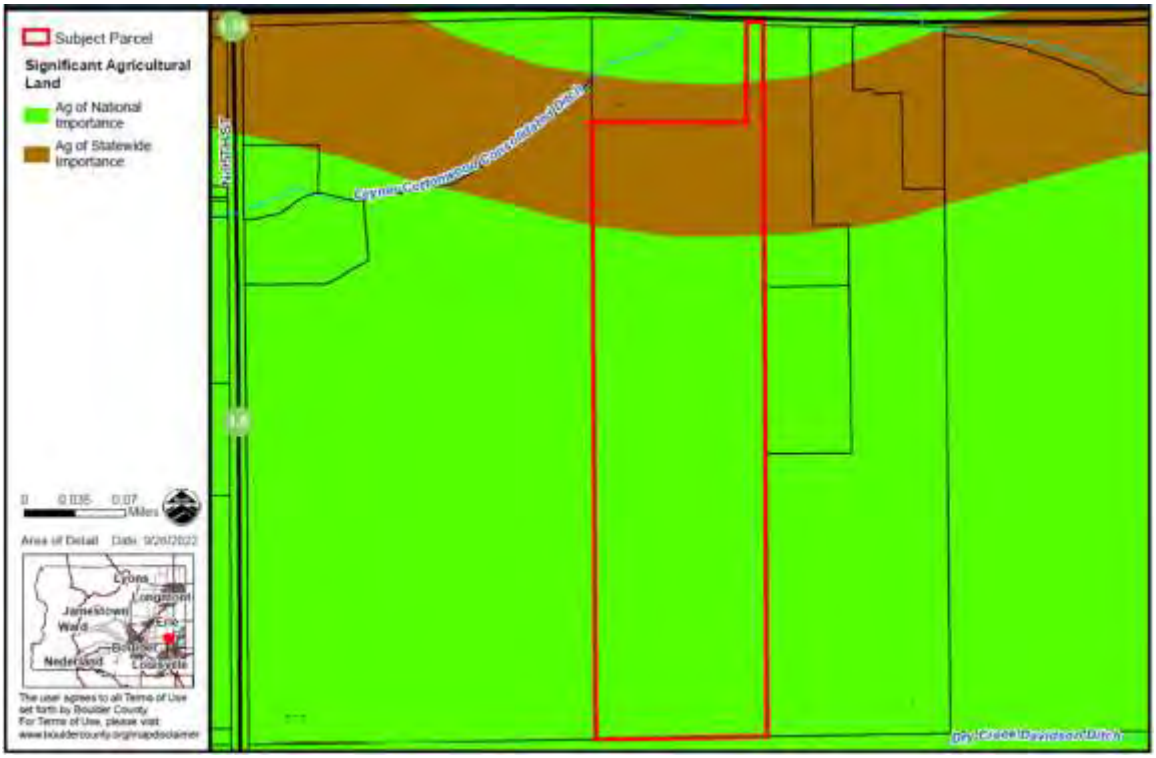

Figure 7: Comprehensive Plan map

The subject parcel is also nearly surrounded by public lands and open space properties, as illustrated by Figure 8, below.

Figure 8: Public Lands map.

As detailed in the criteria review below, staff finds that the proposed solar energy system can meet the Special Review Criteria in Article 4-601 of the Code and the additional provisions for Solar

Energy Systems listed in Article 4-514.M of the Code, with the recommended conditions of approval.

REFERRALS
This application was referred to the typical agencies, departments, and adjacent property owners. All responses received are attached and summarized below.

County Building Safety & Inspection Services Team: This team reviewed the proposal and stated that building permits will be required for the construction of the array and associated electrical equipment. It also noted the minimum wind and snow loading requirements.

Boulder County Public Health: This team reviewed the request and responded that the solar arrays and equipment must not be installed on top of the absorption field, and that damage to the septic system should be avoided during construction and trenching.

County Development Review Team – Access & Engineering: This team reviewed the proposal and confirmed the subject parcel has legal access to Isabelle Road. This team noted that, per the International Building Code, no grading may occur within two feet of the property line. They also noted that the proposed access drive is shown as 26 feet wide, which is the maximum allowed width for a commercial two-lane driveway; however, since there will be limited traffic on this access drive, the team recommended reducing the width of the access drive to 18 feet wide. The Access & Engineering team also provided comment on the potential runoff impacts from the proposed project and noted that the project is subject to full-spectrum detention and permanent water quality controls as identified in Section 1200 of the Boulder County Storm Drainage Criteria Manual (SDCM). Finally, the team noted that, since the total ground disturbance will exceed one acre, a Boulder County Stormwater Quality Permit (SWQP) will be required.

County Parks & Open Space Natural Resources Planner: The Natural Resources Planner reviewed the application materials and expressed some concerns about some of the details of proposal. They noted that the application materials mention the potential use of sheep for grazing, but that the application does not commit to this. They also note that the letter from the Colorado Parks & Wildlife, as submitted by the applicants, recommends the use of wire fence, but that the plans submitted show a mesh fence, which would not be passible by most midsize mammals. The Natural Resources Planner noted that any construction on top of, or in, wet soils can result in permanent damage to the soil structure, which would result in the permanent loss of Significant Agricultural Land. They also provided some comment on notes on the submitted plans which may need to be updated at permitting.

Xcel Energy: This agency reviewed the proposed project and noted that they own and operate overhead and underground electrical lines in the area and that a 10-foot radial clearance must be maintained. They also noted that the applicants must apply for a permit from Xcel Energy for new service or modification to any existing service.

Adjacent Property Owners: Notices were sent to 40 adjacent property owners, and staff received comments from five members of the public. Three members of the public expressed concern and opposition to the proposed project, noting visual impacts, concerns about setting a precedent for future solar facilities in the area, requesting additional information on the decommissioning/removal of the facility, and stating that it may pose a fire risk. Two comments in support were received from solar energy advocacy groups.

Agencies that responded with no conflict: Louisville Fire Protection District and Town of Erie.

Agencies that did not respond: Boulder County Long Range Planning; Boulder County Assessor; Boulder County Attorney; Boulder County Office of Sustainability, Climate Action, and Resilience;

Boulder County Sheriff; Boulder County Treasurer; Boulder County Surveyor; Northern Colorado Water Conservancy District; Boulder Valley & Longmont Conservation Districts; and City of Lafayette

SPECIAL REVIEW CRITERIA

The Community Planning & Permitting staff has evaluated the review standards for approval of a Special Review for a ground-mounted solar energy system in the Agricultural Zoning District, per Article 4-601 of the Code, and finds the following:

(1) Complies with the minimum zoning requirements of the zoning district in which the use is to be established, and will also comply with all other applicable requirements;

As discussed above, the proposed solar facility is allowed as an additional principal use on a parcel with existing principal uses. Staff has reviewed the proposed plans and has determined that the proposed development generally meets the required setbacks in the Agricultural Zoning District with the exception of the proposed fencing adjacent to the proposed access drive. The plans submitted with the application materials indicate the installation of a 7-foot fence around the system and associated equipment. Article 17-300.A.1.b of the Code allows the construction of a fence not over 6 feet high without a building permit. Conversely, fences more than 6 feet in height require a building permit and must meet setbacks. The applicable setback in the Agricultural Zoning District is 7 feet. The site plans as submitted show a section of fencing located approximately on the property line, within that setback (see Figure 9 below). Staff recommends conditions of approval requiring that a revised site plan be submitted showing that the fence meets the applicable setbacks for the Agricultural Zoning District and is issued a building permit, or the height of the proposed fence be reduced to no more than 6 feet in heigh within the required setback.

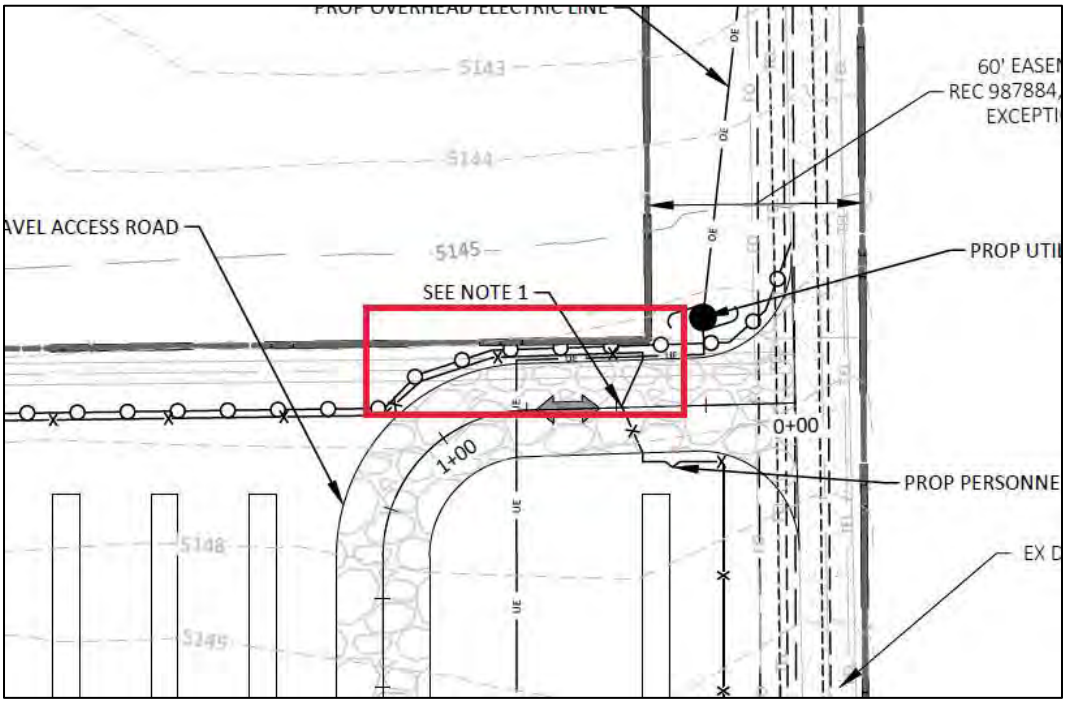

Figure 9. Detail from proposed site plan, with section of fencing located in the required setback indicated in red.

Ground-Mounted Solar Energy Systems located with Significant Agricultural Land with between 2.5 acres and 10 acres of disturbed area are an allowed use if approved through Special Review in the Agricultural Zoning District where the subject property is located,

subject to the additional provisions outlined in Article 4-514.M.5 of the Code as outlined and addressed below.

a. This use is required to be located on a building lot, or an outlot platted for this purpose.

The subject parcel is over 35-acres in size and meets the definition of a legal building lot. Therefore, this provision is met.

b. The use may be allowed on right-of-way, as permitted by the right-of-way owner and if compatible with the use of the right-of-way. For right-of-way systems, further requirements may be stipulated by the Boulder County Public Works Department or the Colorado Department of Transportation to ensure compatibility with transportation-related uses of the right-of-way.

The use is not proposed to encroach into the right-of-way. Therefore, this provision is met.

c. The appropriateness of a site, the specific location on the site, and the extent of site disturbance will be determined through the applicable review process.

The proposed project area is immediately adjacent to multiple residential properties. There is a potential alternate location on the southern portion of the subject parcel, which would be farther removed from those residences (see Figure 3 above). However, based on staff's observations on-site and based on conversations with the property owner, the subject property slopes down on that southern portion of the parcel and that area is subject to flooding from an adjacent irrigation ditch. Staff finds that siting a solar energy facility in an area that is prone to flooding would not be appropriate. Additionally, locating the proposed solar energy facility on that southern portion would require significantly more grading and trenching. As such, staff finds the southern portion of the subject parcel would not be an appropriate location for the proposed solar energy facility. Additionally, as discussed in Criterion 9 below, staff finds that the impacts from the proposed solar facility on the adjacent residential properties can be mitigated through staff recommended conditions of approval.

Therefore, as conditioned in Criterion 9 below, staff finds this provision can be met.

d. Ground-mounted systems with disturbed area greater than 0.5 acre cannot be located on areas designated by the Boulder County Comprehensive Plan as Natural Landmarks, Natural Areas, Critical Wildlife Habitats, or Wildlife Migration Corridors.

Although the disturbed area proposed for the array is greater than .5 acres in size, the Boulder County Comprehensive Plan does not identify any Natural Landmarks, Natural Areas, Critical Wildlife Habitat, or Wildlife Migration Corridors within the boundaries of the subject property. Therefore, this provision is met.

e. Ground-mounted systems are allowed as a second Principal Use on parcels subject to the review process applicable for the proposed new ground-mounted system.

Currently, Open Agriculture (as defined in Art. 4-502.D of the Code) is the principal use of the property. The single-family dwelling that exists on the property is considered customary and incidental to the Open Agricultural use. In addition, there is an approved telecommunications facility on the subject parcel. As discussed above, however, per the Code, Telecommunication Facilities are not required to be located on a legal building lot

and, as such, are not considered an increase in density and are allowed as an additional principal use in the Agricultural Zoning District. Additionally, per Article 4-514-M.5 of the Code, ground-mounted solar energy facilities area explicitly allowed as additional principal use. Therefore, given this is specifically allowable, this provision is met.

f. Ground-mounted systems shall not exceed 15 feet in height, except to accommodate site specific needs and as approved through review. Systems exceeding 15 feet in height require an increased setback of 75 feet from all property lines, unless it is demonstrated that a lesser setback or topographical or vegetative screening adequately mitigates visual impacts. In no case shall a system exceed 25 feet in height.

Plans submitted with the application materials indicate that the individual solar panels will be mounted to racking which will track the sun as it crosses the sky. Plans submitted with the application materials indicate that the peak of the panels will be 10 feet, 11 inches above existing grade at full tilt (or the maximum height of the variable height above grade during the day). Staff recommends a condition of approval limiting the maximum height of any given panel within the array to 11 feet above existing grade. Therefore, as conditioned, this provision is met.

g. Ground-mounted systems with disturbed area greater than 2.5 acre are not permitted in the Forestry Zoning District unless the site has been previously contaminated or the soil otherwise damaged, making it unsuitable for agricultural or forestry uses. Qualifying areas may include properties that have previously undergone intensive development and where it is determined, through the review process, that installation of a ground-mounted system will not have additional significant impacts.

The property where the proposed system will be located is within the Agricultural zoning district. Therefore, this provision is not applicable.

h. Ground-mounted systems with a disturbed area greater than 0.5 acre on lands designated as Significant Agricultural Lands under the Boulder County Comprehensive Plan, and located in the Agricultural, Estate Residential, or Rural Residential zone districts, require Special Review and are subject to the following additional requirements intended to preserve and maintain soil and agricultural integrity:

i. The total disturbed area associated with the ground-mounted system cannot exceed 7 acres on parcels smaller than 70 acres in size, or 14 acres on parcels larger than 70 acres in size.

Per the application materials, the proposed amount of land to be disturbed during construction is limited to 7 acres. However, the proposed size of the solar facility is approximately 10.7 acres. Per Article 18-136A of the Code, in relation to solar energy systems, "Disturbed Area" is defined as "*That area of the land's surface disturbed or in any way changed as a result of construction activity, including but not limited to new structures, access and areas used for access or parking during and following the construction process.*" Staff finds that this definition would include any areas which construction traffic would drive over, any areas impacted by stormwater detention and/or runoff controls, areas used for plantings, and any structures or utility infrastructure. In order to ensure that the area of disturbance does not exceed the maximum allowed of 7 acres, staff recommends as a condition of approval that plans submitted for permitting include detailed information on the areas to be disturbed and that the area of

disturbance be limited to 7 acres. With this condition of approval, this provision can be met.

ii. Application for the ground-mounted system must contain a solar energy system development report as set forth in Article 3-203

The submitted application materials included a development report that meets the requirements of Article 3-203. Therefore, this provision is met.

The applicants have proposed to connect the solar energy facility with the Xcel Energy infrastructure via overhead utility lines running from the project area to the Xcel infrastructure along Isabelle Road. However, Article 7-1200.B.1 of the Code states: "*All utility facilities shall be located underground throughout the development except in situations or locations where undue hardship result from compliance with this requirement and the overriding intent of this Code has been demonstrated.*" Locating utilities underground both reduces their visual impact (discussed in Criterion 9 below) and reduces the potential for those utilities to impacted by significant weather conditions, such as heavy ice or strong wind conditions which may bring down an overhead utility line. As such, staff recommends as a condition of approval that the utility lines for the proposed project be located underground from the project area to where they transition to the existing Xcel infrastructure, in compliance with Article 7-1200.B.1 of the Code.

Therefore, as conditioned, staff finds this criterion can be met.

(2) Will be compatible with the surrounding area. In determining compatibility, the Board should consider the location of structures and other improvements on the site; the size, height and massing of the structures; the number and arrangement of structures; the design of structures and other site features; the proposed removal or addition of vegetation; the extent of site disturbance, including, but not limited to, any grading and changes to natural topography; and the nature and intensity of the activities that will take place on the site. In determining the surrounding area, the Board should consider the unique location and environment of the proposed use; assess the relevant area that the use is expected to impact; and take note of important features in the area including, but not limited to, scenic vistas, historic townsites and rural communities, mountainous terrain, agricultural lands and activities, sensitive environmental areas, and the characteristics of nearby development and neighborhoods;

The system is proposed to be located on the northern portion of a large agricultural property in the plains area of the county. The area surrounding the subject parcel includes several Boulder County Open Space parcels to the west, and county-held conservation easement encumbered agricultural properties to the south and east (see Figure 8 above). The uses in the surrounding area are primarily residential, agricultural, and designated open space.

As discussed above, staff finds that locating the proposed solar facility on the northern portion of the subject parcel is only viable location for the proposed project. However, staff has concerns related to the visual impacts of locating the proposed project on the northern portion of the parcel and recommends conditions of approval to mitigate these impacts, as discussed in Criterion 9 below.

Staff has not identified any long-term traffic impacts resulting from the proposed project. After construction is completed, the use will have little-to-no traffic impacts on the surrounding area as traffic will be minimal and there will be no noise or daily activity. The

proposed access drive to the solar facility must meet the Boulder County Multimodal Transportation Standards; this requirement is discussed in Criterion 7 below.

The narrative also indicates that the array will be removed from the property at the end of the lease (35 years) or once its useful lifespan has ended, whichever occurs first. The applicants have provided staff with a decommissioning plan for the proposed project (see Attachment A – Application Materials, pages A80 – A81). Per this decommissioning plan, at the end of the lease term, they would remove all above and below ground infrastructure, including the arrays, concrete foundations and pad, and the electrical infrastructure to a depth of at least 3 feet. They would also remove all fences, graveled areas, and the access drive, unless the property owner requests for them to remain. The decommissioning plan states that the property will be restored to a condition "reasonably similar" to its current conditions, but specifically excludes removal of the planted trees, the removal of internal site roads, and regarding of the project area to pre-construction condition. Per the plan, decommissioning would begin within one year of the end of the project and reclamation would be completed within one year after that (a total of two years after the end of the facility's lifespan). The applicants have stated that they have offered a bond to the property owner related to decommissioning and reclamation, and they have stated they are willing to offer a bond to Boulder County as well.

To ensure that the subject property is returned to a condition which may allow it to be used for agricultural purposes, staff would recommend several conditions of approval. First, staff recommends a condition of approval that there be a project "sunset" of 35 years after construction is complete or at the end of the effective lifespan of the facility, whichever is sooner. Second, staff recommends as a condition of approval that the applicants submit a full post-decommission revegetation plan to be reviewed and approved by Community Planning & Permitting staff prior to the issuance of any deconstruction permits. Staff also finds the proposal to begin decommissioning of the project within one year of the project's sunset is longer than necessary and may result in an inactive facility sitting untouched for up to a year. For this reason, staff recommends as a condition of approval that decommissioning and remediation begin within 90 days of the project sunset, and be completed within 1 year of decommissioning commencing. Finally, to help ensure that the decommissioning and restoration of the project area is carried out, staff recommends as a condition of approval that the applicants provide Boulder County with a security bond for the cost of removing the system and remediation of the project area.

Because of the mitigating factors related to the siting of the project as described above and with the recommended conditions of approval, staff finds the proposed solar energy system can be compatible with the surrounding area. Therefore, as conditioned, staff finds this criterion can be met.

(3) Will be in accordance with the Boulder County Comprehensive Plan;

Staff reviewed the proposed project in relation to the Boulder County Comprehensive Plan and identified several goals and policies which are particularly applicable to this proposal.

Agricultural Element Policy AG 1.03 Agricultural Land of Importance. This policy states that the county should encourage the preservation and utilization of identified significant agricultural lands for agricultural or rural uses. As discussed above, the Comprehensive Plan identifies Agricultural Lands of Statewide and National Importance on the subject parcel. Staff finds that, while a solar energy facility as proposed in this project is not necessarily an "agricultural or rural" use, with the recommended conditions of approval in Criterion 2 above, it is a use that can allow for the land to returned to an agricultural or rural use at later

date. As such, with the recommended conditions of approval, staff finds the proposal is not in conflict with this policy.

Agricultural Element Policy AG 1.04 Development Review. This policy states that the county should consider potential impacts on existing agricultural uses and can imposed conditions of approval through the review process in order to mitigate those impacts. As discussed above, staff finds that the proposed project will impact adjacent agricultural properties; however, staff also finds that these impacts can be sufficiently mitigated through the recommended conditions of approval. As such, staff finds the proposal is not in conflict with this policy.

Natural Hazards Element Policy NH 3.02 Drainage and Erosion. This policy states that any drainage from development shall not increase erosion either on- or off-site. Per the application materials submitted, the applicants states that the proposed project would result in an approximately 5.6% increase in peak flow rate. However, per the referral response from the Access & Engineering Team, the assumption that a solar field will not change the degree of imperviousness is not consistent with research and recent Mile High Flood District (MHFD) evaluations. As such, mitigation will be necessary for the project to not conflict with this policy. The potential drainage and erosion impacts, and recommended conditions of approval to mitigate these impacts, are discussed in more detail in Criterion 13 below. With the recommended conditions of approval set forth in Criterion 13, staff finds the proposal can be in accordance with this policy.

Sustainability Element Goal 4 Identify & Implement Actions to Diminish Greenhouse Gas Emissions. This goal directs the county to identify and implement actions that will lead to a decrease in the county's contribution to total greenhouse gas emissions through an increase in energy efficiency. The proposed project is intended to support and increase the percentage of energy which comes from renewable, non-greenhouse gas producing sources. Staff finds that a project which increases the amount of energy from solar facilities supports this goal. As such, staff finds the proposal is in accordance with this goal of the Comprehensive Plan.

Therefore, staff finds this criterion can be met.

(4) Will not result in an over-intensive use of land or excessive depletion of natural resources. In evaluating the intensity of the use, the Board should consider the extent of the proposed development in relation to parcel size and the natural landscape/topography; the area of impermeable surface; the amount of blasting, grading or other alteration of the natural topography; the elimination or disruption of agricultural lands; the effect on significant natural areas and environmental resources; the disturbance of plant and animal habitat, and wildlife migration corridors; the relationship of the proposed development to natural hazards; and available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or arrangement of structures and land disturbance, and the use of sustainable construction techniques, resource use, and transportation management.

As outlined in the project discussion and Criterion 1 above, the proposed solar energy facility is considered an additional principal use on the subject parcel, however staff finds that this is not necessarily considered an over-intensive use of the land. Specifically, the Open Agricultural use is an appropriate and reasonable use in the Agricultural Zoning District; additionally, the existing Telecommunication Facility use is not required to be located on a legal building lot, so is not considered an increase in density. While there will be traffic impacts during construction, staff does not anticipate that the proposed project will generally increase the overall intensity of use on the subject parcel.

As discussed in Criterion 1 above, the area of disturbance for the proposed project may not exceed 7 acres. With the recommended condition of approval for the submission of revised plans with detailed information on the areas to be disturbed and that the area of disturbance be limited to 7 acres, staff finds that the proposed project is in keeping with a level or intensity of use that is allowed under the Code.

As discussed above, the proposed project is located in Significant Agricultural Land and will disrupt that agricultural land. However, with proposed decommissioning and remediation of the project site, and with the recommended conditions of approval related to the decommissioning and remediation, staff finds that the disruption of agricultural land can be mitigated and that the land could be returned to productive agricultural activities in the future. Additionally, to minimize the impacts to the soil conditions during construction, staff recommends an additional condition of approval that no construction occur under wet soil conditions.

As discussed in Criterion 13 below, the Access & Engineering Team have determined that the proposed project will increase the impermeable surface on the subject parcel, and staff recommends conditions of approval under Criterion 13 below to mitigate this increase.

Therefore, as conditioned here and in other criteria, staff finds this criterion can be met.

(5) Will not have a material adverse effect on community capital improvement programs;

There is no indication the proposal will have an adverse effect on community capital improvement programs, and no referral agency has responded with such a concern.

Therefore, staff finds this criterion is met.

(6) *Will not require a level of community facilities and services greater than that which is available;*

Staff does not anticipate the proposal will have an adverse effect on community facilities and services, and no referral agency responded with any such concerns.

Therefore, staff finds this criterion is met.

(7) *Will support a multimodal transportation system and not result in significant negative impacts to the transportation system or traffic hazards;*

The subject parcel is accessed from Isabelle Road, a paved Boulder County owned and maintained right-of-way (ROW) with a Functional Classification of Minor Arterial. Legal access has been demonstrated via adjacency to this public ROW. The proposed solar facility would be access off the existing access drive from Isabelle Road to the existing residential and agricultural structures on-site; no new access from Isabelle Road is required or proposed.

Per the Access & Engineering referral response, the proposed access is 26 feet in width, which is the maximum allowable width for a commercial two-lane driveway. As there will be minimal traffic on the driveway, staff recommends as a condition of approval that the access drive to the project area be reduce to 18 feet in width. This width will allow convenient access for construction, maintenance, and emergency vehicles. Additionally, the proposed access must be designed according to the Boulder County Multimodal Transportation Standards (MMTS) as outlined in the Access & Engineering referral response. As such, staff recommends as a condition of approval that plans submitted for permitting must delineate and

note the revised access requirements, including revised width, access cross section, and revised emergency vehicle turnaround.

A Boulder County Hauler License is required for hauling of material off site, regardless of where the material is deposited. This applies to the prime contractor as well as any subcontractors that collect, transport or dispose of any materials (dirt, gravel, garbage, recyclables, or compostables, construction and demolition waste, or landscaping materials) anywhere except within the project site, including locations outside unincorporated Boulder County. Additional information can be found here: https://www.bouldercounty.org/environment/trash/hauler-license/

Additionally, to ensure that construction traffic and activities do not impede traffic on any public right-of-way, staff recommends as a condition of approval that during construction, all materials, machinery, dumpsters, vehicles and other items associated with the project should be staged on the subject parcel.

With the recommended conditions of approval described above, staff finds the proposal does not conflict with the multimodal transportation system and does not anticipate that the request will have a negative impact on the transportation system.

Therefore, as conditioned, staff finds this criterion can be met.

(8) Will not cause significant air, odor, water, or noise pollution;

Staff have not identified any concerns that the proposed solar energy system would result in the creation of air, odor, water, or noise pollution. Although the mounting systems will be motorized to allow panels to maximize efficiency by following the sun throughout the day, the project narrative indicates that the motors are very quiet. Staff finds that any incidental noise will be drowned out by road noise from vehicles on nearby public rights-of-way.

Therefore, staff finds this criterion can be met.

(9) Will be adequately buffered or screened to mitigate any undue visual impacts of the use;

Per the application materials, the applicants propose to install two 10-foot by 40-foot storage containers in the project area. These would be used to store materials and equipment related to on-going maintenance of the facility. These would be removed as part of the facility's decommissioning and remediation. To help mitigate the visual impact of these containers, staff recommends as a condition of approval that the containers be neutral or earth-tone in color. The applicants are also proposing to install a temporary construction trailer and portable toilet within the project area. The applicants have stated that these will be removed once construction is complete. To ensure that these are removed promptly, staff recommends as a condition of approval that the construction trailer and portable toilet be removed from the subject property within 30 days of completion of construction.

The maximum height of the proposed solar panel (the height at their steepest pitch) is approximately 10 feet, 11 inches above grade. As discussed in Criterion 1 above, this is below the maximum allowed height of 15 feet, and staff finds the proposed height of the panels to be appropriate based on their size, operation, and location, and finds that reducing the height of the panels would not practical. However, staff has determined that the proposed panels would have a significant visual impact and that mitigation is required.

Per the application materials submitted, the applicants have proposed to install vegetative screening (juniper trees) along a portion of the northern project area (see Figure 6 above). This would help to screen the development from property immediately north of the project area. Based on observations on-site, however, staff finds that the proposed solar facility will have significant visual impacts on all of the adjacent properties to the east, north, and west. There are a number of properties with residences in the immediate vicinity of the project area (see Figure 10 below). Additionally, staff has determined that, due to the change in terrain, the development would also be highly visible from N. 95th Street, as N. 95th Street is downslope from project area (see Figures 11 and 12 below).

Give the proximity of these residences, the visibility from N. 95th Street, and the high visibility of the proposed solar facility, staff finds that that the project as proposed would result in significant negative visual impacts. There is an existing line of trees on one of the adjacent parcels to the east (indicated in green in Figure 10 below). However, it is staff's determination that relying on existing plantings on an adjacent parcel to screen development on the subject parcel effectively places the burden of mitigating the visual impacts of the development on the neighbor, rather than on the developer or applicants.

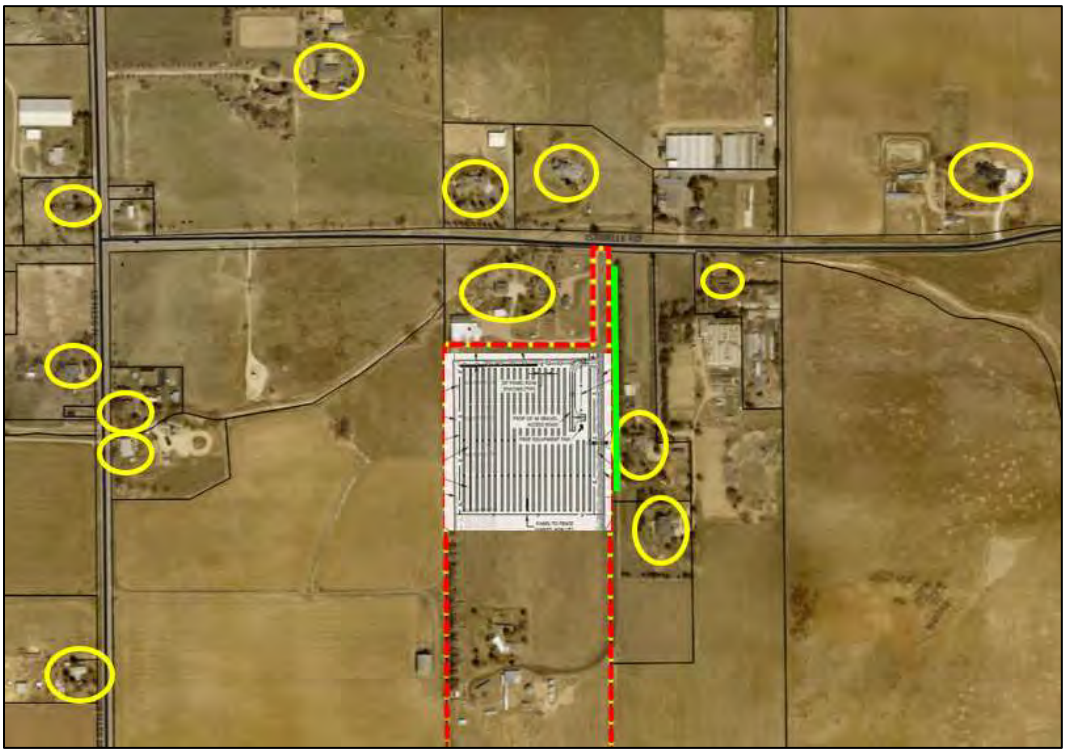

Figure 10. Aerial photograph of the area around the subject parcel (indicated in red, with the project area superimposed on it); nearby residences are indicated in yellow; existing line of trees on adjacent parcel indicated in green.

Figures 11. Streetview image from N. 95th Street, looking east, with approximate project location indicated in red

Figures 12. Streetview images from N. 95th Street, looking southeast, with approximate project location indicated in red.

In order to reduce and mitigate the visual impacts of the proposed development, staff recommends as a condition of approval that the applicants extend the vegetative screening (the juniper trees as proposed in application materials) along all of the eastern, northern, and western edges of the project area, with the exception of the access drive to the project area (see Figure 13 below). This vegetative screening will help to shield the proposed panels and the proposed storage containers from adjacent properties and the public right-of-way, reducing and mitigating the visual impacts of the development.

To ensure that the vegetative screening is properly installed and maintained, staff recommends as a condition of approval that the applicants submit a detailed landscaping plan at permitting, showing the location of all landscape plantings, information on the specific species to be used, and watering and maintenance information. Additionally, staff recommends as a condition of approval that the applicants remove and replace any of the vegetative screening that dies or fails throughout the life span of the facility.

Figure 13. Staff recommended vegetative screening locations (indicated in yellow).

In addition to the visual impacts from the proposed solar panels, staff has determined that the proposed overhead utility lines would be very visual from the adjacent properties to the north and east of the project area. However, with the recommended condition of approval in Criterion 1 to locate the utilities lines underground, staff finds these impacts would be nearly completely eliminated, with the exception of where they come above ground to connect with Xcel's infrastructure, but staff finds this would have very limited visual impact.

Therefore, as conditioned, staff finds this criterion is met.

(10) Will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County;

There is no indication the proposal will have detrimental effects on the health, safety, or welfare of the present or future inhabitants of Boulder County, and no referral agency has responded with such a concern.

Therefore, staff finds this criterion is met.

(11) Will establish an appropriate balance between current and future economic, environmental, and societal needs by minimizing the consumption and inefficient use of energy, materials, minerals, water, land, and other finite resources;

With the recommended conditions of approval, the construction of the proposed solar energy system will minimize the consumption and inefficient use of resources by providing a sustainable source of energy generation on an underutilized agricultural property to the benefit of low-income members of the public. Inefficient use of land will also be minimized through the required remediation of the site after the system's life cycle has ended.

Therefore, staff finds this criterion can be met.

(12) Will not result in unreasonable risk of harm to people or property – both onsite and in the surrounding area – from natural hazards. Development or activity associated with the use must avoid natural hazards, including those on the subject property and those originating off-site with a reasonable likelihood of affecting the subject property. Natural hazards include, without limitation, expansive soils or claystone, subsiding soils, soil creep areas, or questionable soils where the safe-sustaining power of the soils is in doubt; landslides, mudslides, mudfalls, debris fans, unstable slopes, and rockfalls; flash flooding corridors, alluvial fans, floodways, floodplains, and flood-prone areas; and avalanche corridors; all as identified in the Comprehensive Plan Geologic Hazard and Constraint Areas Map or through the Special Review or Limited Impact Special Review process using the best available information. Best available information includes, without limitation, updated topographic or geologic data, Colorado Geologic Survey landslide or earth/debris flow data, interim floodplain mapping data, and creek planning studies.

The Comprehensive Plan does not identify any natural hazards on or near the subject parcel. No referral agencies have responded with any concerns related to natural hazards.

Therefore, staff finds this criterion is met.

(13) The proposed use shall not alter historic drainage patterns and/or flow rates unless the associated development includes acceptable mitigation measures to compensate for anticipated drainage impacts. The best available information should be used to evaluate these impacts, including without limitation the Boulder County Storm Drainage Criteria Manual, hydrologic evaluations to determine peak flows, floodplain mapping studies, updated topographic data, Colorado Geologic Survey landslide, earth/debris flow data, and creek planning studies, all as applicable given the context of the subject property and the application.

As discussed above, per the application materials submitted, the applicants states that the existing storm water flow characteristics are expected to remain unchanged on-site, and they find the increases in peak flow rates (an increase of approximately 5.6% over existing conditions) to be negligible. However, per the referral response from the Access & Engineering Team, the assumption that a solar field will not change the degree of imperviousness is not consistent with research and recent Mile High Flood District (MHFD) evaluations. Per Access & Engineering, the proposed solar panels will concentrate runoff, and will create "rain shadow" areas beneath panels will not be fully utilized for infiltration. The solar panel orientation plays a large role in how well the runoff infiltrates. Pending MHFD criteria for solar fields use imperviousness of 5% when panels are parallel to contours (maximum tilt), 20% when diagonal, and 40% when perpendicular (minimum tilt). In order to fully determine the runoff impacts of the proposed panels, staff recommends as a condition of approval that, at permitting, the applicants submit revised runoff calculations and detention

requirements in light of this information. Post-development runoff numbers must account for the change in runoff from the solar panels.

Additionally, the proposed project is subject to full-spectrum detention and permanent water quality controls as identified in Section 1200 of the Boulder County Storm Drainage Criteria Manual (SDCM). Section 1200 of the SDCM states that full-spectrum detention is required for all new development unless it meets one of four specific exceptions:

1. Parcels that are 3 acres or larger, have one single-family dwelling, and have a total imperviousness of less than 10 percent;
2. Additions to buildings where the total impervious area, both existing and proposed, covers less than 5,000 square feet of impervious paved and roof surfaces;
3. Fill areas that are not paved over or otherwise made impervious; or
4. Other situations as may be determined by the County Engineer to be in the best interest of the county.

It is staff's determination that the proposed project does not meet any of these exceptions. While the property is more than 3 acres in size, it has more than one single-family dwelling, so does not meet exception #1; exceptions #2 and #3 are not applicable; and granting the project an exception from the full-spectrum detention requires (exception #4) has not been determined to be in the best interest of the county. As such, staff recommends as a condition of approval that the plans submitted for permitting must demonstrate compliance with this section of the SDCM.

Finally, since the project as proposed would include more the one acre of ground disturbance, it will require a Boulder County Stormwater Quality Permit (SWQP). Staff recommends as a condition of approval that the applicants submit an application for a SWQP at building permit application.

Therefore, as conditioned, staff finds this criterion can be met.

RECOMMENDATION

Staff has determined that the proposal can meet all the applicable criteria of the Boulder County Land Use Code for Special Review. Therefore, staff recommends that the Planning Commission recommend that the Board of County Commissioner ***CONDITIONALLY APPROVE docket SU-23-0005 Harvest Moon Solar Energy Facility*** with the following conditions:

1. Prior to the issuance of any permits by the Boulder County Community Planning & Permitting Department and within one-year of the signing of the Resolution, the applicants must provide a Development Agreement for review and approval by County staff. Once approved by County staff, the Development Agreement must be signed and notarized by the applicants, and will be recorded by County staff.

2. The maximum height of any given panel in the system is not to exceed 11 feet above existing grade.

3. Plans submitted for permitting must show that all fencing of more than 6 feet in heigh meets the applicable setbacks for the Agricultural Zoning District and is issued a building permit.

4. The area of disturbance must not exceed 7 acres. Plans submitted for permitting must include detailed information on all areas of disturbance, including delineating the extent of all areas of the land's surface disturbed or in any way changed as a result of construction activity,

including but not limited to new structures, access, and areas used for access or parking during and following the construction process.

5. All utility lines from the project area to where they transition to the existing Xcel infrastructure must be located underground, in compliance with Article 7-1200.B.1 of the Code.

6. The solar energy facility as proposed is subject to a sunset date of 35 years after construction is complete or at the end of the effective lifespan of the facility, whichever is sooner.

7. ***Prior to issuance of any permit for deconstruction/decommission***, the applicants must submit a full post-decommission revegetation plan to be reviewed and approved by Community Planning & Permitting staff.

8. Decommissioning and remediation of the facility and project area must begin within 90 days of the project sunset, and must be completed within 1 year of decommissioning commencing.

9. ***Prior to the recordation of the development agreement,*** the applicants must provide Boulder County with a security bond for the cost of removing the system and remediation of the project area.

10. No construction is permitted occur under wet soil conditions.

11. The access drive to the project area be reduce to 18 feet in width.

12. The proposed access must be designed according to the Boulder County Multimodal Transportation Standards (MMTS), including but not limited to:

    a. Standard Drawing 11 – Private Access
    b. Standard Drawing 18 – Access Turnaround
    c. Standard Drawing 19 – Typical Turnaround & Pullout Locations

    At building permit, the applicant must submit plans that delineate and note the revised access requirements, including revised width, access cross section, and revised emergency vehicle turnaround.

13. ***During construction,*** all materials, machinery, dumpsters, vehicles, and other items associated with the project should be staged on the subject parcel.

14. The storage containers shall be neutral or earth-tone in color.

15. The construction trailer and portable toilet must be removed from the subject property within 30 days of completion of construction.

16. Vegetative screening (the juniper trees as proposed in application materials) is required along all of the eastern, northern, and western edges of the project area, with the exception of access drive to the facility.

17. ***Prior to the issuance of any building or grading permit,*** the applicants must submit a detailed landscaping plan, showing the location of all landscape plantings, information on the specific species to be used, and watering and maintenance information.

18. The applicants must remove and replace any of the vegetative screening that dies or fails throughout the life span of the facility.

19. ***At permitting,*** the applicants must submit revised runoff calculations and detention requirements in light of this information. Post-development runoff numbers must account for the change in runoff from the solar panels.

20. ***At building permit,*** the applicants must submit plans that demonstrate compliance with Section 1200 of the Boulder County Storm Drainage Criteria Manual.

21. ***At building permit,*** the applicants must submit Boulder County Stormwater Quality Permit application.

22. The applicants are subject to the terms, conditions, and commitments of record and in the file for docket ***SU-23-0005 Harvest Moon Solar Energy Facility.***

Boulder County Land Use Department
Courthouse Annex Building
2045 13th Street • PO Box 471 • Boulder, Colorado 80302
Phone: 303-441-3930
Email: planner@bouldercounty.org
Web: www.bouldercounty.org/lu
Office Hours: Mon., Wed., Thurs., Fri. 8 a.m. to 4:30 p.m.
Tuesday 10 a.m. to 4:30 p.m.

Shaded Areas for Staff Use Only
Intake Stamp

Planning Application Form

The Land Use Department maintains a submittal schedule for accepting applications. Planning applications are accepted on Mondays, by appointment only. Please call 303-441-3930 to schedule a submittal appointment.

Project Number		Project Name Harvest Moon Solar	
☐ Appeal ☐ Correction Plat ☐ Exemption Plat ☐ Final Plat ☐ Limited Impact Special Use ☐ Limited Impact Special Use Waiver ☐ Location and Extent	☐ Modification of Site Plan Review ☐ Modification of Special Use ☐ Preliminary Plan ☐ Resubdivision (Replat) ☐ Rezoning	☐ Road Name Change ☐ Road/Easement Vacation ☐ Site Plan Review ☐ Site Plan Review Waiver ☐ Sketch Plan ☒ Special Use/SSDP	☐ Special Use (Oil & Gas development) ☐ State Interest Review (1041) ☐ Subdivision Exemption ☐ Variance ☐ Other:

Location(s)/Street Address(es) 9770 Isabelle Road, Lafayette, CO 80026				
Subdivision Name N/A				
Lot(s) Parcel A, Rec # 3374155	Block(s)	Section(s) 21	Township(s) 1N	Range(s) 69W
Area in Acres 10.0 acres	Existing Zoning	Existing Use of Property		Number of Proposed Lots N/A
Proposed Water Supply N/A		Proposed Sewage Disposal Method N/A		

EL

Applicants:

Applicant/Property Owner LK Living Trust			Email davidleistikow@mac.com, rleistik@hotmail.com, leistikow2@netzero.net
Mailing Address 9770 Isabelle Rd			
City Lafayette	State CO	Zip Code 80026	Phone (303) 549-4076, (720) 854-9283, (303) 549-9554
Applicant/Property Owner/Agent/Consultant CBEP Solar 21, LLC			Email info@cloudbreakenergy.com
Mailing Address 1120 Pearl St			
City Boulder	State CO	Zip Code 80302	Phone (970) 425-3175
Agent/Consultant			Email
Mailing Address			
City	State	Zip Code	Phone

Certification (Please refer to the Regulations and Application Submittal Package for complete application requirements.)

I certify that I am signing this Application Form as an owner of record of the property included in the Application. I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge. I understand that all materials required by Boulder County must be submitted prior to having this matter processed. I understand that public hearings or meetings may be required. I understand that I must sign an Agreement of Payment for Application processing fees, and that additional fees or materials may be required as a result of considerations which may arise in the processing of this docket. I understand that the road, school, and park dedications may be required as a condition of approval.

I understand that I am consenting to allow the County Staff involved in this application or their designees to enter onto and inspect the subject property at any reasonable time, without obtaining any prior consent.

All landowners are required to sign application. If additional space is needed, attach additional sheet signed and dated.

Signature of Property Owner	Printed Name	Date
Elisabeth Leistikow	EL Elizabeth Leistikow ELISABETH LEISTIKOW	05/01/2023
Signature of Property Owner	Printed Name	Date

The Land Use Director may waive the landowner signature requirement for good cause, under the applicable provisions of the Land Use Code.

Boulder County Land Use Department
Courthouse Annex Building
2045 13th Street • PO Box 471 • Boulder, Colorado 80302
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Project Number | **Project Name** Harvest Moon Solar

☐ Appeal	☐ Modification of Site Plan Review	☐ Road Name Change	☐ Special Use (Oil & Gas development)
☐ Correction Plat	☐ Modification of Special Use	☐ Road/Easement Vacation	☐ State Interest Review (1041)
☐ Exemption Plat	☐ Preliminary Plan	☐ Site Plan Review	☐ Subdivision Exemption
☐ Final Plat	☐ Resubdivision (Replat)	☐ Site Plan Review Waiver	☐ Variance
☐ Limited Impact Special Use	☐ Rezoning	☐ Sketch Plan	☐ Other:
☐ Limited Impact Special Use Waiver		☒ Special Use/SSDP	
☐ Location and Extent			

Location(s)/Street Address(es) 9770 Isabelle Road, Lafayette, CO 80026

Subdivision Name N/A

Lot(s)	Block(s)	Section(s)	Township(s)	Range(s)
Parcel A, Rec # 3374155		21	1N	69W

Area in Acres	Existing Zoning	Existing Use of Property	Number of Proposed Lots
17.0 acres			N/A

Proposed Water Supply N/A | **Proposed Sewage Disposal Method** N/A

Applicants:

Applicant/Property Owner LK Living Trust | **Email** davidleistikow@mac.com, rleistik@hotmail.com, leistikow2@netzero.net

Mailing Address 9770 Isabelle Rd

City	State	Zip Code	Phone
Lafayette	CO	80026	(303) 549-4076, (720) 854-9283, (303) 549-9554

Applicant/Property Owner/Agent/Consultant CBEP Solar 21, LLC | **Email** info@cloudbreakenergy.com

Mailing Address 1120 Pearl St

City	State	Zip Code	Phone
Boulder	CO	80302	(970) 425-3175

Agent/Consultant | **Email**

Mailing Address

City	State	Zip Code	Phone

Certification (Please refer to the Regulations and Application Submittal Package for complete application requirements.)

I certify that I am signing this Application Form as an owner of record of the property included in the Application. I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge. I understand that all materials required by Boulder County must be submitted prior to having this matter processed. I understand that public hearings or meetings may be required. I understand that I must sign an Agreement of Payment for Application processing fees, and that additional fees or materials may be required as a result of considerations which may arise in the processing of this docket. I understand that the road, school, and park dedications may be required as a condition of approval.

I understand that I am consenting to allow the County Staff involved in this application or their designees to enter onto and inspect the subject property at any reasonable time, without obtaining any prior consent.

All landowners are required to sign application. If additional space is needed, attach additional sheet signed and dated.

Signature of Property Owner	Printed Name	Date
[signature]	David Leistikow	5/6/23
Signature of Property Owner	Printed Name	Date

The Land Use Director may waive the landowner signature requirement for good cause, under the applicable provisions of the Land Use Code.

CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Development Narrative

A. Address List:
   a. See attached Exhibit A

B. Description of site features:
   a. There are no streams, areas subject to flooding, lakes, or high ground water areas. There is no significant topography on the site. The site vegetation is currently pasture land.

C. Soil Characteristics:
   a. According to the Soil Resource Report from the National Resources Conservation Service (NRCS), which is included as Exhibit B, the site contains the following soil types:

Soil Type	Percent of Estimated Project Area
Ascalon sandy loam, 0 to 3 percent slopes	29.3%
Ascalon-Otero complex, 3 to 5 percent slopes	7.2%
Manter sandy loam, 1 to 3 percent slopes	1.4%
Manter sandy loam, 3 to 9 percent slopes	62.1%

D. Long and short term effect on flora and fauna:
   a. There will be no long or short term effects on flora on the site, as the site will remain vegetated with native grasses.
   b. There will be short-term effects on fauna during the construction of the project, which lasts for about 4-5 months. All pre-construction surveys recommended by Colorado Parks and Wildlife (CPW) will be completed, as applicable.
   c. There will also be long-term impacts on fauna. To minimize these impacts, we have consulted with CPW (letter from CPW attached as Exhibit C), who recommended the following items, which CBEP Solar 21, LLC will comply with:

i. CPW recommends that any installed fencing should be eight feet in height, have round-capped posts (e.g., so wildlife isn't impaled), smooth top wire to the fence (e.g., no top barbed wire) (or if two top strands are needed, ensure they are at least six inches apart). The bottom wire can be barbed but should be four inches or less from the ground.
   - Our fencing is 7 feet tall instead of eight, but CPW's document entitled "Fencing with Wildlife in Mind" says that "exclusion fence for deer and elk should be seven to eight feet high" so our fence is still compliant with CPW's recommendations in that document.

ii. CPW recommends that other non-security fencing is kept to a minimum. Where such fencing is required, please use wildlife-friendly fencing specifications as described in CPW's document entitled "Fencing with Wildlife in Mind".
   - This project includes no non-security fencing.

iii. CPW recommends that the solar facility is checked weekly (or escape structures are installed inside the fenced area) to allow deer to escape if one becomes trapped within the facility.
   - Cameras will be installed at the project to monitor wildlife. The cameras will be checked on at least a weekly basis.

iv. If construction is slated from March 15 to July 15, please complete pre-construction nesting surveys for songbirds, Burrowing Owls, and ground- or tree-nesting raptors within the Project area or in the immediate vicinity (e.g., their buffers may extend into the Project area) within a couple of weeks of construction.
   - If construction is slated from March 15 to July 15, we will complete pre-construction nesting surveys.

v. For the eventual consultation regarding transmission lines to this Solar Project, CPW recommends they are installed according to Avian Power Line Interaction Committee (APLIC) standards and outside the raptor nesting season. Also, please install bird diverters within ¼-mile of any lake, drainage, or riparian area, and within the raptor nesting buffer for occupied nests.
   - The lines to connect the project to Xcel's existing infrastructure on Isabelle Road will be permitted and constructed by Xcel Energy, and ensuring Xcel complies with these standards is out of our control.

E. Effect on significant cultural (archaeological and historical) resources and on other designated environmental resources:
    a. There will be no impact on significant cultural resources or designated environmental resources according to the Boulder County Comprehensive Plan maps.

F. Evaluation of any potential radiation hazard that may have been identified by the State or County Public Health Departments:
    a. No radiation hazard has been identified by the State of County Public Health Departments.

G. Evaluation of the expected demands and effects of the development on the ability of local governments and quasi-governmental agencies:
    a. The development is not expected to affect the ability of local governments and quasi-governmental agencies to provide water, sanitation, natural gas, electricity, access, fire, schools, hospitals, police, flood protection, solid waste disposal, and other services to this development while maintaining adequate levels of service to other areas.
        i. No water, sanitation, gas, access, schools, hospitals, flood protection, or solid waste disposal will be required for this project.
        ii. The development will be utilizing an existing access, so no new access is required.
        iii. Electricity will be provided to the development by Xcel Energy through an interconnection agreement with CBEP Solar 21, LLC.
        iv. The development should also not significantly increase the demands of police or fire.

H. Provision of financial guarantees for public or communal improvements
    a. There will be no provision of financial guarantees for public or communal improvements as part of this project. No public or communal improvements will be necessary as part of this project.

EXHIBIT A

ADJACENT PROPERTY OWNERS (APOs)

Account	Owner	Mailing Address	Mail City	Mail State	Mail Zip	Site Address
R0108451	AAL LOGAN & JONATHAN	9745 ISABELLE RD	LAFAYETTE	CO	80026	9745 ISABELLE RD
R0106848	ALDERMAN JODY HARPER & JOHN T	2711 N 95TH ST	BOULDER	CO	80301	2711 N 95TH ST
R0037122	BAILEY FAMILY TRUST	2200 S SHERMAN ST	DENVER	CO	80210-4415	0 ISABELLE RD
R0035167	BEITELSHEES FAMILY LIMITED PARTNERSHIP	9169 SOMERSET DR	BARKER	NY	14012	3395 N 95TH ST
R0060715	BEITELSHEES FAMILY LIMITED PARTNERSHIP	9169 SOMERSET DR	BARKER	NY	14012-9654	3305 N 95TH ST
R0036737	BELL JAMES E JR & FRANCES J	1950 W HICKORY HOLLOW LN	TUCSON	AZ	85704-0918	9760 ISABELLE RD
R0110102	CITY OF BOULDER	1777 BROADWAY	BOULDER	CO	80302	2349 N 95TH ST
R0036042	CITY OF BOULDER	PO BOX 791	BOULDER	CO	80306	3287 N 95TH ST
R0113872	CITY OF BOULDER	2520 55TH ST	BOULDER	CO	80301	0 AVOCET LN
R0114270	CITY OF BOULDER	1777 BROADWAY	BOULDER	CO	80302	0 N 95TH ST
R0104249	CITY OF LAFAYETTE	1290 S PUBLIC RD	LAFAYETTE	CO	80026	0 N 107TH ST
R0036951	CONDON NATALIE & JASON A	10029 ISABELLE RD	LAFAYETTE	CO	80026-9103	10029 ISABELLE RD
R0036239	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1	LONGMONT	CO	80503	3220 N 95TH ST
R0503239	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1	LONGMONT	CO	80503	0 N 95TH ST
R0503240	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1	LONGMONT	CO	80503	0 N 95TH ST
R0111002	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1	LONGMONT	CO	80503	0 N 95TH ST
P0230900	EXTRACTION OIL & GAS LLC	555 17TH STREET STE 3500	DENVER	CO	80202	
P0272821	EXTRACTION OIL & GAS LLC	555 17TH STREET STE 3500	DENVER	CO	80202	
P0272822	EXTRACTION OIL & GAS LLC	555 17TH STREET STE 3500	DENVER	CO	80202	
R0035855	FITCH MARK R	3451 95TH ST	BOULDER	CO	80301-4941	3451 N 95TH ST
R0089781	GOFF KATHRYN J	9810 ISABELLE RD	LAFAYETTE	CO	80026-9104	9810 ISABELLE RD
R0035509	GOULD DANIEL K & KATHRYN L MEYER	3415 95TH ST	BOULDER	CO	80301-4941	3415 N 95TH ST
R0106846	HARNESS FAMILY TRUST	3504 N 95TH ST	BOULDER	CO	80301-4931	3504 N 95TH ST
M9000016	HI LINE FARM	3504 95TH ST	BOULDER	CO	80301-4931	3508 N 95TH ST
R0108452	HORIZON TECHNOLOGY COMPANY LLC	1819 DENVER WEST DR STE 350	LAKEWOOD	CO	80401	9849 ISABELLE RD
R0035208	HORIZON TECHNOLOGY COMPANY LLC	1819 DENVER WEST DR STE 350	LAKEWOOD	CO	80401	9849 ISABELLE RD
R0603830	HUBBARD GERALD L & DELLA D	3319 95TH ST	BOULDER	CO	80301-4921	3319 N 95TH ST
R0068347	JABBERWOCKY LIVING TRUST	2892 95TH ST	BOULDER	CO	80301	2892 N 95TH ST
R0104736	JAKOSKY JOHN JAY IV & KRYSTAL	9760 ISABELLE RD	LAFAYETTE	CO	80026	9760 ISABELLE RD
R0104736	JAKOSKY JOHN JAY IV & KRYSTAL	9760 ISABELLE RD	LAFAYETTE	CO	80026	9762 ISABELLE RD
R0104736	JAKOSKY JOHN JAY IV & KRYSTAL	9760 ISABELLE RD	LAFAYETTE	CO	80026	9764 ISABELLE RD
R0104736	JAKOSKY JOHN JAY IV & KRYSTAL	9760 ISABELLE RD	LAFAYETTE	CO	80026	9768 ISABELLE RD
R0146894	KELSEY EDITH M ESTATE ET AL	2668 N 95TH ST	BOULDER	CO	80301	2892 N 95TH ST
R0505172	KELSEY EDITH M ESTATE ET AL	2668 N 95TH ST	BOULDER	CO	80301	2668 N 95TH ST
R0505169	KELSEY EDITH M ESTATE ET AL	2668 N 95TH ST	BOULDER	CO	80301	0 N 95TH ST
R0505170	KELSEY EDITH M ESTATE ET AL	2668 N 95TH ST	BOULDER	CO	80301	2668 N 95TH ST
R0505171	KELSEY EDITH M ESTATE ET AL	2668 N 95TH ST	BOULDER	CO	80301	0 N 95TH ST
M9900347	KELSEY ROBERT J	2788 N 95TH ST	BOULDER	CO	80301	2788 N 95TH ST
M9400064	KELSEY ROBERT JOHN	2788 95TH ST	BOULDER	CO	80301-4939	2788 N 95TH ST
R0035205	KENT JAMES & SUZANNE A HARNESS	3504 N 95TH ST	BOULDER	CO	80301-4931	0 N 95TH ST
R0036647	KUETTEL BARBARA ANN	6076 SIMMS ST	ARVADA	CO	80004	9862 ISABELLE RD
R0036955	L K LIVING TRUST	9770 ISABELLE RD	LAFAYETTE	CO	80026	9772 ISABELLE RD
R0036955	L K LIVING TRUST	9770 ISABELLE RD	LAFAYETTE	CO	80026	9770 ISABELLE RD
R0603831	LEFT HAND WATER DISTRICT	P O BOX 210	NIWOT	CO	80544-0210	3311 N 95TH ST
R0111902	LEYNER LANE ASSOCIATION	3358 VISTA DR	BOULDER	CO	80304-2325	0 ISABELLE
R0108450	LORENZ ROBERT M & JANIS M	9741 ISABELLE RD	LAFAYETTE	CO	80026	9741 ISABELLE RD
R0035760	MATTSON ANN L & PATRICK	3298 N 95TH ST	BOULDER	CO	80301	3298 N 95TH ST
R0036098	MONTGOMERY HOMESTEAD LLC	10286 ISABELLE RD	LAFAYETTE	CO	80026	10290 ISABELLE RD
R0036101	MONTGOMERY HOMESTEAD LLC	10286 ISABELLE RD	LAFAYETTE	CO	80026	10286 ISABELLE RD
R0035762	PIERCE DANIEL JAMES & JEAN MARIE	3280 N 95TH ST	BOULDER	CO	80301	3280 N 95TH ST
R0084538	PLEASANT VIEW GRANGE NO 164 INC	3400 95TH ST	BOULDER	CO	80301	3400 N 95TH ST
R0400134	PUBLIC SERVICE CO OF COLORADO - XCEL	PO BOX 1979	DENVER	CO	80201-1979	3001 N 95TH ST
R0400135	PUBLIC SERVICE CO OF COLORADO - XCEL	PO BOX 1979	DENVER	CO	80201-1979	3408 N 95TH ST
R0035495	SCHREIBER-BOHNENKAMP NOELLE E ET AL	3151 95TH ST	BOULDER	CO	80301	3151 N 95TH ST
R0089782	SWIRES LIVING TRUST	9820 ISABELLE RD	LAFAYETTE	CO	80026-9104	9820 ISABELLE RD
R0035697	SWIRES LIVING TRUST	9820 ISABELLE RD	LAFAYETTE	CO	80026-9104	9830 ISABELLE RD
R0036562	UNION PACIFIC LAND RESOURCES	PO BOX 1330	HOUSTON	TX	77251-1330	0 ISABELLE RD
M9000050	UNKNOWN OWNER OF RECORD	9770 ISABELLE RD	LAFAYETTE	CO	80026	9770 ISABELLE RD
R0105287	VOGEL CYNTHIA L ET AL	4453 CR 7	ERIE	CO	80516-8907	3280 N 95TH ST

CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Solar Energy System Development Report

A. Installation Plan:

CBEP Solar 21, LLC will install the solar energy system using a minimally invasive approach that includes installing the steel piles using rubber track-mounted, state of the art machines without the need for traditional earthmoving heavy equipment. The pile-driven steel posts will disturb very little soil. The total disturbed area will be 7 acres or less according to the site plan (see attached site plan in Exhibit A). CBEP Solar 21, LLC will coordinate and monitor all best management practices and construction installation will be strictly monitored and coordinated with the stormwater permitting requirements. Any soil disturbed during the installation process will be returned to its original condition using a tractor attachment designed to regrade with minimal to no compaction.

Our pile-driving machines and skid steers all have rubber tracks designed to minimize disturbance and compaction outside of the access roads and staging areas. To limit compaction, long-term material staging and vehicle traffic will be limited to access roads and staging areas. Construction activities will be limited to good weather days and unnecessary vehicle traffic will be eliminated. Additionally, instead of a traditional regrading and compacting approach, CBEP Solar 21, LLC and its contractor will use an agricultural scraper to restore soils which eliminates compaction and provides more effective revegetation.

B. Management Plan:

The soil quality will be maintained and improved via regenerative agriculture techniques such as rotational grazing of sheep and no-till farming. The soil will be left undisturbed for the duration of the solar project's life, which will enhance the soil's moisture retention, sequester carbon, rebuild top soil, and improve biodiversity.

The agricultural integrity of the land will be maintained and improved via regenerative agriculture techniques such as rotational grazing of sheep and no-till farming. The sheep grazing will keep the land agriculturally productive for the life of the solar project.

By not tilling the soil, the soil's health will improve during the solar project's life, preserving the long-term agricultural integrity of the land.

SPECIAL USE REVIEW

HARVEST MOON SOLAR

PT OF THE SW 1/4 SECTION 21, T1N, R69W OF THE 6TH P.M.
COUNTY OF BOULDER, STATE OF COLORADO

LEGAL DESCRIPTION

PARCEL A: THE W 1/2 OF THE E 1/2 OF THE SW 1/4 OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH P.M., EXCEPT THE NORTH 390.00 FEET THEREOF AND EXCEPT ANY PORTION THEREOF LYING WITHIN THAT CERTAIN TRACT OF LAND CONVEYED TO THE LEYNER COTTONWOOD CONSOLIDATED DITCH COMPANY BY DEED RECORDED MAY 27, 19030 IN BOOK 254 AT PAGE 574.

PARCEL B: THE EAST 60.00 FEET OF THE NORTH 390.00 FEET OF THE W 1/2 OF THE E 1/2 OF THE SW 1/4 OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH P.M., EXCEPT ANY PORTION THEREOF LYING WITHIN THAT CERTAIN TRACT OF LAND CONVEYED TO THE LEYNER COTTONWOOD CONSOLIDATED DITCH COMPANY BY DEED RECORDED MAY 27, 1903, IN BOOK 254 AT PAGE 574, COUNTY OF BOULDER, STATE OF COLORADO.

CONTAINING 1,502,591 SQUARE FEET OR 34.495 ACRE, MORE OR LESS

PROPERTY OWNER'S CERTIFICATION

THE UNDERSIGNED PROPERTY OWNER(S) DO(ES) HEREBY AGREE TO THE SITE SPECIFIC DEVELOPMENT PLAN AND USE BY SPECIAL REVIEW DEVELOPMENT STANDARDS AS DESCRIBED HEREON

THIS ______ DAY OF __________________, 20_____,

____

SIGNATURE - L K LIVING TRUST

PLANNING COMMISSION CERTIFICATION

THIS IS TO CERTIFY THAT THE BOULDER COUNTY PLANNING COMMISSION HAS CERTIFIED AND DOES HEREBY RECOMMEND TO THE BOARD OF COUNTY COMMISSIONERS, BOULDER COUNTY, COLORADO, FOR ITS CONFIRMATION, APPROVAL AND ADOPTION THIS SITE SPECIFIC DEVELOPMENT PLAN AND USE BY SPECIAL REVIEW AS SHOWN AND DESCRIBED HEREON

THIS ______ DAY OF __________________, 20_____,

____

CHAIR, BOULDER COUNTY PLANNING COMMISSION

BOARD OF COUNTY COMMISSIONERS CERTIFICATION

THIS IS TO CERTIFY THAT THE BOARD OF COUNTY COMMISSIONERS, BOULDER COUNTY, COLORADO DOES HEREBY CONFIRM AND ADOPT THIS SITE SPECIFIC DEVELOPMENT PLAN AND USE BY SPECIAL REVIEW AND THE DEVELOPMENT STANDARDS AS SHOWN AND DESCRIBED HEREON

THIS ______ DAY OF __________________, 20_____,

____

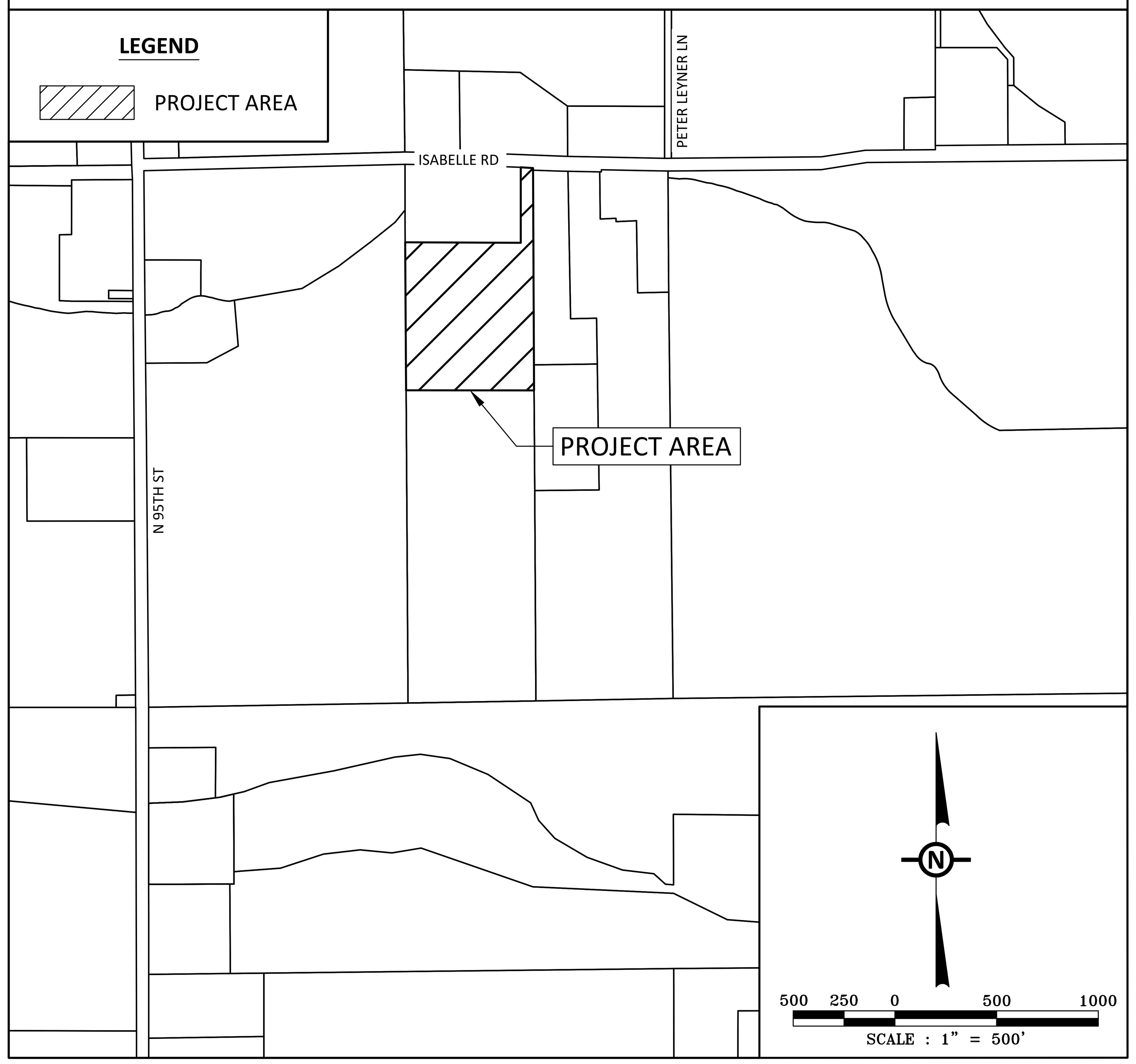
CHAIR, BOARD OF COUNTY COMMISSIONERS

ATTEST:

BOULDER COUNTY CLERK TO THE BOARD

BY: ________________________ DATED:___________________
DEPUTY CLERK TO THE BOARD

VICINITY MAP



SITE DATA

CASE #: USRXX-XXXX
ZONE DISTRICT: A (AGRICULTURAL)
PROPERTY ADDRESS: TBD
PROPERTY AREA: 34.495 AC
SOLAR ENERGY FACILITY AREA: 10.70 AC
LEASE AREA: 10.70 AC
SOILS: MANTER SANDY LOAM (HSG A), ASCALON SANDY LOAM (HSG B), ASCALON OTERO COMPLEX (HSG B)
ESTIMATED CONSTRUCTION LAND DISTURBANCE: 7.00 ACRES

SHEET INDEX

APPLICANT

CBEP SOLAR 21, LLC
PO BOX 1255
STERLING, CO 80751
ZACH BRAMMER
ZACH@CLOUDBREAKENERGY.COM

SURVEYOR

EHRHART LAND SURVEYING
PO BOX 930
ERI, COLORADO 80516
(303) 828-3340
WWW.COLORADOLS.COM

ENGINEER

TRC ENGINEERS, INC.
700 HIGHLANDER BLVD, SUITE 210
ARLINGTON, TX 76015
ALLYSON WILLIAMSON
AWILLIAMSON@TRCCOMPANIES.COM
(504) 258-0791

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TRC
TRC Companies, Inc.
700 Highlander Blvd.
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Tel: 817-522-1000
www.trccompanies.com

STAMP:

INTERIM REVIEW DOCUMENTS
NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMITTING PURPOSES
ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: TITLE SHEET

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)
0 ½" 1"

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: AS SHOWN
SHEET NO.: C-001

SITE SPECIFIC DEVELOPMENT PLAN
USE BY SPECIAL REVIEW PERMIT
DEVELOPMENT STANDARDS
L K LIVING TRUST, C/O CBEP SOLAR X, LLC
USRXX-XXXX

GENERAL NOTES

1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE INSTALLATION OF A SOLAR GENERATION FACILITY.
2. EXISTING TOPOGRAPHIC DATA TAKEN FROM ALTA/NSPS LAND TITLE SURVEY BY EHRHART LAND SURVYEING. GEOGRAPHIC SYSTEM USED: NORTH AMERICAN DATUM OF 1983 (NAD83), NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), COLORADO NORTH ZONE STATE PLANE COORDINATES.
3. PROPERTY BEARING & DISTANCES RECORDED IN SURVEY BY EHRHART LAND SURVEYING, FEBRUARY 10TH, 2023.

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CALL COLORADO 811 AT 1-800-922-1987 AT LEAST 72 HOURS (SATURDAYS, SUNDAYS, AND HOLIDAYS EXCLUDED) PRIOR TO EXCAVATING AT ANY LOCATION.
2. A COPY OF THE COLORADO 811 PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER'S REPRESENTATIVE PRIOR TO EXCAVATION. LOCATIONS OF EXISTING PIPES, CONDUITS, UTILITIES AND OTHER UNDERGROUND OBJECTS ARE NOT WARRANTED TO BE CORRECT AND THE CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN SHOWN.
3. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. CONTRACTOR SHALL NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, OR EXCAVATE WITHOUT APPROPRIATE PERMITS.
4. CONTRACTOR IS RESPONSIBLE FOR OBTAINING STREET OCCUPANCY; STREET OPENINGS; AND TRENCH PERMITS FROM THE DPW ENGINEERING DIVISION BEFORE CONSTRUCTION.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY: CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
6. CONTRACTOR SHALL ENSURE THE MAINTENANCE OF SAFETY AND TRAFFIC FLOW ON THE PUBLIC AND PRIVATE WAYS AFFECTED BY THE CONSTRUCTION OF THIS PROJECT. THE CONSTRUCTION SITE MUST BE ACCESSIBLE TO EMERGENCY VEHICLES AT ALL TIMES.
7. CONTRACTOR SHALL CAREFULLY COORDINATE ALL WORK WITH THAT OF HIS/HER SUBCONTRACTOR, THE OWNER'S REPRESENTATIVE, OTHER CONTRACTORS WORKING WITHIN THE PROJECT LIMITS. WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO THE BOULDER COUNTY DPW AND THE TOWN OF MILLIKEN DPW STANDARDS.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING THE LIMITS OF WORK IN THE FIELD BASED ON THE SITE PLAN AND ANY EXISTING CONDITIONS SURVEY INFORMATION THAT MAY BE PROVIDED BY THE OWNER.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING THE LINE AND GRADE OF ALL EARTHWORK INCLUDING SITE GRADING AND ACCESS ROADS. ALL SURVEY WORK SHALL BE PERFORMED UNDER THE SUPERVISION OF A COLORADO-LICENSED PROFESSIONAL LAND SURVEYOR.
10. CONTRACTOR WILL PROVIDE A SMOOTH, FLUSH TRANSITION BETWEEN NEW AND EXISTING PAVEMENTS.
11. TRAFFIC SIGNAGE SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). ALL PAVEMENT MARKINGS CHANGED, ALTERED OR REMOVED SHALL BE RE-APPLIED.
12. IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
13. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY CONTRACTOR'S OPERATIONS, TO INCLUDE DELIVERIES AND CONSTRUCTION LOAD DAMAGE, SHALL BE RESTORED BY CONTRACTOR TO THEIR ORIGINAL CONDITION AT CONTRACTOR'S EXPENSE.
14. AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH CRUSHED STONE SHALL RECEIVE LOAM AND SEED AS NEEDED.
15. CONTRACTOR SHALL NOT PERFORM ANY WORK ON PROPERTIES ADJACENT TO THE SITE AND SHALL USE BEST EFFORTS TO MINIMIZE DISRUPTION TO THOSE ADJACENT PROPERTIES (INCLUDING SEDIMENT CONTROL, DUST CONTROL, TRAFFIC CONTROL, TRASH CONTROL, AND NOISE CONTROL). CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF ADJACENT PROPERTIES ARE AFFECTED.
16. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO DRAINAGE SYSTEM: OFF SITE AREAS; AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER AND BOULDER COUNTY. THE PROPOSED WORK SHALL NOT ALTER EXISTING DRAINAGE PATTERNS. SEE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
17. FOUNDATIONS AND OTHER UNDERGROUND OBJECTS ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN SHOWN ON THESE PLANS.
18. TEST PITS TO LOCATE EXISTING UTILITIES MAY BE ORDERED BY OWNER'S REPRESENTATIVE.
19. STONE WALLS, FENCES, MAIL BOXES, SIGNS, CURBS, LIGHT POLES, ETC. SHALL BE REMOVED AND REPLACED AS NECESSARY TO PERFORM THE WORK. UNLESS OTHERWISE INDICATED, ALL SUCH WORK SHALL BE INCIDENTAL TO CONSTRUCTION OF THE PROJECT.
20. ALL PAVEMENT DISTURBED BY CONTRACTOR'S OPERATIONS SHALL BE REPLACED TO MATCH EXISTING.
21. CONTRACTOR SHALL COMPLETE ALL STAKEOUT, SURVEYS, ETC. REQUIRED FOR CONSTRUCTION OF THE PROJECT AS SHOWN AND AS SPECIFIED.
22. INLET PROTECTION SHALL BE PROVIDED ON ALL CATCH BASINS FOR THE DURATION OF THE PROJECT.
23. ANY CHANGES TO THE PLAN SHALL BE SUBMITTED BY CONTRACTOR FOR REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE.
24. CONTRACTOR SHALL PERFORM CONTINUOUS MONITORING AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROLS THROUGHOUT THE CONSTRUCTION PERIOD AND IN ACCORDANCE WITH THE PERMITS.

NATURAL FEATURES NOTE

1. AS INDICATED ON THE U.S. FISH & WILDLIFE SERVICE WETLANDS MAPPER LAST UPDATED 2021, THERE ARE NO STREAMS AND WETLANDS LOCATED WITHIN THE SUBJECT PROPERTY OF THIS DEVELOPMENT.

NATURAL FEATURES NOTE

1. AS INDICATED ON THE U.S. FISH & WILDLIFE SERVICE WETLANDS MAPPER LAST UPDATED 2021, THERE ARE STREAMS AND WETLANDS LOCATED WITHIN THE SUBJECT PROPERTY OF THIS DEVELOPMENT.

SITE DEMOLITION/REMOVAL NOTES

1. UTILITIES REQUIRING INTERRUPTION, CAPPING OR REMOVAL - EXISTING SEWER, WATER AND ELECTRIC UTILITY LINES, AS WELL AS STRUCTURES WITHIN THE CONTRACT AREA SHALL REMAIN AND BE PROTECTED FROM DAMAGE FROM CONSTRUCTION ACTIVITY, UNLESS REMOVAL OF SAME IS SPECIFICALLY NOTED.
2. ADDITIONAL UTILITIES MAY EXIST WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL USE CAUTION WHILE WORKING NEAR THESE UTILITIES TO AVOID DAMAGE TO THEM DURING CONSTRUCTION. ANY DAMAGE TO THESE UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR EXPENSE AND TO THE SATISFACTION OF THE UTILITY OWNER.
3. CONTRACTOR SHALL NOTIFY THE OWNER'S FIELD REPRESENTATIVE FOR RESOLUTION OF ANY ABANDONED PIPES AND/OR UTILITIES WHICH ARE NOT NOTED ON THE SURVEY BUT ARE ENCOUNTERED DURING EXCAVATION.
4. CONTRACTOR SHALL REPLACE ANY EXISTING CURBS OR PAVEMENTS THAT WERE INTENDED TO REMAIN BUT ARE DAMAGED OR DISTURBED DURING CONSTRUCTION. IF REPLACEMENT IS NECESSARY, IT SHALL BE DONE AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR SHALL REMOVE, EXCAVATE, AND DISPOSE OF ALL MATERIALS ACCORDING TO THE PROJECT SPECIFICATIONS.
6. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM THE APPROPRIATE AGENCIES PRIOR TO COMMENCING WORK.

SANITARY

1. THE PROJECT WILL NOT INCREASE THE SEWAGE DISPOSAL NEEDS FOR THE SITE AND THEREFORE, DOES NOT REQUIRE SANITARY SEWER EXTENSIONS, SEWER SERVICE CONNECTIONS OR ONSITE SEWAGE DISPOSAL SYSTEMS (OSDS).

WATER SUPPLY

1. THE PROJECT DOES NOT REQUIRE DOMESTIC WATER SUPPLY.

WETLAND NOTES

WETLANDS AND STREAMS WERE DELINEATED BY TRC ON 11/01/2021. BASED ON DELINEATION STUDY, NO WETLANDS OR STREAMS WERE FOUND ON SITE.

FLOODPLAIN NOTES

ACCORDING TO THE FEMA MAPPING FIRM PANEL NUMBERS 08069C1001F AND 08069C1003G, THERE IS A MAPPED 100-YEAR/500-YEAR FLOODPLAIN IS LOCATED WITH THE PROJECT AREA.

1. FLOOD DATA ACQUIRED FROM FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) NATIONAL FLOOD HAZARD LAYER (NFHL), VERSION 1.1.1.0, PUBLISHED 2006-12-19 AND 2012-05-02. EFFECTIVE PANELS WERE RELEASED IN 2016.
2. FEMA'S FLOODPLAIN BOUNDARIES MAY BE UPDATED AT ANY TIME BY FEMA. PRIOR TO THE START OF ANY DEVELOPMENT ACTIVITIES, THE OWNER SHOULD CONTACT LARIMER COUNTY TO DETERMINE IF THE FLOODPLAIN BOUNDARIES HAVE BEEN MODIFIED. (DEPARTMENT OF PLANNING SERVICES - FLOODPLAIN)

LIGHTING NOTES

1. NO LIGHTING SHALL BE PERMITTED WHICH WOULD GLARE ONTO ANY STREET, INTO ANY ADJACENT PROPERTY, OR BE DEEMED AS LIGHTING TRESPASS, E.G., THE SHINING OF LIGHT PRODUCED BY A FIXTURE BEYOND THE BOUNDARIES OF THE PROPERTY ON WHICH SUCH FIXTURE IS LOCATED.
2. NO FLASHING LIGHTS OR STROBE LIGHTS ARE PERMITTED, EITHER AFFIXED, NON-AFFIXED, OR INTERNAL WHICH WOULD BE SEEN FROM ANY ADJACENT PROPERTY, ROAD OR AERIAL LOCATION, EXCEPT IN SITUATIONS INVOLVING PUBLIC HEALTH OR SAFETY.

CLOUDBREAK
WWW.CLOUDBREAKENERGY.COM

TRC Companies, Inc.
700 Highlander Blvd.
Ste. 210
Arlington, TX 76015
Tel: 817-522-1000
www.trccompanies.com

STAMP:

INTERIM REVIEW DOCUMENTS

NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMITTING PURPOSES

ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD,
LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: GENERAL NOTES

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

0 ½" 1"

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE:	5/1/23
DRAWN BY:	TRC
ENGINEER:	AW
APPROVED BY:	---
PROJECT PHASE:	USR PLANS
SCALE:	NONE
SHEET NO.:	C-002

C:\pwworking\trc\d0292987\C-002 General Notes.dwg [5-01-2023 9:33:49 AM BY: phall]

PROJECT PROPERTY INFORMATION

PARCEL #	PARCEL ID	ACCOUNT #	OWNER NAME	OWNER ADDRESS
A	146521000013	M9000050	L K LIVING TRUST	9770 ISABELLE RD LAFAYETTE, CO 80026

LIST OF ADJACENT PROPERTY OWNERS

PARCEL #	PARCEL ID	ACCOUNT #	OWNER NAME	OWNER ADDRESS
1	146521001002	R0089781	KATHRYN J GOFF	9810 ISABELLE RD LAFAYETTE, CO 80026
2	146521001003	R0089782	SWIRES LIVING TRUST	9820 ISABELLE RD LAFAYETTE, CO 80026
3	146521001001	R0035697	SWIRES LIVING TRUST	9820 ISABELLE RD LAFAYETTE, CO 80026
4	146528100001	R0146894	KELSEY EDITH M ESTATKELSEY EDITH M ESTATE ET AL & KELSEY FAMILY TRUST ET AL	2668 N 95TH ST BOULDER, CO 80301
5	146521000010	R0036239	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1 LONGMONT, CO 80503
6	146521000031	R0111002	COUNTY OF BOULDER	5201 ST VRAIN RD BLDG 1 LONGMONT, CO 80503
7	146521000011	R0104736	JOHN JAY IV & KRYSTAL JAKOSKY	9768 ISABELLE RD LAFAYETTE, CO 80026
8	146521000005	M9000016	HI LINE FARM	3504 95TH ST BOULDER, CO 80301
9	1465210040011	R0108450	ROBERT M & JANIS M LORENZ	9741 ISABELLE RD LAFAYETTE, CO 80026
10	146521004002	R0108451	LOGAN & JONATHAN AAL	9745 ISABELLE RD LAFAYETTE, CO 80026
11	146521004003	R0035208	HORIZON TECHNOLOGY COMPANY LLC	1819 DENVER WEST DR STE 350 LAKEWOOD, CO

EXISTING FEATURES

- PROJECT PROPERTY
- ADJACENT PROPERTY
- SOLAR LEASE AREA
- 1 — PROPERTY NUMBER
- RIGHT-OF-WAY
- EASEMENT/SETBACK
- EXISTING ASPHALT ROAD
- EXISTING PRIVATE ROAD
- EXISTING DITCH
- EXISTING CULVERT
- 4685 — EXISTING MAJOR CONTOURS
- 4686 — EXISTING MINOR CONTOURS
- SOILS BOUNDARY LINE
- MdB — SOILS CLASSIFICATION
- OE — OVERHEAD ELECTRICAL LINE
- G — UNDERGROUND GAS LINE (APPROX LOCATION)
- UTILITY POLE
- EXISTING FENCE
- 00 — EXISTING VITICULTURE FENCE
- FO — EXISTING FIBER OPTIC LINE
- TEL TEL — EXISTING TELEPHONE LINE

PROPOSED FEATURES

- GRAVEL ROAD
- X — FENCE
- SOLAR ARRAY
- OE OE OE — OVERHEAD ELECTRIC LINE
- UE UE UE — UNDERGROUND MV LINE
- UTILITY POLE
- EQUIPMENT PAD
- TRAFFIC FLOW ARROW

PROPOSED EROSION CONTROL FEATURES

- GRASS SWALE
- SILT FENCE

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ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT USRXX-XXXX

9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: PROPERTY & DISTANCE INFORMATION

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

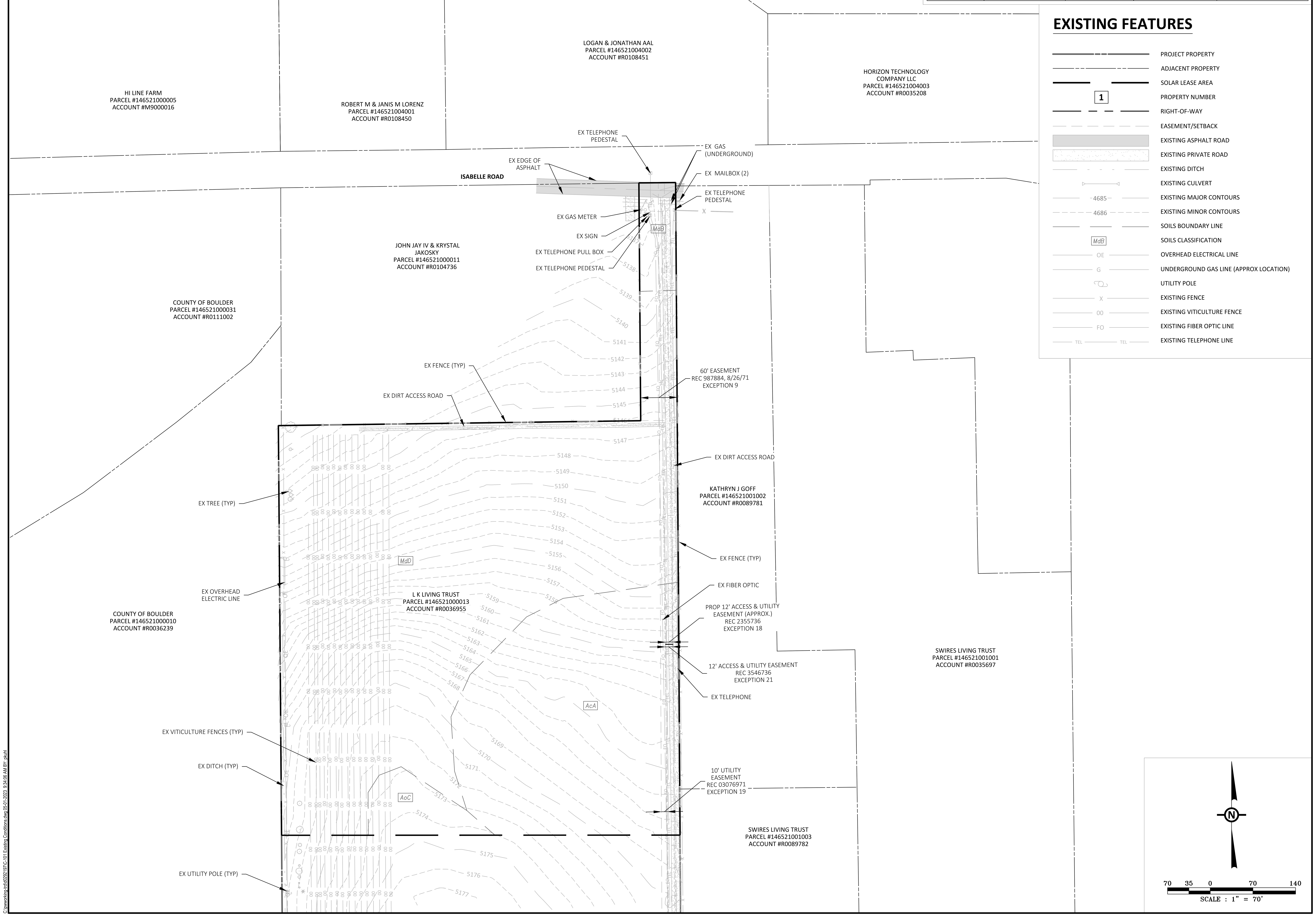
0 ½" 1"

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE:	5/1/23
DRAWN BY:	TRC
ENGINEER:	AW
APPROVED BY:	---
PROJECT PHASE:	USR PLANS
SCALE:	1" = 150'
SHEET NO.:	C-003

MAP UNIT SYMBOL	MAP UNIT NAME	DESCRIPTION	HYDROLOGICAL SOIL GROUP	AREA IN LEASE BOUNDARY (ac.)
AcA	ASCALON SANDY LAOM	0 TO 3 PERCENT SLOPES	B	3
AoC	ASCALON-OTERIO COMPLEX	3 TO 5 PERCENT SLOPES	B	0.3
MdB	MANTER SANDY LOAM	1 TO 3 PERCENT SLOPES	A	0.2
MdD	MANTER SANDY LOAM	3 TO 9 PERCENT SLOPES	A	7.1



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CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX
9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

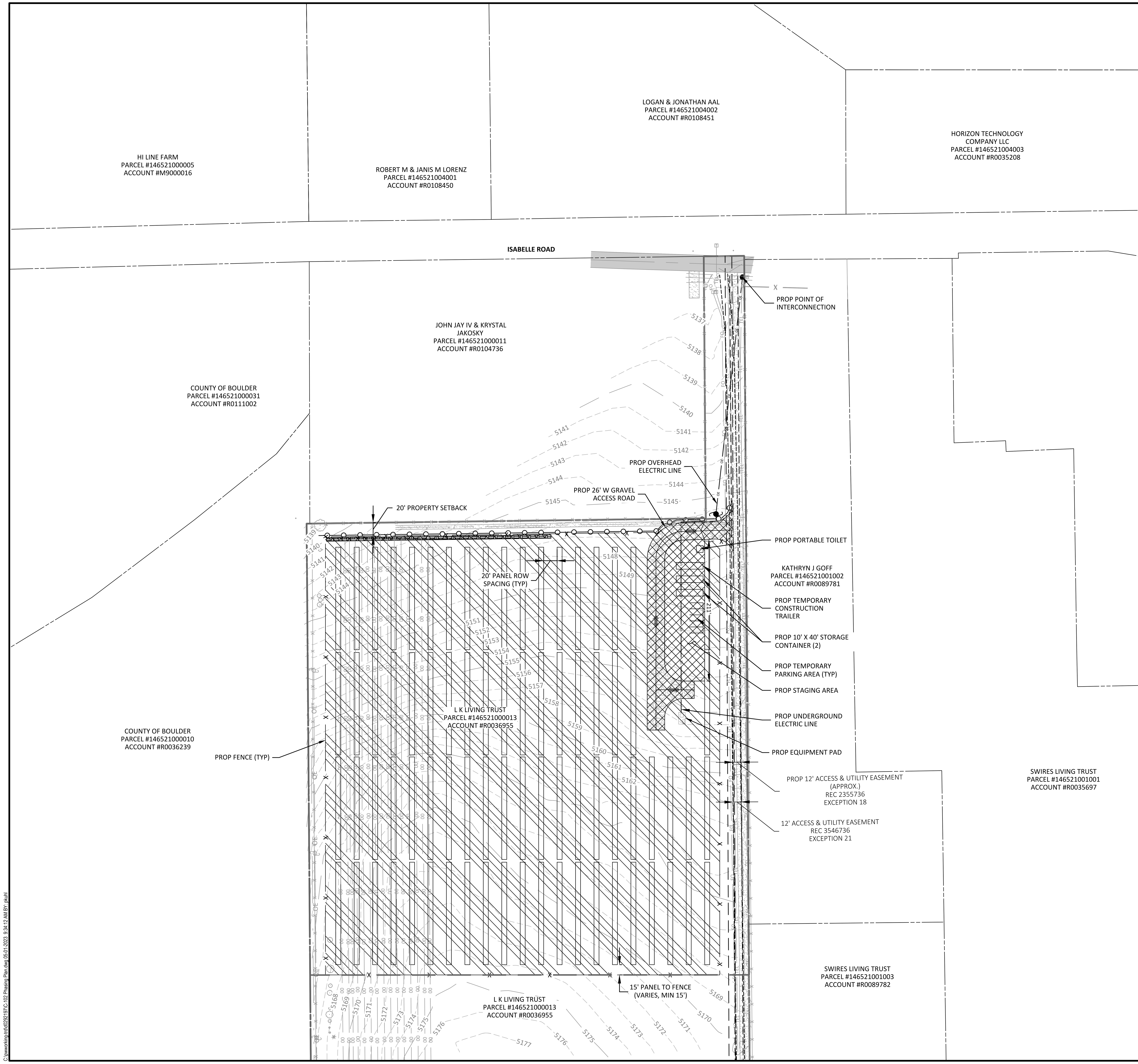
SHEET TITLE: EXISTING CONDITIONS

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 70'
SHEET NO.: C-101


HI LINE FARM
PARCEL #146521000005
ACCOUNT #M9000016
ROBERT M & JANIS M LORENZ
PARCEL #146521004001
ACCOUNT #R0108450
LOGAN & JONATHAN AAL
PARCEL #146521004002
ACCOUNT #R0108451
HORIZON TECHNOLOGY COMPANY LLC
PARCEL #146521004003
ACCOUNT #R0035208
ISABELLE ROAD
PROP POINT OF INTERCONNECTION
JOHN JAY IV & KRYSTAL JAKOSKY
PARCEL #146521000011
ACCOUNT #R0104736
COUNTY OF BOULDER
PARCEL #146521000031
ACCOUNT #R0111002
PROP OVERHEAD ELECTRIC LINE
PROP 26' W GRAVEL ACCESS ROAD
20' PROPERTY SETBACK
PROP PORTABLE TOILET
KATHRYN J GOFF
PARCEL #146521001002
ACCOUNT #R0089781
20' PANEL ROW SPACING (TYP)
PROP TEMPORARY CONSTRUCTION TRAILER
PROP 10' X 40' STORAGE CONTAINER (2)
PROP TEMPORARY PARKING AREA (TYP)
PROP STAGING AREA
L K LIVING TRUST
PARCEL #146521000013
ACCOUNT #R0036955
PROP UNDERGROUND ELECTRIC LINE
COUNTY OF BOULDER
PARCEL #146521000010
ACCOUNT #R0036239
PROP FENCE (TYP)
PROP EQUIPMENT PAD
PROP 12' ACCESS & UTILITY EASEMENT (APPROX.)
REC 2355736
EXCEPTION 18
SWIRES LIVING TRUST
PARCEL #146521001001
ACCOUNT #R0035697
12' ACCESS & UTILITY EASEMENT
REC 3546736
EXCEPTION 21
SWIRES LIVING TRUST
PARCEL #146521001003
ACCOUNT #R0089782
15' PANEL TO FENCE (VARIES, MIN 15')
L K LIVING TRUST
PARCEL #146521000013
ACCOUNT #R0036955
70 35 0 70 140
SCALE : 1" = 70'

EXISTING FEATURES

- PROJECT PROPERTY
- ADJACENT PROPERTY
- SOLAR LEASE AREA
- PROPERTY NUMBER
- RIGHT-OF-WAY
- EASEMENT/SETBACK
- EXISTING ASPHALT ROAD
- EXISTING PRIVATE ROAD
- EXISTING DITCH
- EXISTING CULVERT
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- SOILS BOUNDARY LINE
- SOILS CLASSIFICATION
- OVERHEAD ELECTRICAL LINE
- UNDERGROUND GAS LINE (APPROX LOCATION)
- UTILITY POLE
- EXISTING FENCE
- EXISTING VITICULTURE FENCE
- EXISTING FIBER OPTIC LINE
- EXISTING TELEPHONE LINE

PROPOSED FEATURES

- GRAVEL ROAD
- FENCE
- SOLAR ARRAY
- OVERHEAD ELECTRIC LINE
- UNDERGROUND MV LINE
- UTILITY POLE
- EQUIPMENT PAD
- TRAFFIC FLOW ARROW

PROPOSED EROSION CONTROL FEATURES

- GRASS SWALE
- SILT FENCE

CONSTRUCTION PHASES

- CONSTRUCTION PHASE 1
- CONSTRUCTION PHASE 2

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ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD,
LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

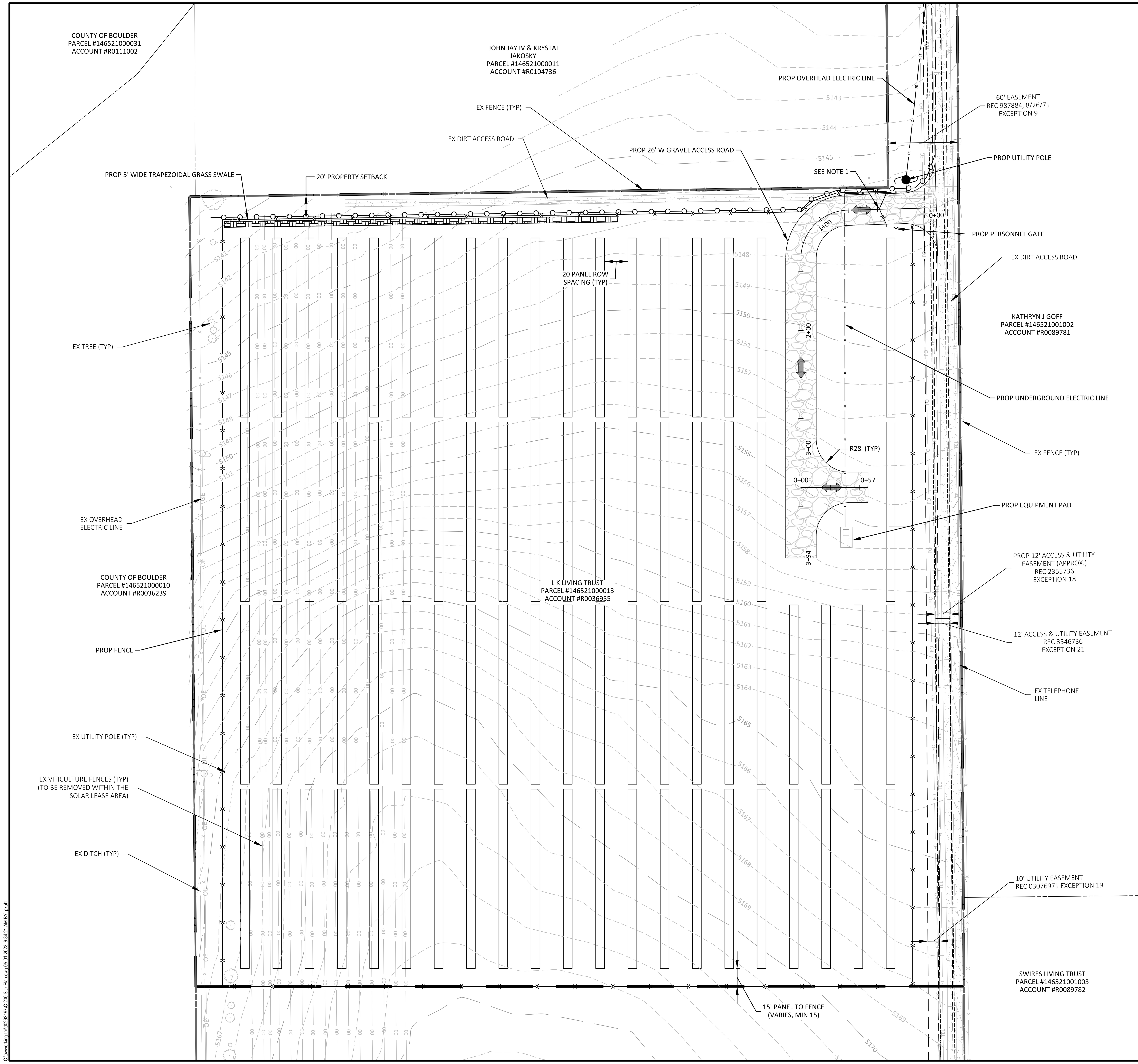
SHEET TITLE: PHASING PLAN

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 70'
SHEET NO.: C-102



EXISTING FEATURES

- PROJECT PROPERTY
- ADJACENT PROPERTY
- SOLAR LEASE AREA
- PROPERTY NUMBER
- RIGHT-OF-WAY
- EASEMENT/SETBACK
- EXISTING ASPHALT ROAD
- EXISTING PRIVATE ROAD
- EXISTING DITCH
- EXISTING CULVERT
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- SOILS BOUNDARY LINE
- SOILS CLASSIFICATION
- OVERHEAD ELECTRICAL LINE
- UNDERGROUND GAS LINE (APPROX LOCATION)
- UTILITY POLE
- EXISTING FENCE
- EXISTING VITICULTURE FENCE
- EXISTING FIBER OPTIC LINE
- EXISTING TELEPHONE LINE

PROPOSED FEATURES

- GRAVEL ROAD
- FENCE
- SOLAR ARRAY
- OVERHEAD ELECTRIC LINE
- UNDERGROUND MV LINE
- UTILITY POLE
- EQUIPMENT PAD
- TRAFFIC FLOW ARROW

PROPOSED EROSION CONTROL FEATURES

- GRASS SWALE
- SILT FENCE

NOTES

1. MAIN ACCESS GATE. POST EMERGENCY CONTRACT SIGN (INCLUDE PROJECT OWNER, OPERATIONS, AND MAINTENANCE CONTRACTOR) AND ELECTRICAL HAZARD SIGN (SEE DETAIL SHEET C-402).

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CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX
9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

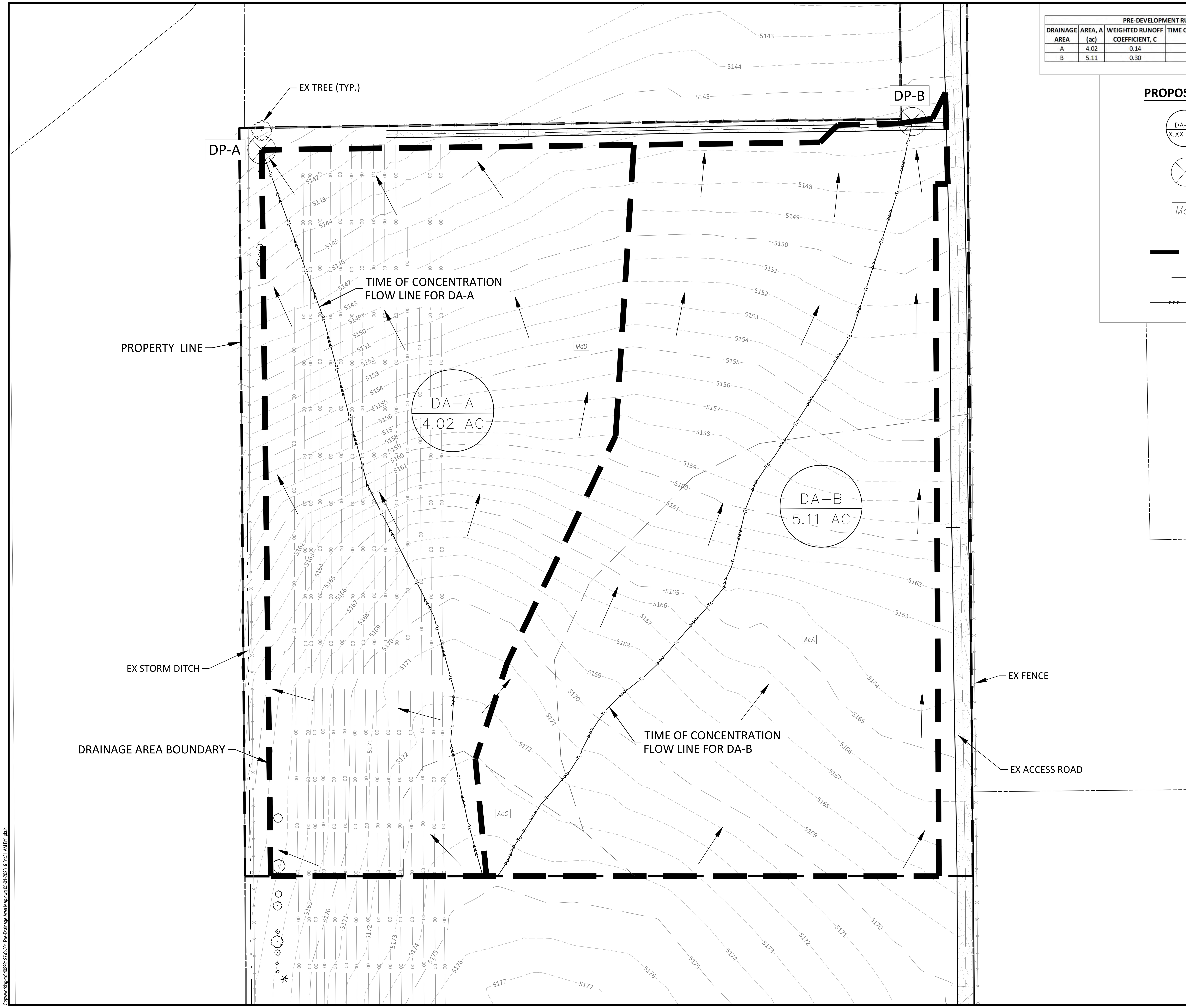
SHEET TITLE: SITE PLAN

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 40'
SHEET NO.: C-201



PRE-DEVELOPMENT RUNOFF CALCULATION PARAMETERS					
DRAINAGE AREA	AREA, A (ac)	WEIGHTED RUNOFF COEFFICIENT, C	TIME OF CONCENTRATION, Tc (min)	RAINFALL INTENSITY, I (in/hr)	100-YR, 24-HR PEAK FLOW (cfs)
A	4.02	0.14	27.94	4.30	2.42
B	5.11	0.30	27.59	4.33	6.64

PROPOSED DRAINAGE FEATURES

Symbol	Description
DA–X X.XX AC	DRAINAGE AREA
DP-X	DRAINAGE REACH
MdD	SOIL MAP UNIT SYMBOL
— —	DRAINAGE CATCHMENT BOUNDARY
→	FLOW ARROW
>>>—Tc—	TIME OF CONCENTRATION FLOW LINE

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5/1/23

HARVEST MOON SOLAR PROJECT USRXX-XXXX

9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: PRE DRAINAGE AREA MAP

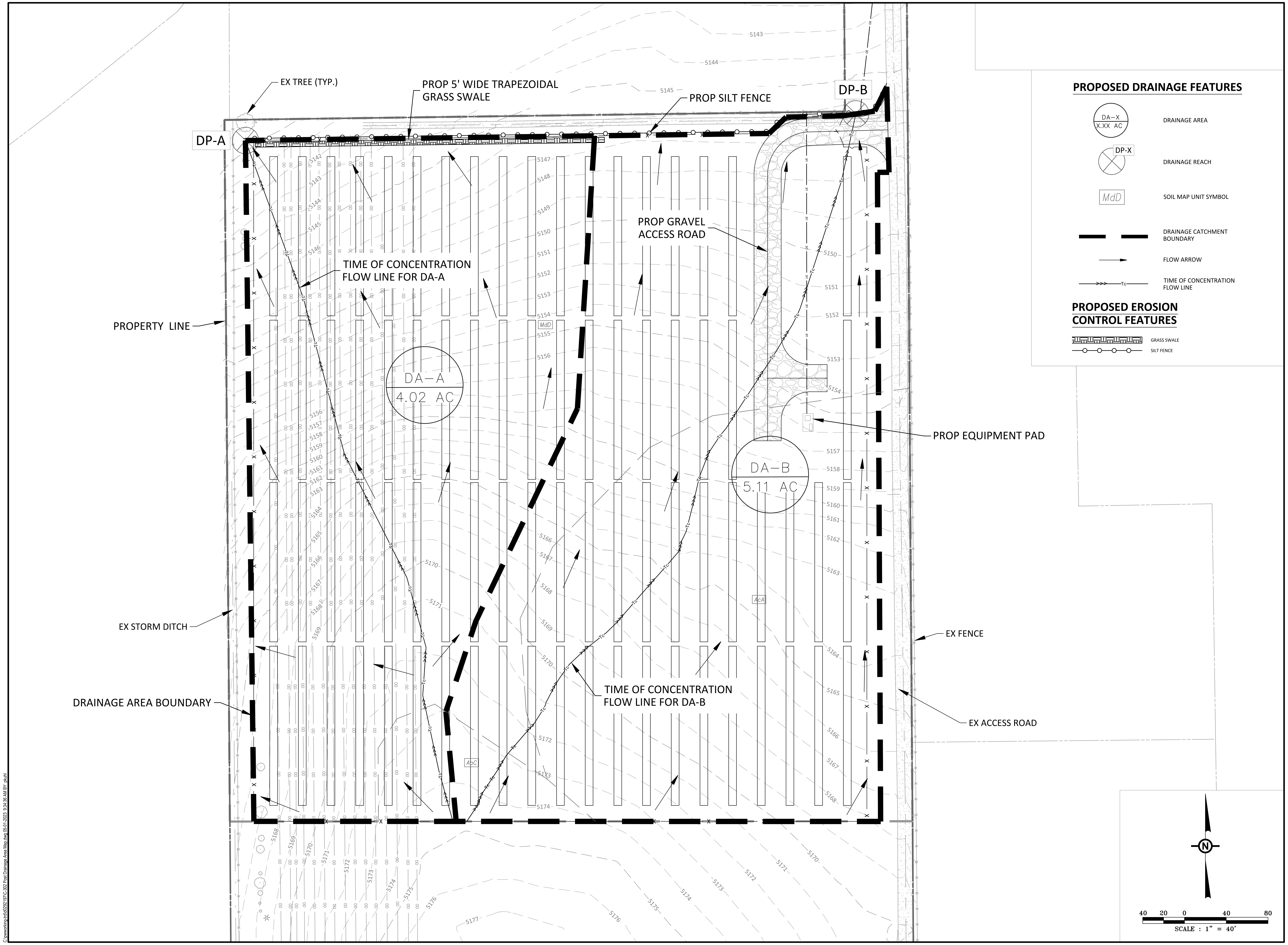
SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)
0 ½" 1"

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 40'
SHEET NO.: C-301

C:\pwworking\...\C-301 Pre-Drainage Area Map.dwg 05-01-2023 9:34:31 AM BY: pkuhl


EX TREE (TYP.)
PROP 5' WIDE TRAPEZOIDAL GRASS SWALE
PROP SILT FENCE
DP-A
DP-B
PROP GRAVEL ACCESS ROAD
TIME OF CONCENTRATION FLOW LINE FOR DA-A
PROPERTY LINE
DA–A
4.02 AC
DA–B
5.11 AC
PROP EQUIPMENT PAD
EX STORM DITCH
EX FENCE
DRAINAGE AREA BOUNDARY
TIME OF CONCENTRATION FLOW LINE FOR DA-B
EX ACCESS ROAD
PROPOSED DRAINAGE FEATURES
DA–X
X.XX AC
DRAINAGE AREA
DP-X
DRAINAGE REACH
MdD
SOIL MAP UNIT SYMBOL
DRAINAGE CATCHMENT BOUNDARY
FLOW ARROW
Tc
TIME OF CONCENTRATION FLOW LINE
PROPOSED EROSION CONTROL FEATURES
GRASS SWALE
SILT FENCE
N
40 20 0 40 80
SCALE : 1" = 40'

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5/1/23

HARVEST MOON SOLAR PROJECT USRXX-XXXX

9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: POST DRAINAGE AREA MAP

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

0 ½" 1"

ISSUED FOR PERMITTING
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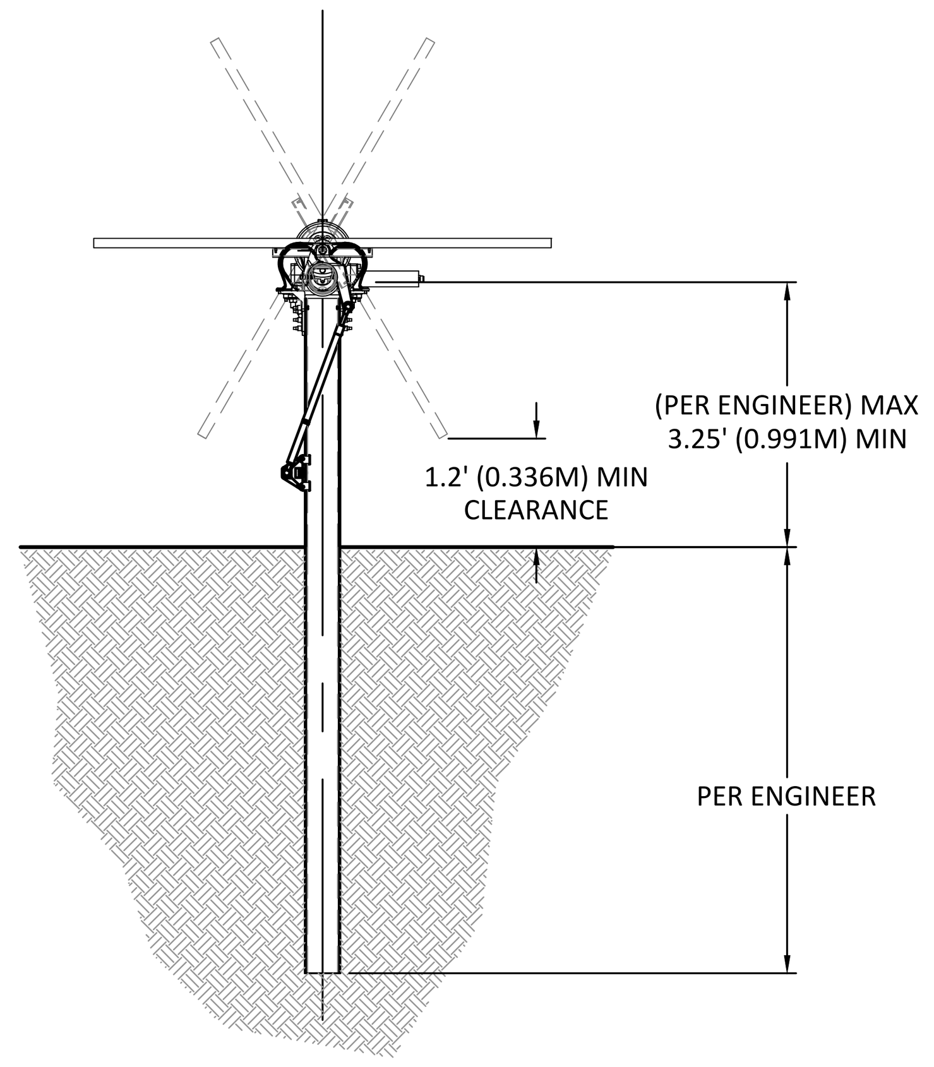
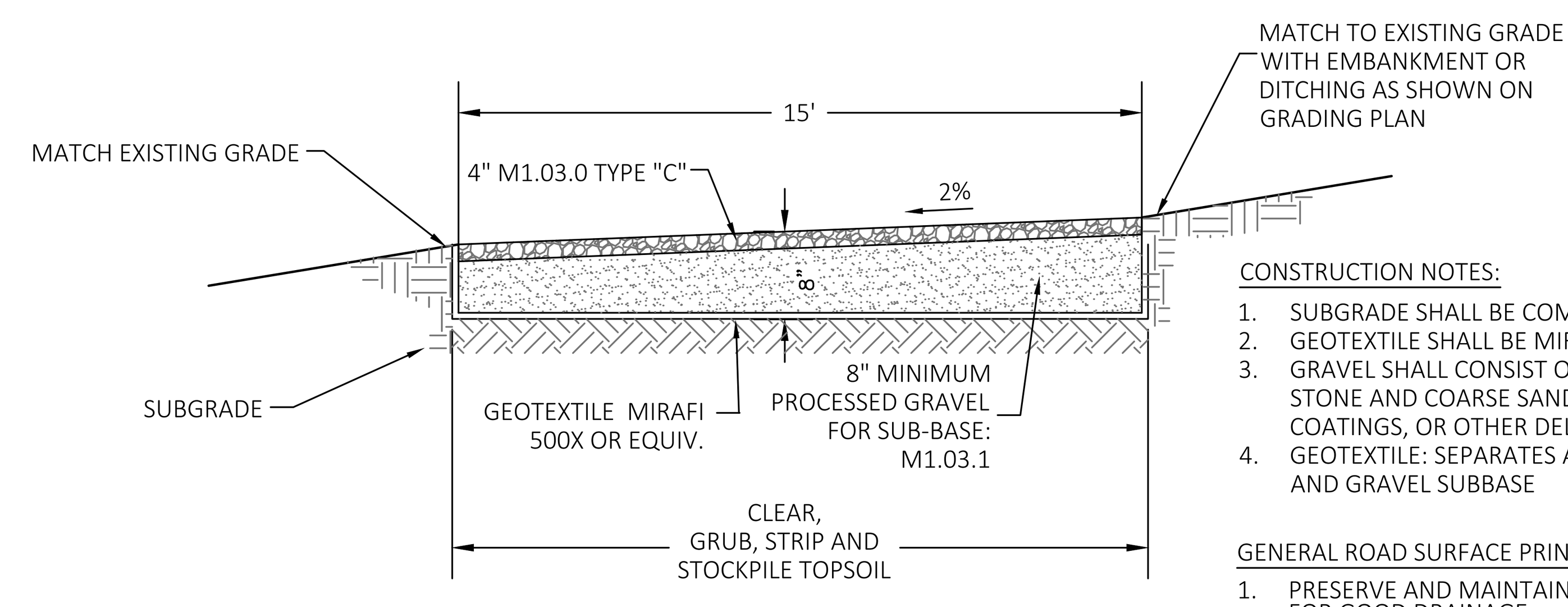
NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 40'
SHEET NO.: C-302



NOTE:
1. SINGLE-AXIS EAST-WEST TRACKER MODULES ARE CURRENTLY PROPOSED BUT MAY BE CHANGED TO FIXED TILT MODULES WITH FUTURE DESIGNS

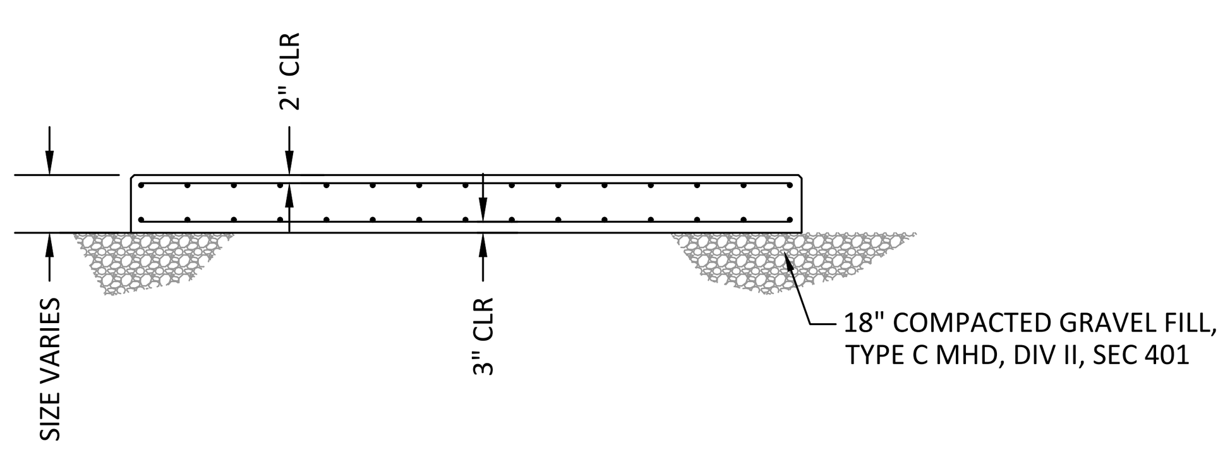
TRACKER WITH MODULES
NOT TO SCALE

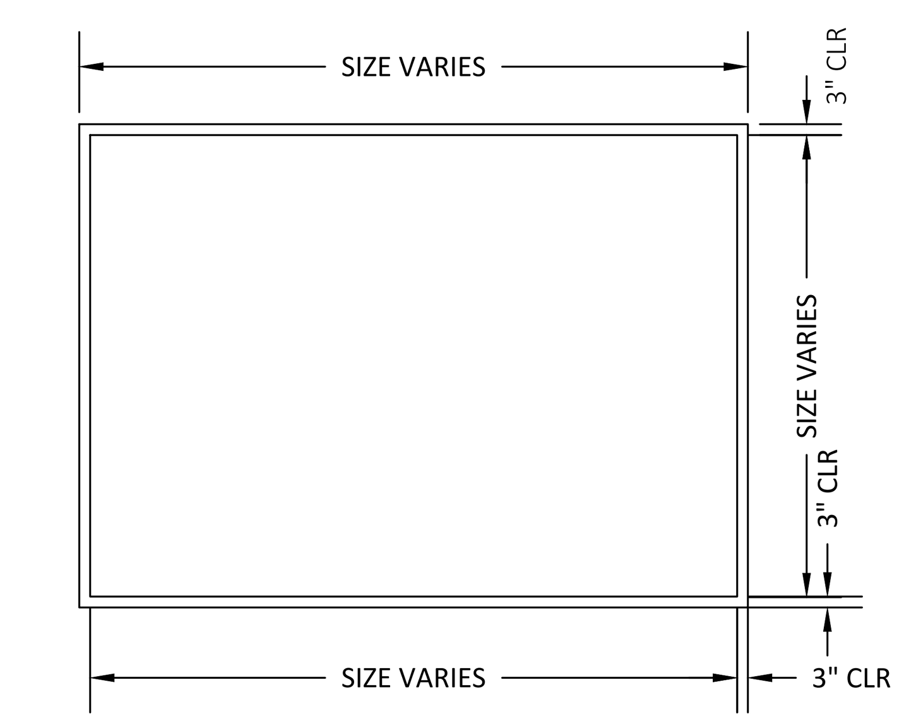


CONSTRUCTION NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 90% OF ASTM D1557.
2. GEOTEXTILE SHALL BE MIRAFI 500X OR APPROVED EQUAL.
3. GRAVEL SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND COARSE SAND, FREE FROM LOAM AND CLAY, SURFACE COATINGS, OR OTHER DELETERIOUS MATERIALS.
4. GEOTEXTILE: SEPARATES AND PREVENTS SETTLING BETWEEN SUBGRADE AND GRAVEL SUBBASE

GENERAL ROAD SURFACE PRINCIPLES:
1. PRESERVE AND MAINTAIN A PROPER CROWN OR SLOPE FOR GOOD DRAINAGE
2. KEEP ROAD SURFACE TIGHT AND IMPERVIOUS.
3. PERFORM REGULAR DRAINAGE AND MAINTENANCE AND GRADING.

TYPICAL ACCESS ROAD SECTION
NOT TO SCALE





NOTES:
1. CONCRETE TO BE 4000 PSI @ 28 DAYS.
2. MAX SLUMP: 4 INCHES (TO BE MEASURED PRIOR TO PUMPING AND ADDITION OF ADMIXTURES.)
3. REINFORCING SHALL BE ASTM A615 GR. 60 (60 KSI YIELD.)
4. USE ¾" CHAMFER ON ALL EXPOSED EDGES, UNLESS NOTED OTHERWISE.
5. FOUNDATIONS TO BE BACKFILLED & COMPACTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. ESTIMATED CONCRETE QUALITY IS FOR OWNER'S ASSET MANAGEMENT PURPOSES ONLY. CONTRACTOR IS RESPONSIBLE FOR DETERMINING QUANTITIES FOR CONSTRUCTION & BID PURPOSES.
7. EQUIPMENT ANCHORAGE TO BE HILTI ADHESIVE ANCHOR, DESIGNED UPON RECEIPT OF CERTIFIED EQUIPMENT DRAWINGS.

TYPICAL EQUIPMENT PAD DETAIL
NOT TO SCALE

T-2 **Grass Swale**

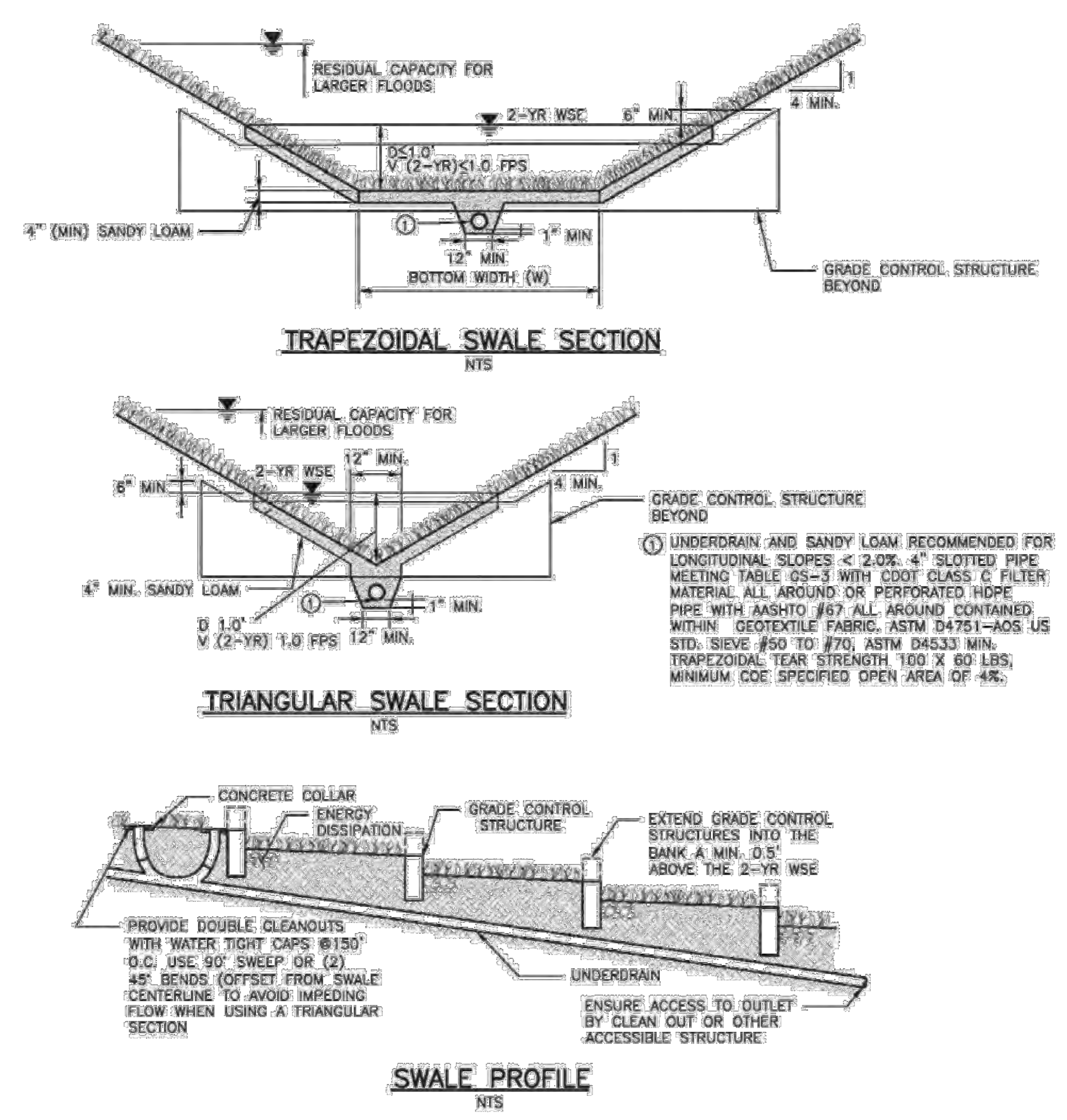
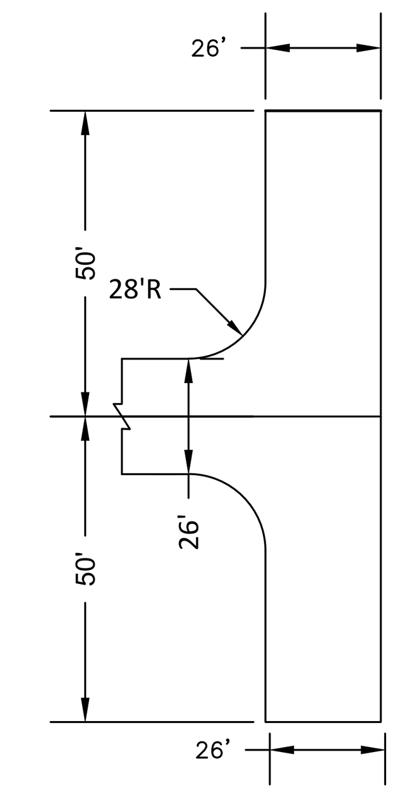


Figure GS-1. Grass Swale Profile and Sections

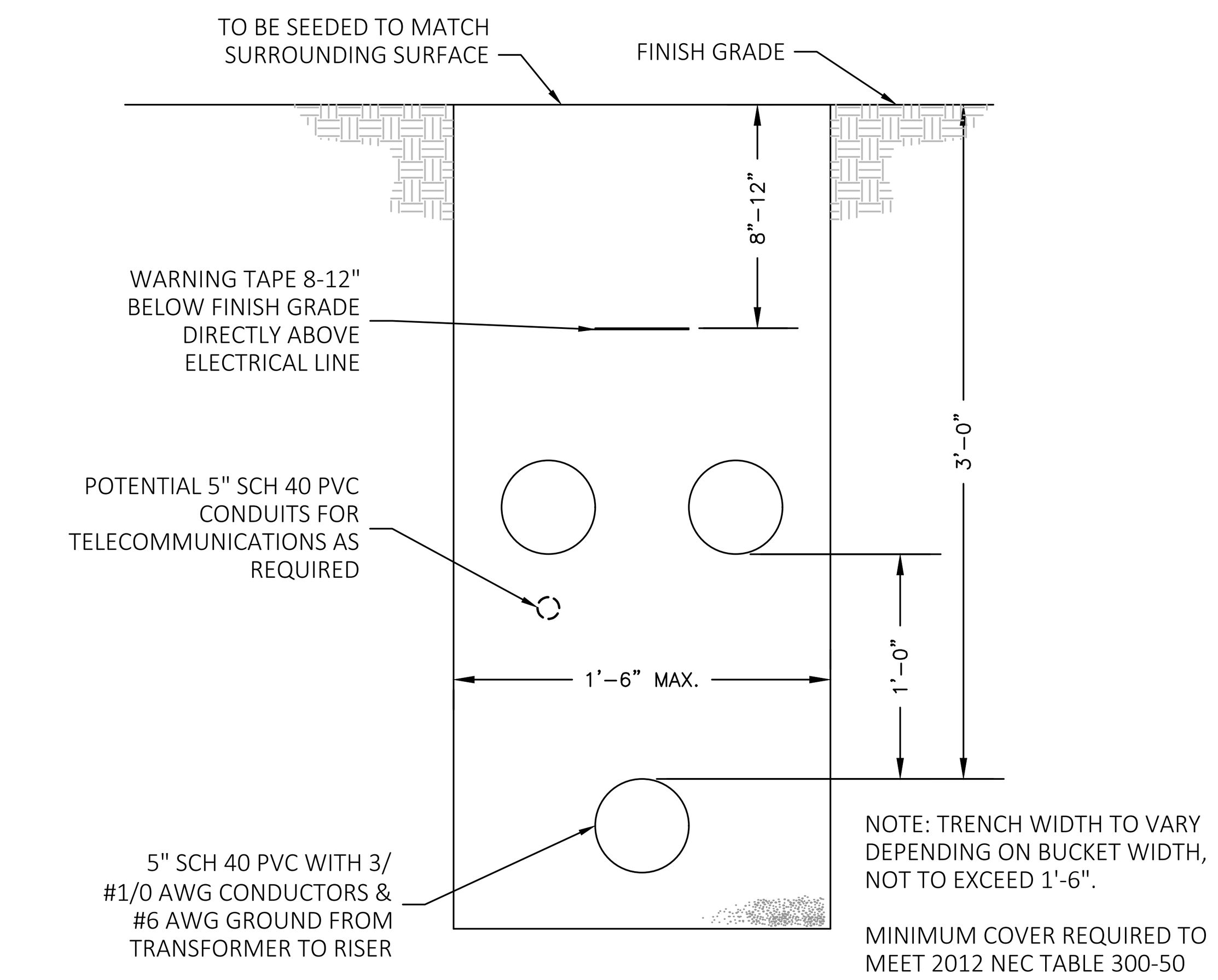
Design Example

The *UD-BMP* workbook, designed as a tool for both designer and reviewing agency is available at www.udfcd.org. This section provides a completed design form from this workbook as an example.

GS-6 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010



TURN AROUND DETAIL
NOT TO SCALE



NOTE: TRENCH WIDTH TO VARY DEPENDING ON BUCKET WIDTH, NOT TO EXCEED 1'-6".

MINIMUM COVER REQUIRED TO MEET 2012 NEC TABLE 300-50

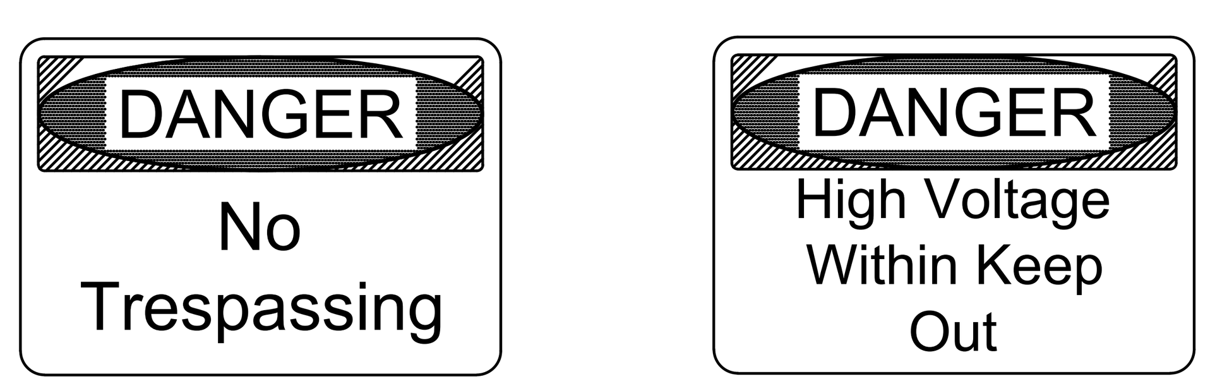
AC CONDUIT TRENCH DETAIL
NOT TO SCALE

TBD
LAFAYETTE, CO 80026

SITE OWNER: -----------
SITE OWNER NUMBER: ------------

O & M COMPANY: HARVEST MOON SOLAR
O & M COMPANY NUMBER: ---------

CONTACT PLAQUE DETAIL
NOT TO SCALE



NOTES:
1. SIGNS SHALL CONFORM TO THE 2013 OSHA AND ANSI REQUIREMENTS.
2. SIGNS SHALL BE 20" WIDE BY 14" HIGH.
3. SIGNS SHALL HAVE A MOUNTING HEIGHT OF BETWEEN 45 TO 66 INCHES.
4. SIGN PANELS SHALL BE 10 GAUGE ALUMINUM WITH HIGH VISIBILITY REFLECTIVE SHEETING.
5. SIGNS SHALL BE PLACED EVERY 100' AROUND PERIMETER OR AS REQUIRED BY APPLICABLE REGULATIONS.

DANGER SIGNS
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5/1/23

HARVEST MOON SOLAR PROJECT USRXX-XXXX
9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: GENERAL DETAILS I

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)
0 ½" 1"

ISSUED FOR PERMITTING
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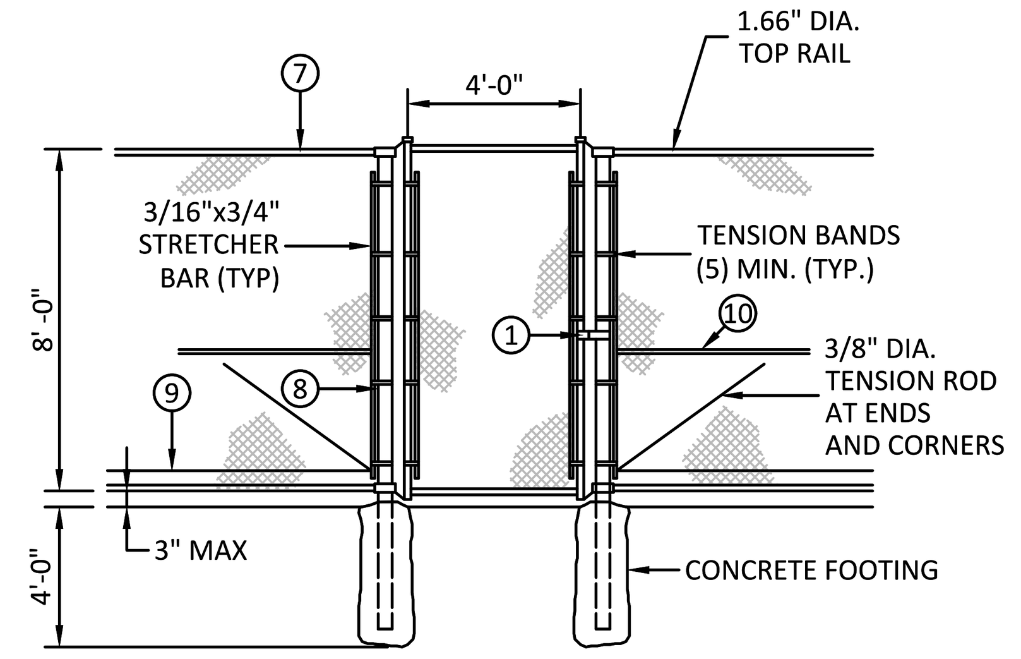
NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: NONE
SHEET NO.: C-401

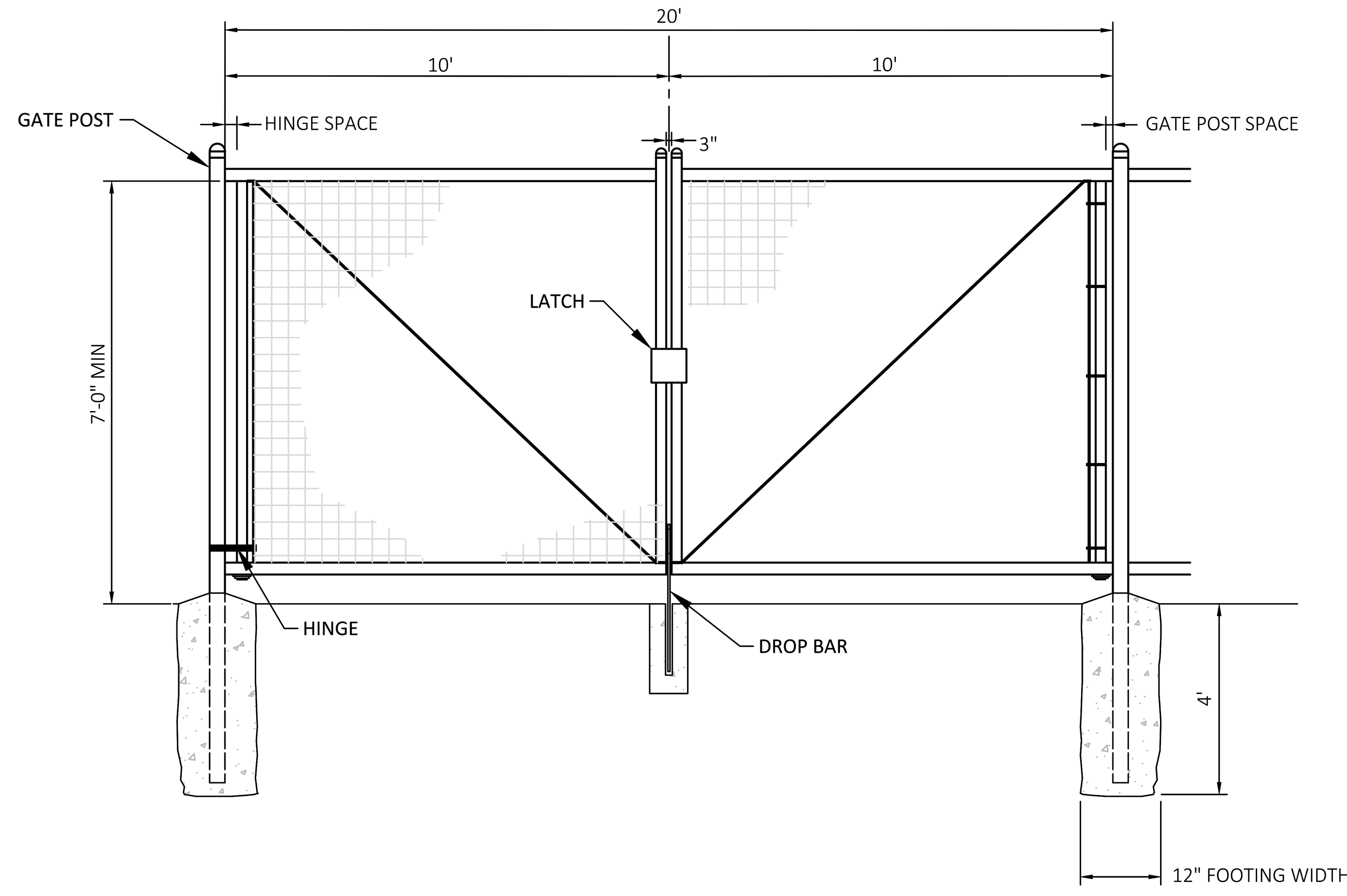


PERSONNEL GATE

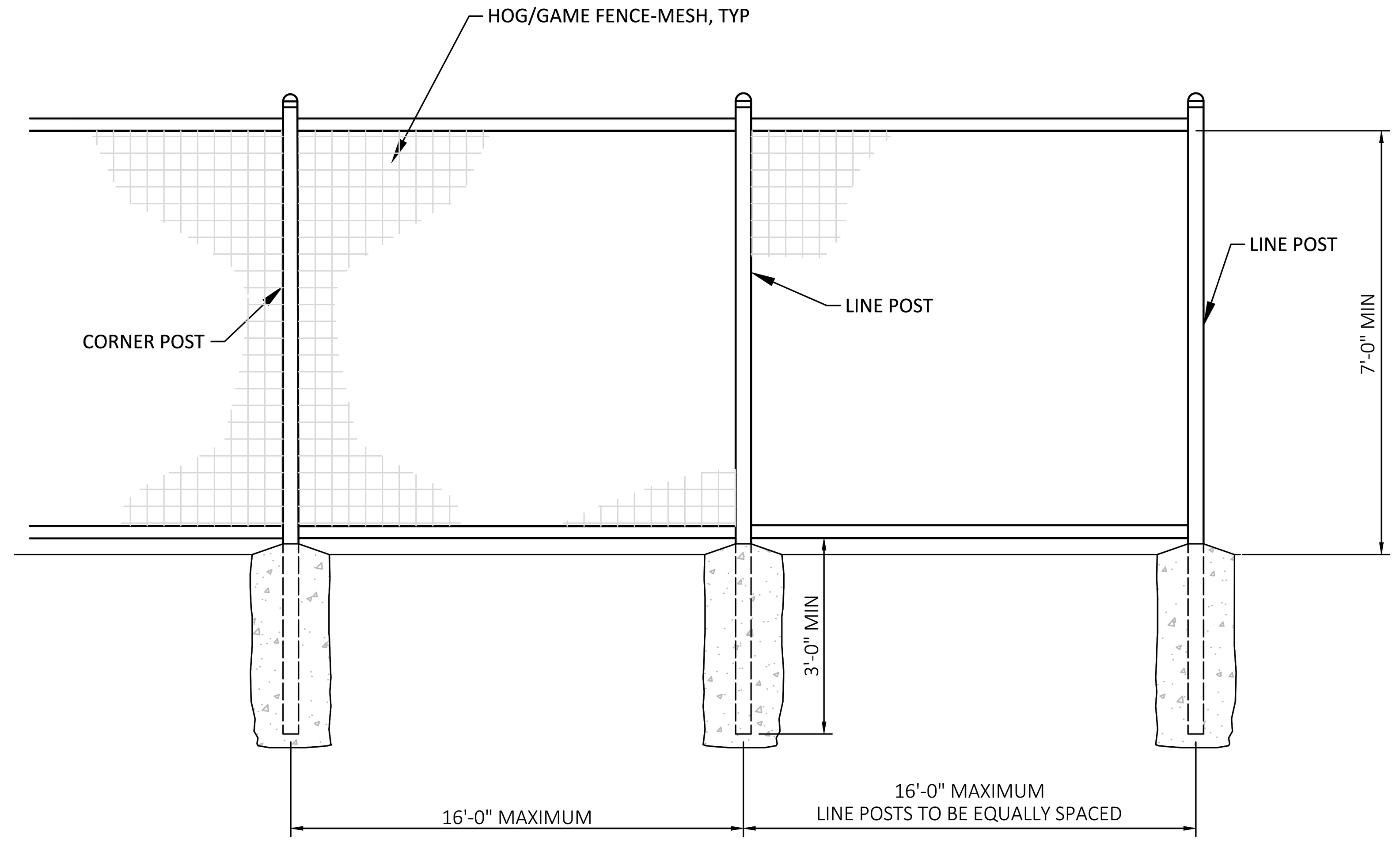
LABEL LEGEND			
1	LOCK KEEPER	6	6 UPPER GUIDE
2	LOCK KEEPER GUIDE	7	9 GA. TIE WIRES @ 12" SPACING ON TOP RAIL & TENSION WIRE
3	LOWER FORKS	8	9 GA. WIRE TIES ON LINE POSTS SHALL BE @ 15" SPACING
4	UPPER FORKS	9	7 GA. TENSION WIRE 6" ABOVE BOTTOM SELVAGE
5	LOWER GUIDE	10	1.66" DIA. BRACE RAIL AT ENDS AND CORNERS

NOTES:

1. PANIC HARDWARE INSTALLED PER FRFR REQUIREMENTS



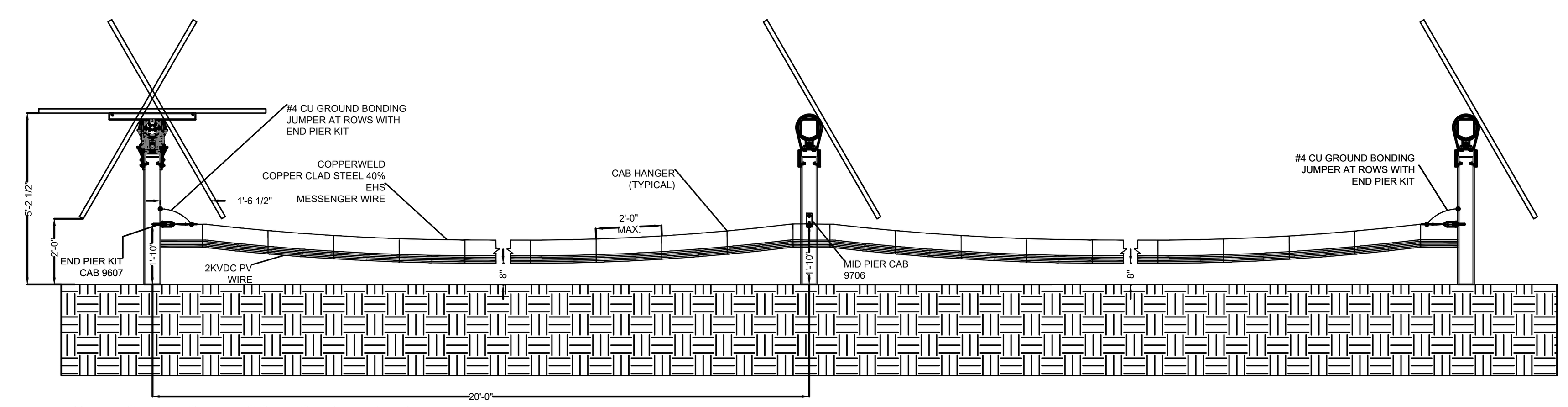
GATE



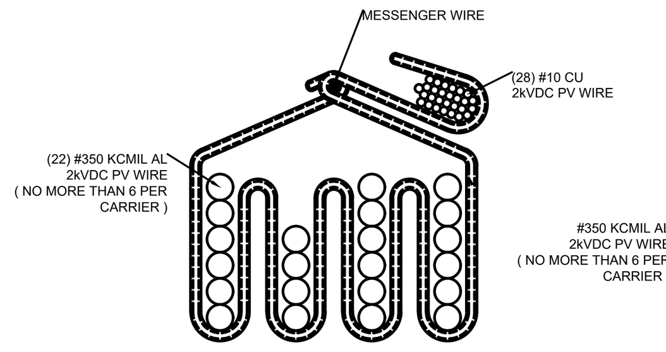
TYPICAL FENCE LAYOUT

GAME FENCE

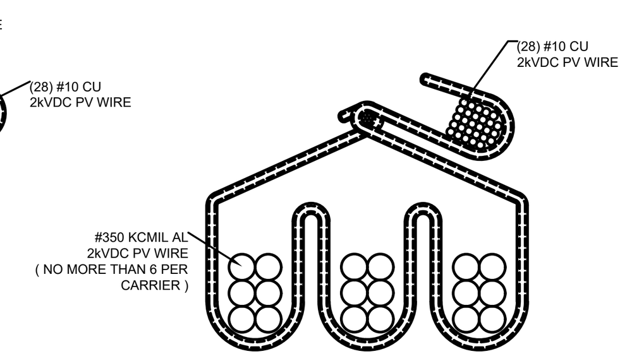
NOT TO SCALE



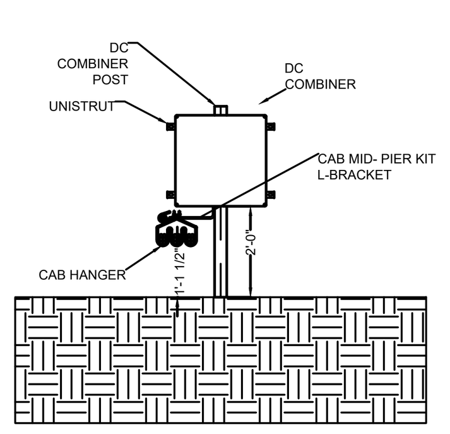
1 EAST-WEST MESSENGER WIRE DETAIL



2 CAB 9993 DETAIL

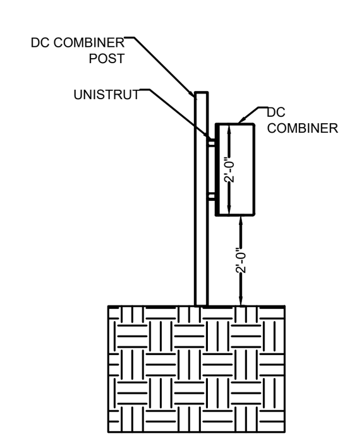


3 CAB 10103 DETAIL



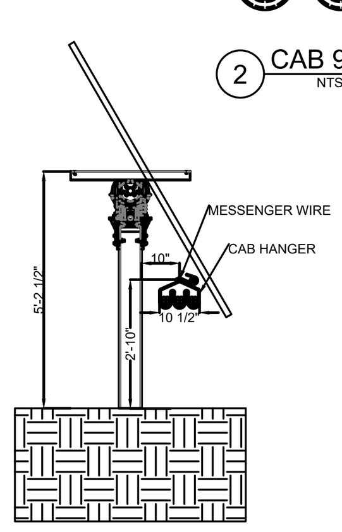
4 COMBINER BOX DETAIL- FRONT ELEVATION

NOTE: FACE COMBINER BOXES EAST

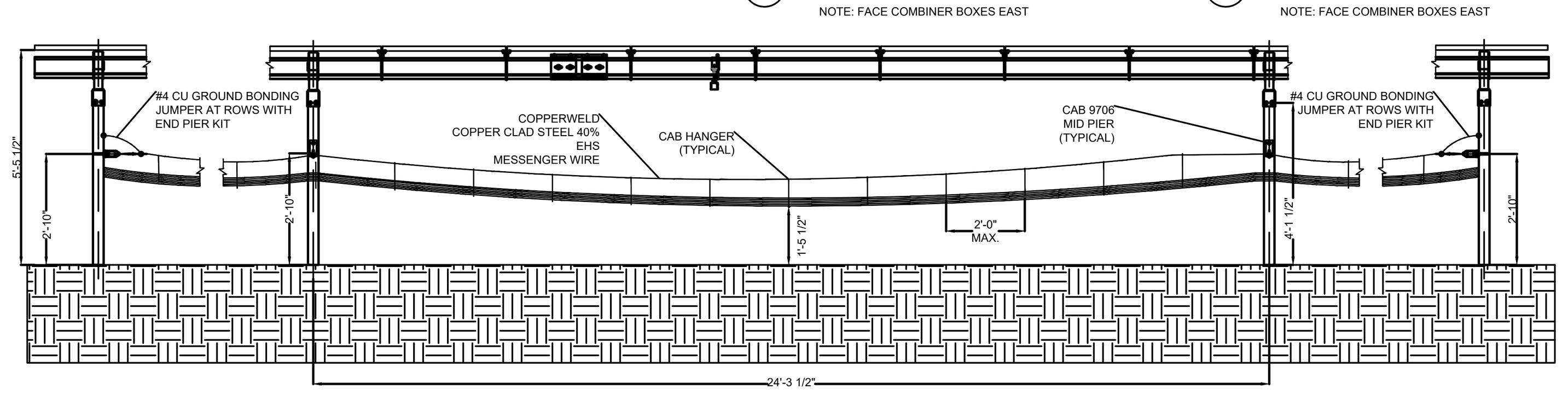


5 COMBINER BOX DETAIL- SIDE ELEVATION

NOTE: FACE COMBINER BOXES EAST



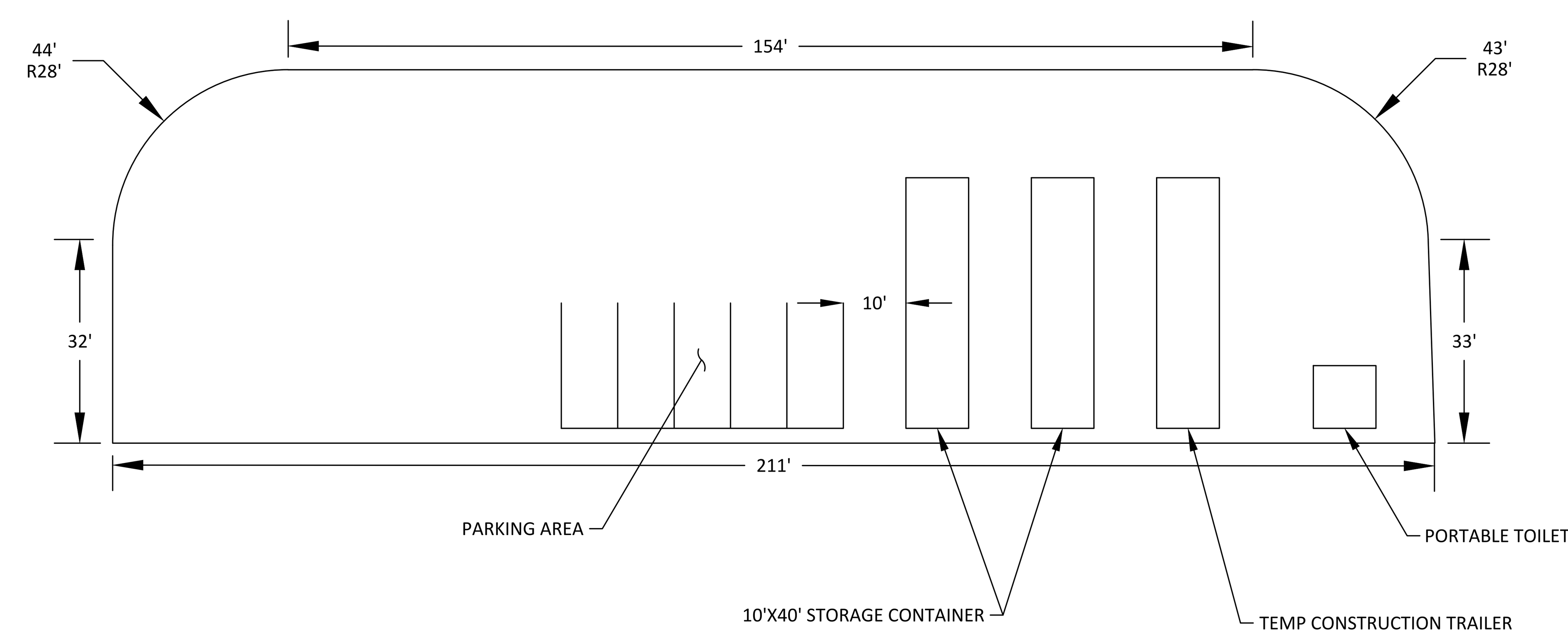
6 CAB HANGER DETAIL- MOUNTED ON MESSENGER WIRE



7 NORTH - SOUTH MESSENGER WIRE DETAIL

MESSENGER WIRE NOTES:

1. REFER TO ARCTECH RACK DRAWINGS FOR RACKING DETAILS.
2. THOROUGHLY REVIEW CAB PRODUCTS INSTALLATION GUIDE BEFORE COMMENCING WORK ON MESSENGER WIRE INSTALLATION. INSTALL MESSENGER WIRE PER CAB PRODUCTS INSTALLATION GUIDELINES. REFER TO PRODUCT DATASHEETS FOR SPECIFIC PART NUMBER DETAILS. THE CAB SOLAR INSTALLATION GUIDE ON PAGE 14-16 PROVIDES SAG AND TENSION TABLES.
3. MAXIMUM TOTAL CABLE WEIGHT IS CALCULATED AT 11.87LBS/FT, NOT INCLUDING THE WEIGHT OF THE CAB HANGERS OR MESSENGER WIRE.
4. FOR THE EAST-WEST MESSENGER WIRE WITH 20 FOOT SPAN, THE MAXIMUM SAG WILL BE APPROXIMATELY 5" AND FOR THE NORTH-SOUTH MESSENGER WIRE WITH 24'-3 1/2" SPAN, THE MAXIMUM SAG WILL BE APPROXIMATELY 8".
5. COPPERWELD COMBINED MESSENGER WIRE AND EGC MAY BE USED AT CONTRACTOR'S OPTION AND ENGINEER'S APPROVAL.
6. PLACE CAB HANGER NEAR TO L-BRACKET.



NOTES:

1. UPON COMPLETION OF PHASE CONTRACTOR SHALL REMOVE TEMPORARY CONTRACTOR STAGING AREA. UPON REMOVAL, CONTRACTOR SHALL RESTORE DISTURBED AREA WITH VEGETATION/GRASS AS DENOTED HEREIN AND ON SITE PLANS.
2. NO MORE THAN 250 GALLONS OF FUEL WILL BE STORED ON SITE

TYPICAL CONTRACTOR STAGING AREA PLAN

NOT TO SCALE

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ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD,
LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: GENERAL DETAILS II

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 5/1/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: NONE
SHEET NO.: C-402

EROSION AND SEDIMENT CONTROL NOTES

PROJECT DESCRIPTION

THE PROJECT INVOLVES THE CONSTRUCTION OF A PHOTOVOLTAIC SOLAR PANEL SYSTEM WITH ALL RELATED ACCESS ROADS, UTILITIES, SITE PREPARATION, DEMOLITION, AND EROSION AND SEDIMENTATION CONTROL MEASURES. THE PROJECT IS LOCATED APPROXIMATELY 5.5 MILES NORTHWEST OF LAFAYETTE CITY HALL, COLORADO. THE PROJECT WILL OCCUPY APPROXIMATELY 10.70 ACRES.

WATER EROSION CONTROL MEASURES

EROSION AND SEDIMENT CONTROL MEASURES SHALL CONSIST OF GEOTEXTILE FABRIC, PERMANENT SEED MIXTURE, EROSION CONTROL BLANKET, WATERPROOF PLASTIC MEMBRANE, FILTER SOCKS, OR A WOVEN FABRIC (SILT FENCE). ALL MATERIAL SHALL BE NEW AND FREE FROM DEFECTS THAT WOULD COMPROMISE THE EFFECTIVENESS OF THE CONTROL MEASURES, AFTER COMPLETION, ALL MATERIAL SHALL BE DISPOSED OF PROPERLY. LOCATION OF EROSION AND SEDIMENT CONTROL STRUCTURES CAN BE SEEN ON THE SITE PLAN (SEE LEGEND FOR CONTROL STRUCTURE SYMBOL). NOTE: ALL WATER CONTROL MEASURES ARE LOCATED DOWN-GRADIENT FROM DISTURBED STREET. IF TOPSOIL IS TO BE STORED IN AN AREA NOT SHOWN ON THE SITE PLAN, DUE TO UNFORESEEN EVENTS, PRIOR TO STORING, THE DOWN-GRADIENT PERIMETER OF THE STORAGE AREA SHALL BE PROPERLY PROTECTED PER THE SPECIFICATIONS DETAILED ON THIS PLAN.

WIND EROSION CONTROL MEASURES

DURING DRY WEATHER CONDITIONS, DISTURBED AREAS SHALL BE PROTECTED AGAINST WIND EROSION, DUSTY AREAS SHALL BE SPRAYED WITH WATER TO PREVENT WIND-BORNE PARTICLES.

CONSTRUCTION LITTER CONTROL

DURING CONSTRUCTION, ALL WRAPPINGS, BOXES, SCRAPS OF BUILDING MATERIAL, AND OTHER LITTER ITEMS SHALL BE DISPOSED OF PROPERLY BY USE OF A DUMPSTER OR CARTED AWAY. THE SITE SHALL BE INSPECTED AND CLEANED DAILY DURING CONSTRUCTION.

TYPICAL CONSTRUCTION SEQUENCE

PRIOR TO THE DEVELOPMENT OF THE PARCEL, EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE INSTALLED AS SHOWN ON PLAN. A TYPICAL SEQUENCE OF DEVELOPMENT IS:

1. PRIOR TO STARTING ANY WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL, EROSION CONTROL MEASURES AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL OBTAIN ALL PERMITS, NOTIFY TOWN OFFICIALS OF CONSTRUCTION COMMENCEMENT, AND SUBMIT CONSTRUCTION TIMETABLE.
2. ON-SITE CONSTRUCTION SEQUENCE SHALL START WITH THE MINIMUM AMOUNT OF CLEARING REQUIRED TO INSTALL EROSION CONTROL MEASURES AS SHOWN ON PLAN. THIS INCLUDES, SILTATION FENCING, ANTI-TRACK PADS (STABILIZED CONSTRUCTION ENTRANCE), AND OTHER MEASURES NOTED ON THE PLAN. NO WORK SHALL TAKE PLACE UNTIL THE OWNER'S REPRESENTATIVE HAS INSPECTED AND APPROVED INSTALLED MEASURES. CONSTRUCTION SHALL START ON THE DOWNGRADIENT SIDE OF THE PROPERTY AND WORK UPWARD TO EXTENT PRACTICABLE. AFTER EROSION CONTROL MEASURES ARE INSTALLED THE TYPICAL SEQUENCE SHALL BE AS FOLLOWS:
   a. REMOVE VEGETATION FROM PROPOSED DEVELOPMENT AREA. ALL STUMPS AND WOOD SHALL BE TAKEN OFF-SITE AND DISPOSED ACCORDINGLY.
   b. STOCKPILING OF WOOD CHIPS MIXED WITH VERY LIMITED AMOUNTS OF TOP SOIL (E.G. 1 TO 2 INCHES) MAY OCCUR TEMPORARILY AND WILL BE STABILIZED AND SURROUNDED WITH SILT FENCE.
   c. PROCEED WITH ALL WORK DEPICTED ON THE DEMOLITION PLAN.
   d. PREPARE AND COMPACT SUBGRADE AND INSTALL DRAINAGE (IF ANY) IN ACCORDANCE WITH "GRADING PLAN AND STORMWATER MANAGEMENT PLAN".
   e. EXCAVATE SOIL TO THE DEPTH NECESSARY TO CONSTRUCT GRAVEL ACCESS ROAD.
   f. INSTALL CONCRETE UTILITY PADS, FOOTINGS, PHOTOVOLTAIC PANELS, UTILITY POLES, OVERHEAD ELECTRIC, ELECTRICAL CONDUITS, FENCE AND GATES.
   g. INSTALL EROSION CONTROL MATTING ON ALL SLOPES OF 3:1 OR GREATER (IF ANY), THEN SEED AND MULCH PER THE REVEGETATION PLAN PROVIDED ON THIS SHEET.
   h. LOAM AND SEED ALL REMAINING DISTURBED AREAS.
   i. REMOVE ALL EROSION AND SEDIMENT STRUCTURES AFTER FINAL ACCEPTANCE. IF STABILIZATION DOES NOT OCCUR (INCLUDING DUE TO SEASONAL CONDITIONS) IN ALL AREAS BEFORE CONTRACTOR HAS SATISFIED ALL OTHER CONDITIONS TO FINAL ACCEPTANCE, CONTRACTOR SHALL PROVIDE A PLAN (INCLUDING APPROPRIATE PERFORMANCE ASSURANCES) TO THE OWNER'S REPRESENTATIVE TO REMOVE SUCH EROSION CONTROL MEASURES AFTER STABILIZATION (AND ALLOWING CONTRACTOR TO ACHIEVE FINAL ACCEPTANCE), FOR ACCEPTANCE IN THE SOLE AND ABSOLUTE DISCRETION BY THE OWNER'S REPRESENTATIVE.

DURING THIS TIME ALL EROSION AND SEDIMENT STRUCTURES SHALL BE MAINTAINED IN PROPER WORKING ORDER. DISTURBED AREAS SHALL BE KEPT TO A MINIMUM AND SHALL ONLY TAKE PLACE WHERE IMMEDIATELY REQUIRED TO FURTHER CONSTRUCTION. IT IS DESIRABLE FROM AN EROSION PREVENTION CONCERN TO MINIMIZE DISTURBED AREAS. FINAL GRADING AND SEEDING SHALL TAKE PLACE AS SOON AS PRACTICAL.

A RAIN GAUGE SHALL BE PLACED AT THE PROJECT IN A WORKABLE LOCATION AND MONITORED DURING RAINFALL PERIODS UNTIL ALL DISTURBED AREAS ARE STABILIZED. IN THE EVENT THERE IS A RAINFALL GREATER THAN ½" IN A 12 HOUR PERIOD, ALL EROSION CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS REQUIRED. IF NO RAIN GAUGE IS USED, ALL EROSION CONTROL MEASURES SHALL BE CHECKED AFTER ALL RAINFALL EVENTS.

AN INSPECTION FORM SHALL BE PROVED TO THE CONTRACTOR BY THE OWNER'S REPRESENTATIVE TO BE FILLED OUT EVERY WEEK OR AFTER EACH RAINFALL EVENT OF 1/2" OR GREATER.

MULCH

MULCH SHALL CONSIST OF STRAW. IT SHALL BE APPLIED AT A RATE OF 1.5 - 2.0 TONS PER ACRE, OR 70 - TO 90 POUNDS (1-1/2 - 2 BALES) PER 1000 SQUARE FEET (31.6' X 31.6'). ALL MULCH MATERIAL SHALL BE FREE FROM WEEDS AND COARSE MATTER. ALL REQUIRED GRADING SHALL BE COMPLETE PRIOR TO PLACEMENT OF MULCH. APPLICATION OF MULCH MATERIAL SHALL BE BY HAND OR MACHINE AND UNIFORM IN THICKNESS. MULCH MATERIAL SHALL BE ANCHORED IMMEDIATELY AFTER APPLICATION TO MINIMIZE WINDBLOWN DISTURBANCE. ANCHORING SHALL BE BY MECHANICAL DEVICE OR LIQUID MULCH BINDER DURING MULCH APPLICATION.

GENERAL NOTES

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PERFORMED IN ACCORDANCE WITH THE "BOULDER COUNTY STORM DRAINAGE CRITERIA MANUAL" (LATEST REVISION).
2. ALL DISTURBED AREAS SHALL BE KEPT TO A MINIMUM. FINAL GRADING AND RESTORATION SHALL BE ACCOMPLISHED AS SOON AS PRACTICAL.
3. EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE INSTALLED PRIOR TO SITE WORK. IF IT IS NOT POSSIBLE TO DO SO, THE OWNER'S REPRESENTATIVE SHALL BE NOTIFIED IN ORDER TO MAINTAIN THE INTEGRITY OF DESIGN.
4. EROSION CONTROLS SHALL REMAIN IN PLACE AND BE MAINTAINED FOR THE DURATION OF THE PROJECT TO LIMIT THE MOVEMENT OF SILTATION AND SEDIMENTS FROM ENTERING EXISTING DRAINAGE SYSTEMS OR FROM LEAVING THE PARCEL. ANY ACCUMULATED SEDIMENTS ARE TO BE REMOVED FROM THE EROSION CONTROLS AND DISPOSED OF PROPERLY. ADDITIONALLY, ALL EROSION CONTROLS ARE TO BE INSPECTED AFTER A STORM EVENT AND THE CONTROLS REPLACED OR ARMORED AS NECESSARY AND ACCUMULATED SEDIMENTS REMOVED.
5. ADDITIONAL EROSION CONTROLS ARE TO BE UTILIZED AS NECESSARY AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE TO LIMIT SEDIMENTS FROM DISCHARGING TO ADJACENT PROPERTIES OR INTO EXISTING DRAIN SYSTEMS.
6. A RESERVE AMOUNT OF EROSION CONTROLS ARE TO BE KEPT ON-SITE AT ALL TIMES.
7. CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM AMOUNT OF TIME BEFORE THEY ARE COVERED, SEEDED OR OTHERWISE STABILIZED TO PREVENT EROSION.
8. TEMPORARY STOCKPILING OF MATERIALS RELATED TO THE CONSTRUCTION ACTIVITIES ARE TO BE PROPERLY STABILIZED, PROTECTED AND DEMARCATED TO LIMIT MOVEMENT OF MATERIAL INTO STORM DRAIN SYSTEM OR ON TO ADJACENT PARCELS.
9. REFUELING AND ANY WORK ASSOCIATED WITH THE MAINTENANCE OF CONSTRUCTION EQUIPMENT TO BE PERFORMED IN COMPLIANCE WITH APPLICABLE REGULATIONS.
10. THE AREAS OF CONSTRUCTION SHALL REMAIN IN A STABLE CONDITION AT THE CLOSE OF EACH CONSTRUCTION DAY. EROSION CONTROLS SHALL BE CHECKED AT THIS TIME AND MAINTAINED OR REINFORCED IF NECESSARY.
11. UTILIZE APPROPRIATE DEWATERING SYSTEMS AND TECHNIQUES TO MAINTAIN THE EXCAVATED AREA SUFFICIENTLY DRY FROM GROUNDWATER AND/OR SURFACE RUNOFF SO AS NOT TO ADVERSELY AFFECT CONSTRUCTION PROCEDURES OR CAUSE EXCESSIVE DISTURBANCE OF UNDERLYING NATURAL GROUND.
12. WATER FROM THE TRENCHES AND EXCAVATIONS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO AVOID PUBLIC NUISANCE, INJURY TO PUBLIC HEALTH OR THE ENVIRONMENT, DAMAGE OR PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO THE WORK COMPLETED OR IN PROGRESS. DO NOT DISCHARGE WATER INTO ANY SANITARY SEWER SYSTEM. SILTATION BARRIERS SHALL BE UTILIZED AS NECESSARY. WATER FROM TRENCHES AND EXCAVATIONS SHALL NOT BE DISCHARGED DIRECTLY TO STORM DRAIN SYSTEMS. PROPER TREATMENT TO A SEDIMENTATION AREA IS TO TAKE PLACE PRIOR TO DISCHARGE TO ANY DRAINAGE SYSTEMS.
13. THE CONTRACTOR SHALL REPAIR ANY DAMAGE RESULTING FROM THE FAILURE OF THE DEWATERING OPERATIONS OR FROM FAILURE TO MAINTAIN THE AREAS OF WORK IN SUITABLE DRY CONDITION.
14. PRECAUTIONS SHALL BE TAKEN TO PROTECT NEW WORK FROM FLOODING DURING STORMS OR FROM OTHER CAUSES. GRADING IN THE AREAS SURROUNDING ALL EXCAVATIONS SHALL BE PROPERLY SLOPED TO PREVENT WATER FROM RUNNING INTO THE EXCAVATED AREA OR TO ADJACENT PROPERTIES, WHERE REQUIRED, TEMPORARY DITCHES SHALL BE PROVIDED FOR DRAINAGE. UPON COMPLETION OF THE WORK AND WHEN DIRECTED, ALL AREAS SHALL BE RESTORED IN A SATISFACTORY MANNER AND AS DIRECTED.
15. ALL PIPELINES OR STRUCTURES NOT STABLE AGAINST UPLIFT DURING CONSTRUCTION OR PRIOR TO COMPLETION SHALL BE THOROUGHLY BRACED OR OTHERWISE PROTECTED.
16. DO NOT EXCAVATE UNTIL THE DEWATERING SYSTEM IS OPERATIONAL AND THE EXCAVATION MAY PROCEED WITHOUT DISTURBANCE TO THE FINAL SUBGRADE.
17. UNLESS OTHERWISE SPECIFIED, CONTINUE DEWATERING UNINTERRUPTED UNTIL THE STRUCTURES, PIPES, AND APPURTENANCES TO BE BUILT HAVE BEEN PROPERLY INSTALLED, WHERE SUBGRADE MATERIALS ARE UNABLE TO MEET THE SUBGRADE DENSITY REQUIREMENTS DUE TO IMPROPER DEWATERING TECHNIQUES, REMOVE AND REPLACE THE MATERIALS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
18. ALL RUNOFF FROM THE DISTURBED AREA SHALL BE CONTROLLED AND FILTERED. NON-WOVEN SYNTHETIC FIBER FILTER FABRIC, HAY BALES OR SILTATION FENCE SHALL BE USED IN THE AREAS SHOWN ON THE SITE PLAN AND INSTALLED AS SHOWN OF THIS PLAN.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTATION OF SEDIMENT AND EROSION CONTROL MEASURES. THIS RESPONSIBILITY INCLUDES THE ACQUISITION OF MATERIALS, INSTALLATION, AND MAINTENANCE OF EROSION AND SEDIMENT STRUCTURES. THE COMMUNICATION AND DETAILED EXPLANATION TO ALL PEOPLE INVOLVED IN THE SITE WORK OF THE REQUIREMENTS AND OBJECTIVE OF THE EROSION AND SEDIMENT CONTROL MEASURES.
20. THE OWNER'S REPRESENTATIVE SHALL BE NOTIFIED OF ANY PROPOSED ALTERATION TO THE EROSION AND SEDIMENT CONTROL PLAN PRIOR TO ALTERING, IN ORDER TO ENSURE THE FEASIBILITY OF THE ADDITION, SUBTRACTION, OR CHANGE IN THE PLAN.

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INTERIM REVIEW DOCUMENTS

NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMITTING PURPOSES

ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
5/1/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: EROSION & SEDIMENT CONTROL NOTES

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

0 ½" 1"

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE:	5/1/23
DRAWN BY:	TRC
ENGINEER:	AW
APPROVED BY:	---
PROJECT PHASE:	USR PLANS
SCALE:	NONE
SHEET NO.:	C-403

CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Landscaping Plan

There is currently no landscaping on the site other than a few trees on the southwest corner of the site. The project will be surrounded by a 7-foot tall game fence. Rocky Mountain Junipers will be planted along the outside of the northern fence line to provide natural screening for nearby residences. Example photos as well as a map depicting the proposed location for tree placement are provided below. Please refer to sheet C-402 of the Site Plan for additional detail on the proposed security fence. CBEP Solar 21, LLC will also establish native grasses within the project's boundary after construction is completed.

EXAMPLE PHOTOS:

PROPOSED LOCATION FOR TREE PLACEMENT:

LEGEND	
Item	Color
Proposed Project Boundary	
Proposed Tree Placement	

CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Grading Plan

Grading will be limited to the equipment pad, staging area, and the new portion of the access road.

At the end of construction, CBEP Solar 21, LLC or its contractors will also grade the access road and any ruts torn up by construction to restore the site to its original state and prepare for revegetation.

Stormwater Drainage Study

Date: 4/28/2023

To: Cloudbreak Energy

From: Allyson Williamson, TRC Companies
700 Highlander Blvd., Suite 210,
Arlington, TX 76015

Project: Harvest Moon Solar Project

Subject: On-Site Drainage Study

PRELIMINARY
FORINTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, NOR CONSTRUCTION.
Prepared by or under the Direct Supervision of:

Allyson Williamson, P.E. 60360
"4/28/2023"

Cloudbreak Energy is pursuing the development of the Harvest Moon project, a photovoltaic energy generation facility at a 10.70 -acre site located approximately 5.5 miles Northwest of Lafayette City Hall, Colorado alongside Isabelle Road (See **Appendix A**-Site Plans C301 & C302). The existing site is currently used for agricultural purposes with average slope of 4.67%. This drainage study was prepared to summarize findings from performing a hydrologic analysis of the project site to identify the potential stormwater impact from the proposed solar project and develop appropriate drainage best management practices (BMPs) to address the impact. This drainage study was prepared to comply with the Boulder County Storm Drainage Criteria (BCSDC) Manual Requirements, updated November 2016.

Proposed Project

The proposed solar project will consist of pole mounted photovoltaic (PV) arrays. Ground disturbance under the panels will be minimal; thus, existing perviousness of the soil will be maintained under the solar cells allowing infiltration. Rainfall runoff from the panels will flow under the pole mounted PV panels matching the pre-development flow patterns.

Additional improvements associated with this project are limited to gravel drives for vehicle access and concrete pads for distribution transformers (see **Appendix A** – Site Plans C301 & C302). No public access or utility infrastructure improvements are anticipated at this time.

Site Drainage

Currently, the existing site does not have any regional retention or water quality features. The soils in the area consist of hydrologic soil groups (HSG) A and B soils given by the Natural Resources Conservation Service (NRCS – **Appendix B**). Drainage basin “A” with area of 4.02 acres and basin “B” with area 5.11 acres have been identified for the site. Any offsite flows appear to follow the existing ditches and streams and are not expected to affect the project site. See **Appendix A** for the drainage area maps and details.

A hydrologic analysis was prepared using the Rational Method based upon requirements from the BCSDC Manual. The analysis provided estimated peak flow rates for the 100-year storm under both pre-and post-development conditions. The design rainfall depth for a 1-hour,

Stormwater Drainage Study

100-year storm is 2.63 inches based upon NOAA Atlas 14: Precipitation-Frequency Atlas. The Rational Method equation shown below was used to determine the peak flow rates from Drainage Area "A" and "B". Runoff coefficients for various NRCS Hydrologic Soil groups and imperviousness were obtained from Table 600-6, Boulder County Storm Drainage Criteria. The drainage area imperviousness and resulting peak flow rates from pre-and post-development conditions are summarized below. See **Appendix C** for the runoff coefficient calculations.

$$Q = C * I * A$$

Where:

Q – Runoff flow rate, in cubic feet per second (cfs)

I – Rainfall Intensity, in inches per hour (in/hr)

A – Area of the basin, in acres (ac)

Pre-development Runoff Calculation Parameters

Drainage Area	Area, A (ac)	Weighted Runoff Coefficient, C	Rainfall Intensity, I (in/hr)
A	4.02	0.14	4.30
B	5.11	0.30	4.33

Post-development Runoff Calculation Parameters

Drainage Area	Area, A (ac)	Weighted Runoff Coefficient, C	Rainfall Intensity, I (in/hr)	% Added Imperviousarea (impervious ac/total ac)
A	4.02	0.14	4.30	0
B	5.11	0.32	4.37	5.56

100-year Runoff Calculation Results

Drainage Area	Pre-development Peak Flow Rate (cfs)	Post-development Peak Flow Rate(cfs)	DIFFERENCE (cfs)
A	2.42	2.42	0
B	6.64	7.15	0.51

Based upon the above results, the increase of impervious area would produce little increase (approximately 5.6%) in the peak flow rate. Because of this, a detention basin facility will not be proposed. Instead, a grass swale will be introduced on the south side to dissipate energy and attenuate any potential flow increase from gravel roads and concrete pads.

Erosion Control/Stormwater Management Plan

Erosion control features such as silt fences and grass swales (also mentioned above) will be installed on the site prior to construction activities. Such measures will be included in the erosion control plan and detail sheets within the final construction documents. Grass swale sizing calculations are summarized in **Appendix D.**

Conclusion

The drainage study and attached drainage maps were produced in accordance with requirements from Boulder County Storm Drainage Criteria Manual, updated November 2016. The existing storm water flow characteristics are expected to remain unchanged and increases in peak flow rates have been proven to be negligible. A basin type of storm water detention would not be necessary.

Improvements proposed with the project site are limited to a gravel paved drive and a small concrete distribution transformer pad. No public access or utility infrastructure improvements are anticipated at this time. The proposed development will not alter historic drainage patterns or adjacent and downstream property owners.

Stormwater Drainage Study

References

1. Boulder County, Boulder County Drainage Criteria Manual, November 2016.

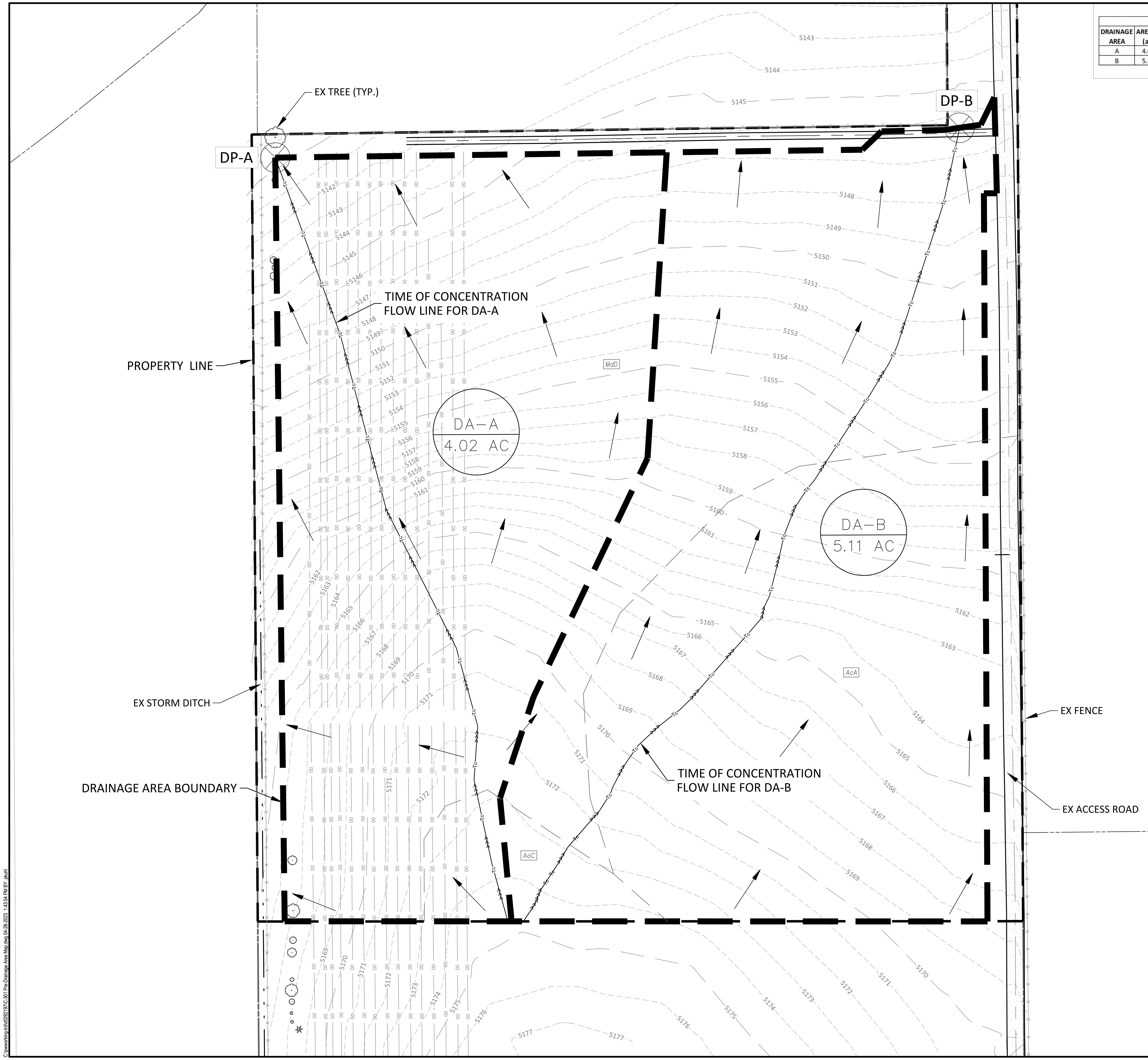
2. Web Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture. Online at: http://websoilsurvey.nrcs.usda.gov, accessed February 2023.

3. NOAA Atlas 14, Volume 11, Version 2. ESRI Maps. USGS. Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite.

Appendix

A. Site Plans C301 & C302
B. NRCS Soil Layer Map
C. Rational Method Calculations
D. Grass Swale Calculations

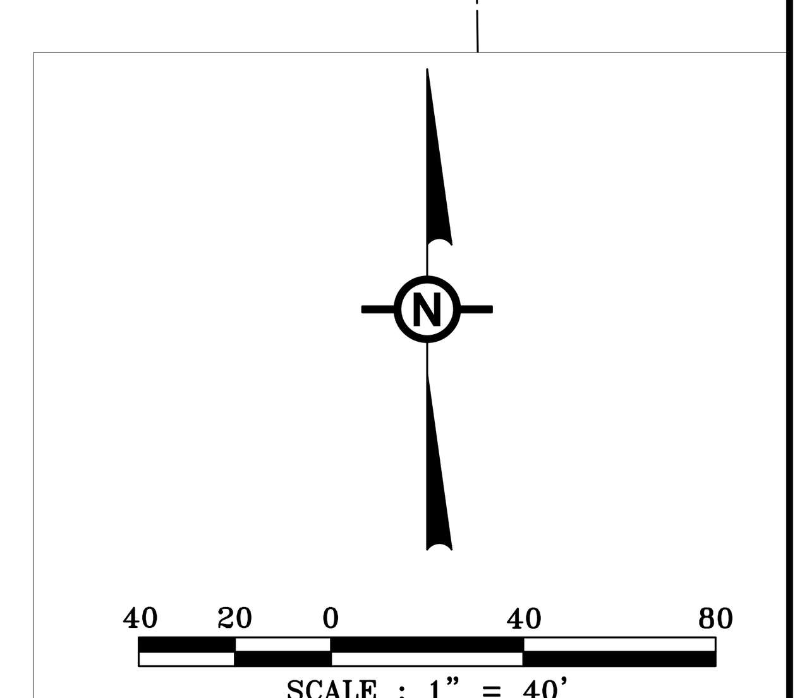
APPENDIX A: SITE PLANS C-301 & C-302



PRE-DEVELOPMENT RUNOFF CALCULATION PARAMETERS					
DRAINAGE AREA	AREA, A (ac)	WEIGHTED RUNOFF COEFFICIENT, C	TIME OF CONCENTRATION, Tc (min)	RAINFALL INTENSITY, I (in/hr)	100-YR, 24-HR PEAK FLOW (cfs)
A	4.02	0.14	27.94	4.30	2.42
B	5.11	0.30	27.59	4.33	6.64

PROPOSED DRAINAGE FEATURES

- DA-X X.XX AC — DRAINAGE AREA
- DP-X — DRAINAGE REACH
- MdD — SOIL MAP UNIT SYMBOL
- DRAINAGE CATCHMENT BOUNDARY
- FLOW ARROW
- TIME OF CONCENTRATION FLOW LINE



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ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
4/28/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX
9770 ISABELLE ROAD, LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

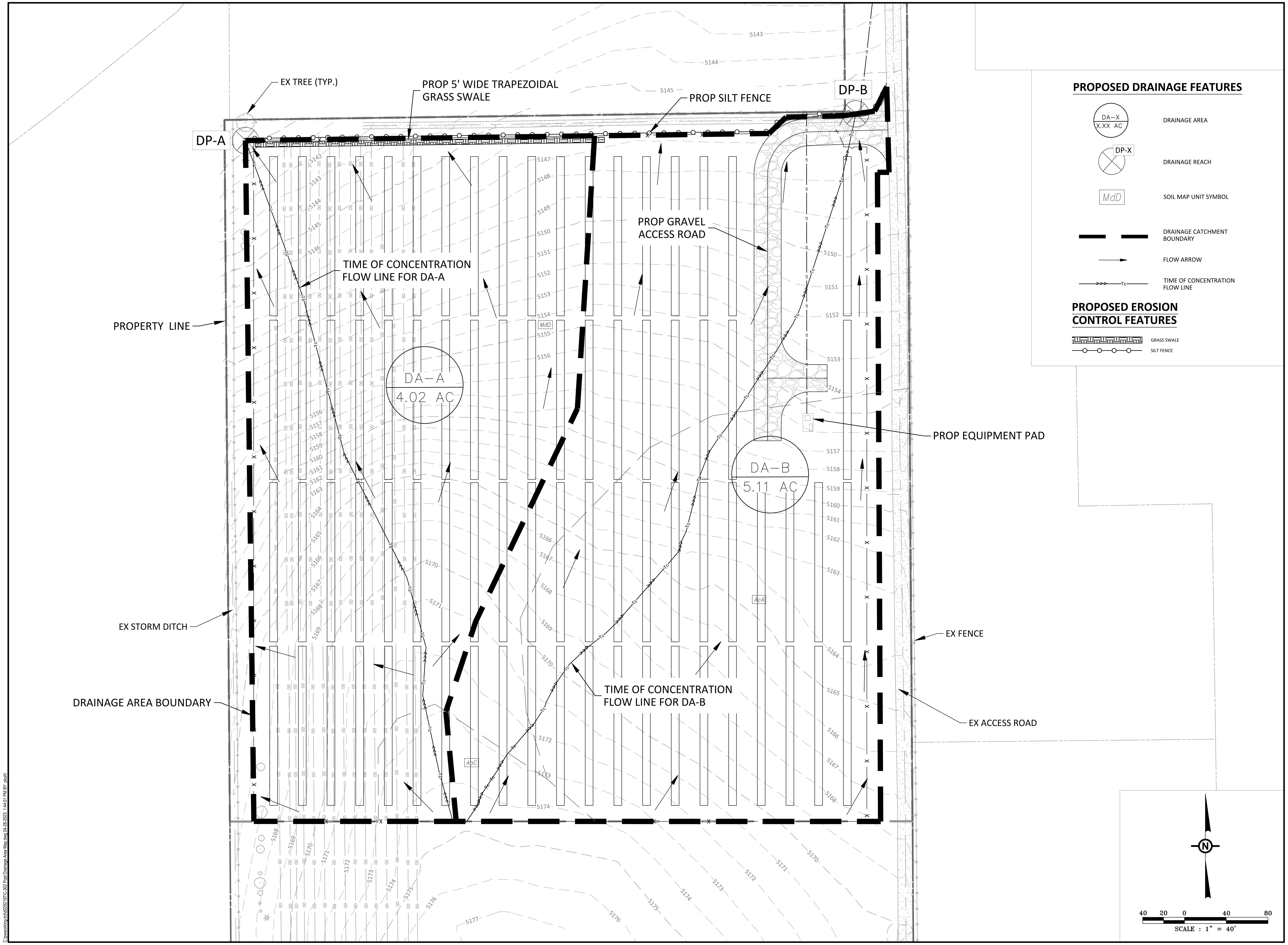
SHEET TITLE: PRE DRAINAGE AREA MAP

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 4/28/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 40'
SHEET NO.: C-301



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ALLYSON WILLIAMSON, P.E.
CO LIC. # 60360
4/28/23

HARVEST MOON SOLAR PROJECT
USRXX-XXXX

9770 ISABELLE ROAD,
LAFAYETTE, CO 80026

PROJECT NUMBER: 516448

SHEET TITLE: POST DRAINAGE AREA MAP

SHEET SIZE: ARCH "D" 24" X 36" (610 x 914)

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	INIT

DATE: 4/28/23
DRAWN BY: TRC
ENGINEER: AW
APPROVED BY: ---
PROJECT PHASE: USR PLANS
SCALE: 1" = 40'
SHEET NO.: C-302

APPENDIX B: NRCS SOIL LAYER MAP

Hydrologic Soil Group—Boulder County Area, Colorado
(DA - A)

Map Scale: 1:1,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 15 30 60 90

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 Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:20,000.

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: Boulder County Area, Colorado
Survey Area Data: Version 19, Sep 7, 2022

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AoC	Ascalon-Otero complex, 3 to 5 percent slopes	B	0.2	4.0%
MdD	Manter sandy loam, 3 to 9 percent slopes	A	3.9	96.0%
Totals for Area of Interest			**4.0**	**100.0%**

Description

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

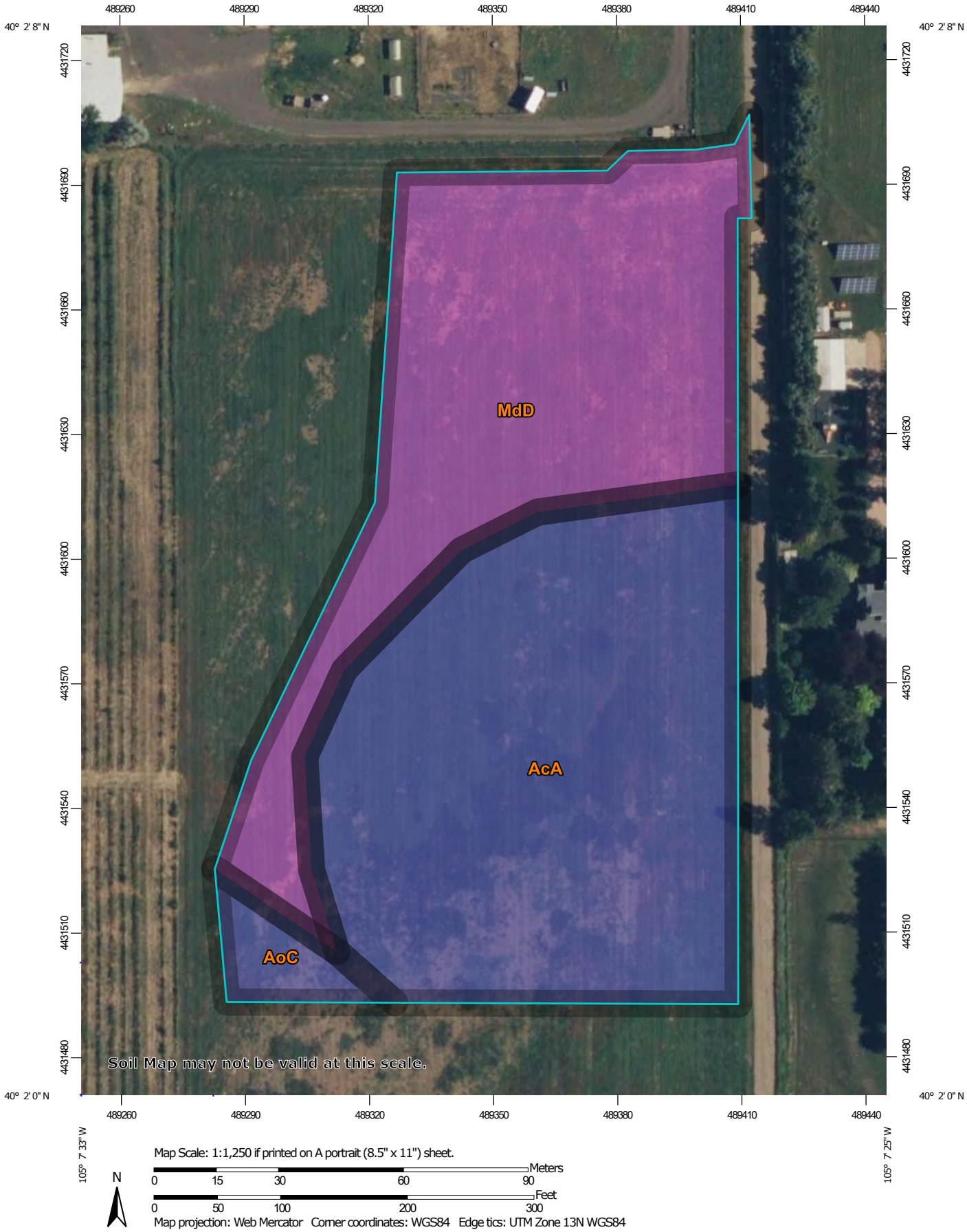
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Boulder County Area, Colorado
(DA - B)



Map Scale: 1:1,250 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

Hydrologic Soil Group—Boulder County Area, Colorado
(DA - B)

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:20,000.

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: Boulder County Area, Colorado
Survey Area Data: Version 19, Sep 7, 2022

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AcA	Ascalon sandy loam, 0 to 3 percent slopes	B	2.7	53.5%
AoC	Ascalon-Otero complex, 3 to 5 percent slopes	B	0.2	3.4%
MdD	Manter sandy loam, 3 to 9 percent slopes	A	2.2	43.1%
Totals for Area of Interest			**5.1**	**100.0%**

Description

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C: RATIONAL METHOD CALCULATIONS

NOAA Atlas 14, Volume 8, Version 2
Location name: Lafayette, Colorado, USA*
Latitude: 40.035°, Longitude: -105.1251°
Elevation: m/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	**0.218** (0.173-0.276)	**0.267** (0.211-0.338)	**0.361** (0.285-0.459)	**0.454** (0.356-0.580)	**0.603** (0.465-0.824)	**0.735** (0.548-1.01)	**0.881** (0.632-1.24)	**1.04** (0.715-1.51)	**1.28** (0.842-1.90)	**1.48** (0.938-2.19)
10-min	**0.319** (0.253-0.404)	**0.390** (0.309-0.495)	**0.529** (0.417-0.672)	**0.665** (0.521-0.849)	**0.883** (0.681-1.21)	**1.08** (0.802-1.48)	**1.29** (0.925-1.81)	**1.53** (1.05-2.20)	**1.88** (1.23-2.78)	**2.17** (1.37-3.21)
15-min	**0.389** (0.308-0.493)	**0.476** (0.377-0.603)	**0.645** (0.508-0.820)	**0.811** (0.635-1.03)	**1.08** (0.830-1.47)	**1.31** (0.978-1.80)	**1.57** (1.13-2.21)	**1.87** (1.28-2.69)	**2.29** (1.50-3.39)	**2.65** (1.67-3.92)
30-min	**0.534** (0.423-0.676)	**0.651** (0.515-0.825)	**0.879** (0.693-1.12)	**1.10** (0.865-1.41)	**1.47** (1.13-2.00)	**1.78** (1.33-2.45)	**2.14** (1.53-3.01)	**2.54** (1.74-3.66)	**3.12** (2.05-4.61)	**3.60** (2.28-5.33)
60-min	**0.654** (0.518-0.828)	**0.802** (0.634-1.02)	**1.09** (0.857-1.38)	**1.37** (1.07-1.74)	**1.81** (1.39-2.47)	**2.20** (1.64-3.02)	**2.63** (1.89-3.69)	**3.11** (2.13-4.48)	**3.81** (2.50-5.63)	**4.39** (2.78-6.50)
2-hr	**0.774** (0.619-0.968)	**0.953** (0.762-1.19)	**1.30** (1.03-1.63)	**1.63** (1.29-2.05)	**2.15** (1.67-2.90)	**2.61** (1.97-3.54)	**3.12** (2.26-4.33)	**3.69** (2.55-5.24)	**4.51** (2.99-6.58)	**5.19** (3.32-7.59)
3-hr	**0.841** (0.677-1.05)	**1.04** (0.835-1.29)	**1.41** (1.13-1.76)	**1.77** (1.41-2.22)	**2.33** (1.82-3.11)	**2.82** (2.13-3.79)	**3.36** (2.45-4.62)	**3.96** (2.76-5.58)	**4.83** (3.22-6.98)	**5.54** (3.57-8.04)
6-hr	**1.01** (0.821-1.24)	**1.23** (1.00-1.52)	**1.65** (1.34-2.04)	**2.05** (1.65-2.54)	**2.68** (2.11-3.52)	**3.22** (2.46-4.26)	**3.81** (2.80-5.16)	**4.46** (3.14-6.20)	**5.40** (3.64-7.71)	**6.18** (4.02-8.85)
12-hr	**1.26** (1.03-1.53)	**1.52** (1.24-1.84)	**1.99** (1.63-2.42)	**2.44** (1.98-2.98)	**3.13** (2.49-4.04)	**3.72** (2.87-4.85)	**4.37** (3.25-5.83)	**5.08** (3.61-6.96)	**6.10** (4.16-8.59)	**6.94** (4.57-9.82)
24-hr	**1.50** (1.24-1.79)	**1.84** (1.52-2.20)	**2.43** (2.01-2.93)	**2.97** (2.44-3.58)	**3.76** (3.00-4.76)	**4.42** (3.43-5.65)	**5.12** (3.83-6.71)	**5.86** (4.20-7.90)	**6.92** (4.75-9.57)	**7.76** (5.17-10.8)
2-day	**1.68** (1.41-1.98)	**2.15** (1.80-2.54)	**2.92** (2.44-3.46)	**3.57** (2.97-4.26)	**4.49** (3.59-5.55)	**5.21** (4.07-6.52)	**5.94** (4.47-7.63)	**6.69** (4.83-8.83)	**7.71** (5.33-10.5)	**8.49** (5.72-11.7)
3-day	**1.83** (1.55-2.15)	**2.31** (1.95-2.71)	**3.10** (2.61-3.65)	**3.77** (3.15-4.45)	**4.70** (3.79-5.76)	**5.44** (4.27-6.76)	**6.18** (4.69-7.88)	**6.96** (5.05-9.11)	**7.99** (5.57-10.8)	**8.79** (5.96-12.0)
4-day	**1.97** (1.68-2.30)	**2.43** (2.06-2.84)	**3.20** (2.70-3.74)	**3.85** (3.23-4.53)	**4.78** (3.87-5.84)	**5.52** (4.36-6.83)	**6.27** (4.78-7.96)	**7.06** (5.15-9.20)	**8.13** (5.70-10.9)	**8.97** (6.11-12.2)
7-day	**2.32** (1.99-2.68)	**2.73** (2.33-3.15)	**3.43** (2.92-3.97)	**4.05** (3.43-4.71)	**4.94** (4.06-6.00)	**5.68** (4.54-6.97)	**6.45** (4.97-8.11)	**7.26** (5.36-9.39)	**8.39** (5.95-11.2)	**9.29** (6.39-12.5)
10-day	**2.60** (2.24-2.99)	**3.00** (2.58-3.44)	**3.69** (3.16-4.24)	**4.29** (3.66-4.96)	**5.18** (4.29-6.24)	**5.91** (4.76-7.21)	**6.68** (5.19-8.34)	**7.49** (5.57-9.62)	**8.63** (6.16-11.4)	**9.53** (6.60-12.7)
20-day	**3.37** (2.93-3.81)	**3.83** (3.33-4.34)	**4.62** (4.00-5.24)	**5.28** (4.55-6.02)	**6.22** (5.18-7.33)	**6.96** (5.65-8.32)	**7.71** (6.05-9.46)	**8.50** (6.38-10.7)	**9.56** (6.89-12.4)	**10.4** (7.27-13.7)
30-day	**3.97** (3.48-4.46)	**4.54** (3.97-5.10)	**5.45** (4.76-6.15)	**6.21** (5.38-7.03)	**7.24** (6.05-8.43)	**8.03** (6.55-9.49)	**8.81** (6.94-10.7)	**9.60** (7.24-12.0)	**10.6** (7.69-13.6)	**11.4** (8.04-14.9)
45-day	**4.71** (4.16-5.25)	**5.41** (4.77-6.04)	**6.53** (5.73-7.30)	**7.43** (6.48-8.34)	**8.62** (7.23-9.92)	**9.51** (7.80-11.1)	**10.4** (8.21-12.4)	**11.2** (8.49-13.8)	**12.3** (8.93-15.6)	**13.0** (9.26-16.9)
60-day	**5.33** (4.72-5.91)	**6.15** (5.45-6.82)	**7.45** (6.57-8.28)	**8.48** (7.44-9.47)	**9.84** (8.28-11.2)	**10.8** (8.92-12.6)	**11.8** (9.37-14.0)	**12.7** (9.68-15.6)	**13.9** (10.1-17.5)	**14.7** (10.5-18.9)

[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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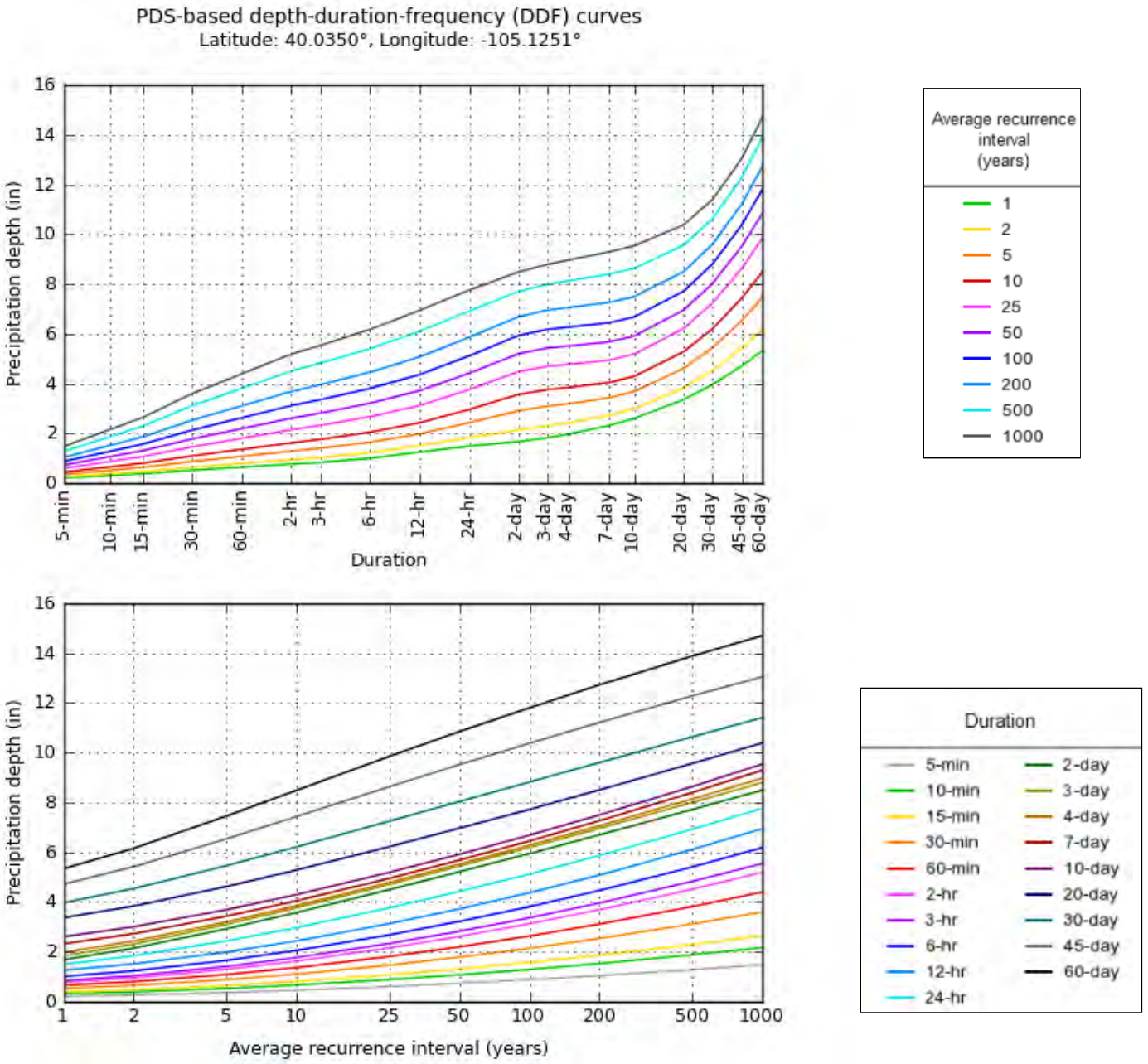
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Wed Mar 29 14:44:06 2023

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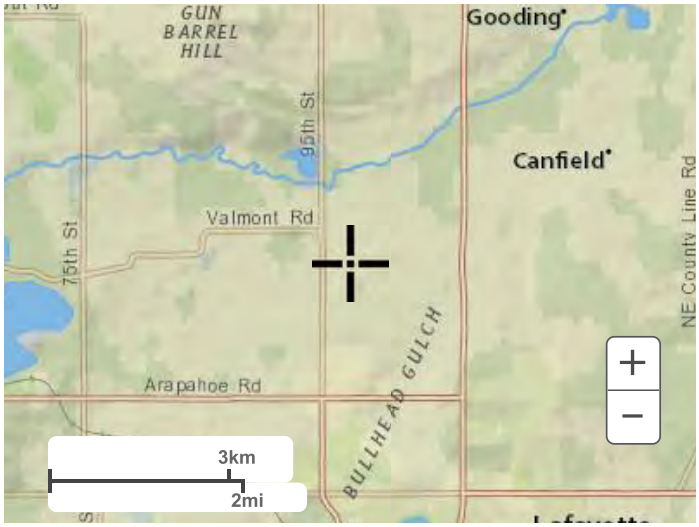
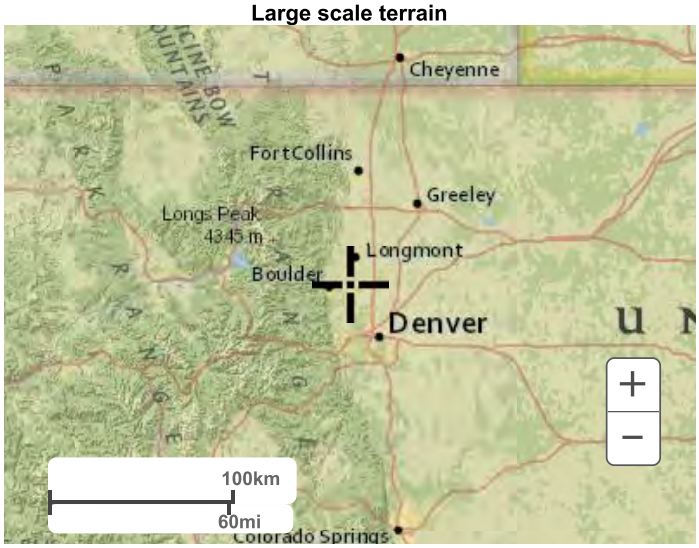
Maps & aerials

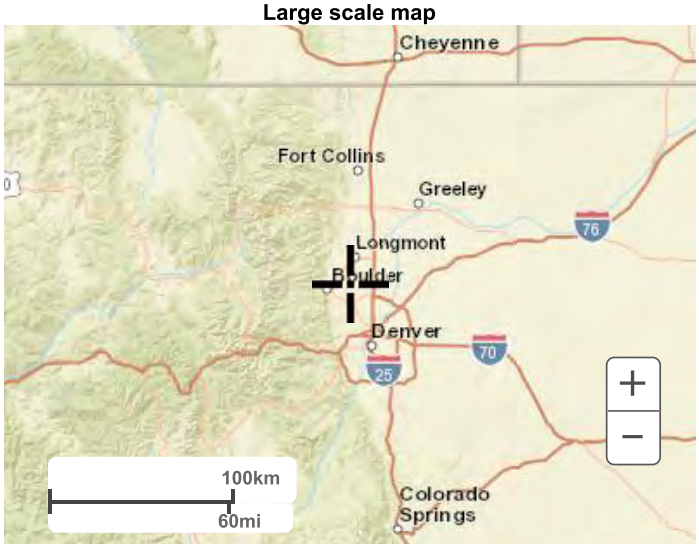
Small scale terrain



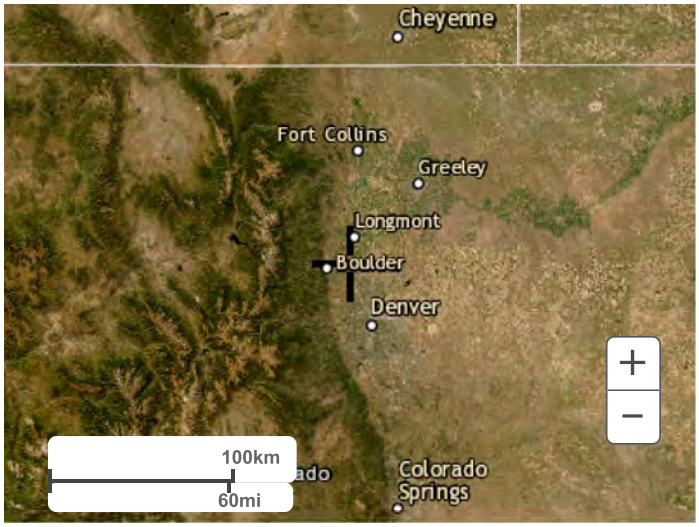
Large scale terrain



Large scale map



Large scale aerial



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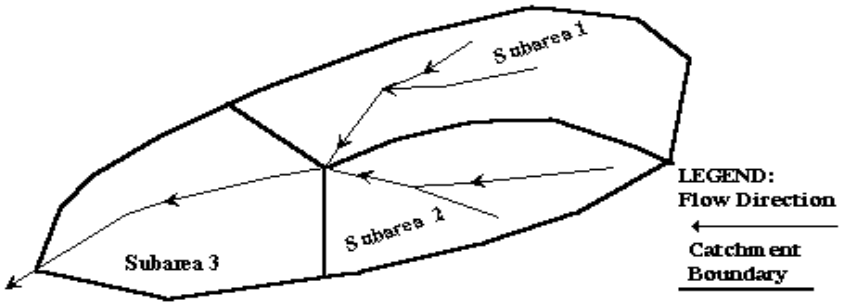
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado



Subcatchment Name
A

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

See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
A1 (Undev Agr)	0.16	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
A2 (Undev Agr)	3.86	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27
Total Area (ac)	4.02		Area-Weighted C	0.01	0.01	0.01	0.02	0.05	0.14	0.28
			Area-Weighted Override C	0.01	0.01	0.01	0.02	0.05	0.14	0.28

Calculation of Peak Runoff using Rational Method

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado

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

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

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

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) =	0.80	1.09	1.37	1.81	2.20	2.63	3.81
	a	b	c				
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786				

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

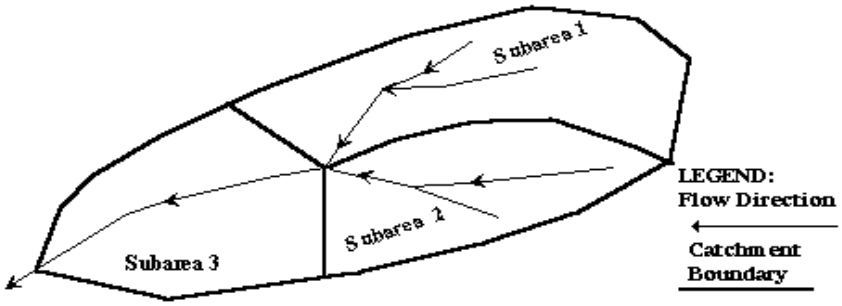
$$Q(cfs) = CIA$$

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
A	4.02			0.01	0.01	0.01	0.02	0.05	0.14	0.28															27.94	1.31	1.78	2.24	2.96	3.60	4.30	6.23	0.05	0.07	0.09	0.24	0.72	2.42	7.01

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado



Subcatchment Name
B

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

See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
B1 (Undev Agr)	0.17	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
B2 (Undev Agr)	2.74	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
B3 (Undev Agr)	2.20	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27
Total Area (ac)	5.11		Area-Weighted C	0.01	0.01	0.04	0.15	0.21	0.30	0.42
			Area-Weighted Override C	0.01	0.01	0.04	0.15	0.21	0.30	0.42

Calculation of Peak Runoff using Rational Method

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado

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

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

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

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) =	0.80	1.09	1.37	1.81	2.20	2.63	3.81
	a	b	c				
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786				

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

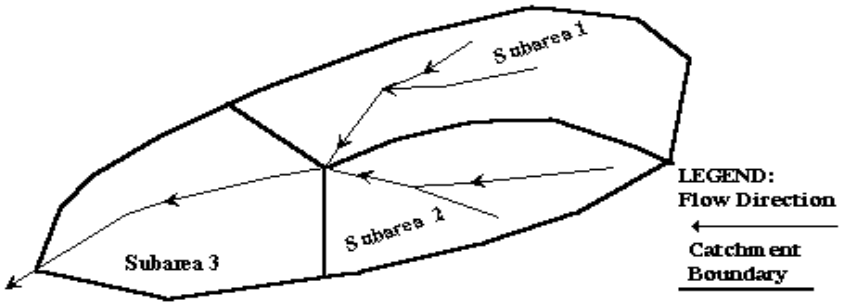
$Q(cfs) = CIA$

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
B	5.11			0.01	0.01	0.04	0.15	0.21	0.30	0.42															27.59	1.32	1.80	2.26	2.98	3.62	4.33	6.28	0.07	0.09	0.46	2.29	3.89	6.64	13.47

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado



Subcatchment Name
A

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

See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
A1 (Solar)	0.16	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
A2 (Solar)	3.86	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27
Total Area (ac)	4.02		Area-Weighted C	0.01	0.01	0.01	0.02	0.05	0.14	0.28
			Area-Weighted Override C	0.01	0.01	0.01	0.02	0.05	0.14	0.28

Calculation of Peak Runoff using Rational Method

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado

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

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

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

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) =	0.80	1.09	1.37	1.81	2.20	2.63	3.81
	a	b	c				
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786				

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

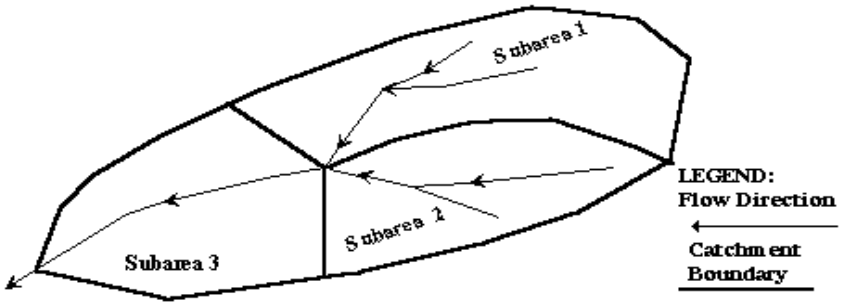
$$Q(cfs) = CIA$$

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
A	4.02			0.01	0.01	0.01	0.02	0.05	0.14	0.28															27.94	1.31	1.78	2.24	2.96	3.60	4.30	6.23	0.05	0.07	0.09	0.24	0.72	2.42	7.01

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado



Subcatchment Name
B

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

See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
B1 (Solar)	0.17	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
B2 (Solar)	2.71	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
B2 (Gravel)	0.02	B	40.0	0.29	0.32	0.38	0.50	0.55	0.61	0.68
B2 (Concrete)	0.0040	B	100.0	0.84	0.86	0.86	0.88	0.89	0.89	0.90
B3 (Solar)	1.95	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27
B3 (Gravel)	0.26	A	40.0	0.25	0.27	0.28	0.32	0.37	0.42	0.51
Total Area (ac)	**5.11**		**Area-Weighted C**	**0.02**	**0.02**	**0.06**	**0.17**	**0.23**	**0.32**	**0.44**
			Area-Weighted Override C	**0.02**	**0.02**	**0.06**	**0.17**	**0.23**	**0.32**	**0.44**

Calculation of Peak Runoff using Rational Method

Designer: TL
Company: TRC
Date: 4/28/2023
Project: Cloudbreak - Harvest Moon
Location: Weld County, Colorado

Version 2.00 released May 2017

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Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

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

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

$$\text{Computed } t_c = t_i + t_t$$

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

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

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

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) =	0.80	1.09	1.37	1.81	2.20	2.63	3.81

	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: 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
B	5.11			0.02	0.02	0.06	0.17	0.23	0.32	0.44

Subcatchment Name	Overland (Initial) Flow Time: 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 (Travel) Flow Time: 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)
B												

Subcatchment Name	Time of Concentration: Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	Rainfall Intensity, I (in/hr): 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Peak Flow, Q (cfs): 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
B			27.16	1.33	1.81	2.28	3.01	3.66	4.37	6.33	0.14	0.19	0.70	2.61	4.30	7.15	14.24

APPENDIX D: GRASS SWALE CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, April 28, 2023

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Channel Analysis

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width 5.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0350

Depth 1.0000 ft

Result Parameters

Flow 26.9414 cfs

Area of Flow 8.0000 ft^2

Wetted Perimeter 11.3246 ft

Hydraulic Radius 0.7064 ft

Average Velocity 3.3677 ft/s

Top Width 11.0000 ft

Froude Number: 0.6959

Critical Depth 0.8145 ft

Critical Velocity 4.4435 ft/s

Critical Slope: 0.0218 ft/ft

Critical Top Width 9.89 ft

Calculated Max Shear Stress 0.6240 lb/ft^2

Calculated Avg Shear Stress 0.4408 lb/ft^2

CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Sanitary Sewer Service Information

No sanitary sewer service will be required for the operation of the project. CBEP Solar 21, LLC or its contractor will provide portable toilets during construction.

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 Boulder County Area, Colorado

April 30, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

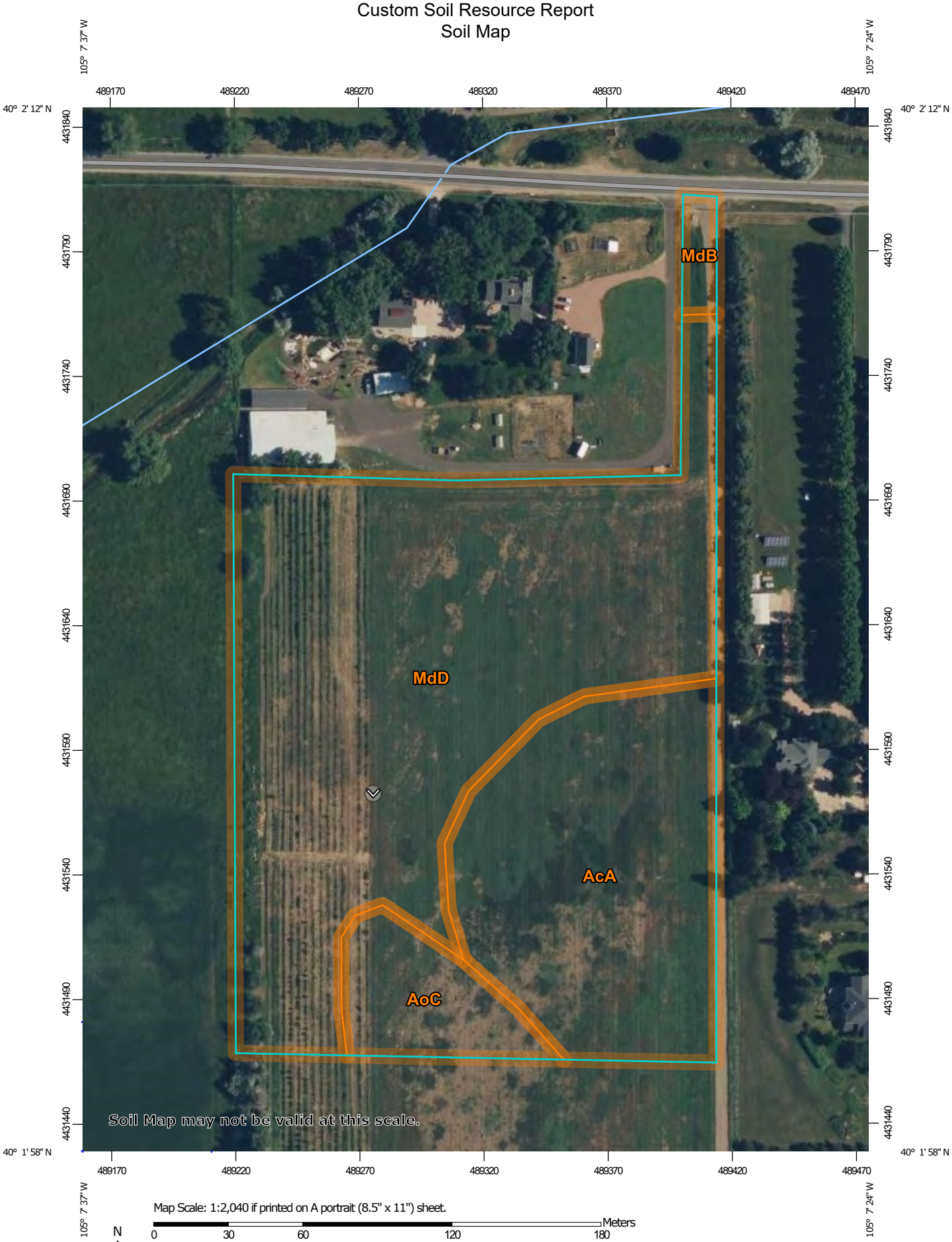
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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: 1:2,040 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

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 1:20,000.

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: Boulder County Area, Colorado
Survey Area Data: Version 19, Sep 7, 2022

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

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
AcA	Ascalon sandy loam, 0 to 3 percent slopes	3.4	29.3%
AoC	Ascalon-Otero complex, 3 to 5 percent slopes	0.8	7.2%
MdB	Manter sandy loam, 1 to 3 percent slopes	0.2	1.4%
MdD	Manter sandy loam, 3 to 9 percent slopes	7.2	62.1%
Totals for Area of Interest		**11.6**	**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.

Boulder County Area, Colorado

AcA—Ascalon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2swl3
Elevation: 3,870 to 5,960 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk - 19 to 35 inches: sandy clay loam
C - 35 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

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

Minor Components

Olnest

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Vona

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

AoC—Ascalon-Otero complex, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2yqpp
Elevation: 4,980 to 5,550 feet
Mean annual precipitation: 13 to 17 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 55 percent
Otero and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt1 - 8 to 12 inches: sandy clay loam

Bt2 - 12 to 19 inches: sandy clay loam
Bt3 - 19 to 26 inches: sandy loam
C - 26 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 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: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Description of Otero

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bk - 6 to 12 inches: sandy loam
C1 - 12 to 36 inches: sandy loam
C2 - 36 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively 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: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

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

Minor Components

Weld

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

Manter

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

MdB—Manter sandy loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: jps3
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Manter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manter

Setting

Landform: Terraces
Landform position (three-dimensional): Side slope, tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy eolian deposits and/or outwash

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 16 inches: fine sandy loam
H3 - 16 to 60 inches: sandy loam

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: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

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

Minor Components

Calkins

Percent of map unit: 8 percent
Ecological site: R067BY031CO - Sandy Bottomland
Hydric soil rating: No

Ascalon

Percent of map unit: 7 percent
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

MdD—Manter sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jps4
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Manter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manter

Setting

Landform: Terraces
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy eolian deposits and/or outwash

Typical profile

H1 - 0 to 5 inches: sandy loam
H2 - 5 to 14 inches: fine sandy loam
H3 - 14 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

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

Minor Components

Ascalon

Percent of map unit: 12 percent
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

Otero

Percent of map unit: 3 percent
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

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CBEP SOLAR 21, LLC
1120 PEARL ST
BOULDER, CO 80302
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: April 30, 2023

PROJECT: Harvest Moon Solar - CBEP Solar 21, LLC

SUBJECT: Water Information/Documentation

No water service will be required for the development. Water used for dust mitigation and vegetation establishment during the construction of the project will be transported to the site via water truck. Water for landscaping will be provided by the landowner.

COLORADO
Parks and Wildlife
Department of Natural Resources

Area 2/ Lon Hagler SWA Office
4207 West County Road 16E
Loveland, CO 80537
P 970-472-4460 | F 970-472-4468

December 19, 2022

Patti Lorenz
Senior Environmental Planner/Biologist
TRC Companies
PLorenz@trccompanies.com

RE: CPW's Comments on the Proposed Cloudbreak Energy Partners LLC – Harvest Moon Solar Project, unincorporated Boulder County.

Dear Ms. Lorenz,

Thank you for the opportunity for Colorado Parks and Wildlife (CPW) to comment on the proposed 10.3-acre Cloudbreak Energy Partners (CBEP) Harvest Moon Solar Project (Solar Project), located South of Isabelle Road and approximately ¼ mile east of N 95th Street in Boulder County, Colorado (T1N, R69W, S21). We recognize renewable energy development is important to meeting the State's greenhouse gas reduction goals and improves our climate resiliency. CPW appreciates that CBEP and TRC have initiated early consultation with CPW because it can lead to a responsibly-developed project that works toward achieving state solar goals while protecting sensitive wildlife species, habitats, and time frames.

The mission of CPW is to perpetuate the wildlife resources of the state, to provide a quality state parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources. CPW has a statutory responsibility to manage all wildlife species in Colorado; as such we encourage protection for Colorado's wildlife species and habitats through responsible energy development and land use planning. One way we achieve this goal is by responding to referral comment requests, as is the case for this project. CPW encourages developers to afford the highest level of protection to Colorado's High Priority Habitats (HPHs). HPHs are defined as sensitive wildlife habitats where CPW has sound spatial data and scientifically-backed best management practice recommendations to help developers with the siting process to minimize any impacts.

RECOMMENDATIONS FOR THIS PROJECT

CPW appreciates this formal consultation from TRC and CBEP. Early consultation is our preferred time to discuss any concerns or questions about the proposed Solar Project.

CPW also appreciates that this Solar Project is located outside of HPHs. CPW encourages the following recommendations for this project:

- CPW recommends that any installed fencing should be eight feet in height, have round-capped posts (e.g., so wildlife isn't impaled), smooth top wire to the fence (e.g., no top barbed wire) (or if two top strands are needed, ensure they are at least six inches apart). The bottom wire can be barbed but should be four inches or less from the ground.
- CPW recommends that other non-security fencing is kept to a minimum. Where such fencing is required, please use wildlife-friendly fencing specifications as described in CPW's document entitled "Fencing with Wildlife in Mind".
- CPW recommends that the solar facility is checked weekly (or escape structures are installed inside the fenced area) to allow deer to escape if one becomes trapped within the facility.
- If construction is slated from March 15 to July 15, please complete pre-construction nesting surveys for songbirds, Burrowing Owls, and ground- or tree-nesting raptors within the Project area or in the immediate vicinity (e.g., their buffers may extend into the Project area) within a couple of weeks of construction.
- For the eventual consultation regarding transmission lines to this Solar Project, CPW recommends they are installed according to Avian Power Line Interaction Committee (APLIC) standards and outside the raptor nesting season. Also, please install bird diverters within ¼-mile of any lake, drainage, or riparian area, and within the raptor nesting buffer for occupied nests.

CPW appreciates the opportunity to review this project and provide comments and recommendations to avoid and minimize impacts to wildlife resources. If the timing or scope of this project changes and/or if you have any questions, please contact Brandon Marette (Northeast Region Energy Liaison) at 303-291-7327 or brandon.marette@state.co.us.

Sincerely,

Mark Leslie
Northeast Regional Manager

cc: CBEP
- Rosie Stewart (rosie@cloudbreakenergy.com)
- Zach Brammer (zach@cloudbreakenergy.com)

- Alec Shobe (alec@cloudbreakenergy.com)

TRC

- Jaime Schlangen (JSchlangen@trccompanies.com)
- Ben Hall (BHall@trccompanies.com)
- Taylor Higgins (THiggins@trccompanies.com)

CPW

- Jason Duetsch (Area Wildlife Manager - Loveland Area)
- Joe Halseth (Area 2 Big Game Biologist – Boulder & Larimer Counties)
- Mike Sherman (Area 2 & 4 Non-Game Biologist – Boulder, Larimer & Weld Counties)
- Tyler Asnicar (District Wildlife Manager – Boulder North)
- Lance Carpenter (NE Region Senior Terrestrial Biologist)
- Brandon Marette (NE Region Energy Liaison)
- Shannon Schaller (NE Region Deputy Regional Manager)

CBEP SOLAR 21, LLC
PO BOX 1255
STERLING, CO 80751
(970) 425-3175
INFO@CLOUDBREAKENERGY.COM

DATE: June 14, 2023

PROJECT: Harvest Moon Solar Project

SUBJECT: Decommissioning Plan

Approach

CBEP Solar 21, LLC has developed this decommissioning plan for the Harvest Moon Solar Project, to be implemented after the contracted lease term has ended. CBEP Solar 21, LLC, the owner of the Solar Energy Facility (SEF) will be responsible for the decommissioning.

Decommissioning of the Project will include removal of all above and below-ground infrastructure, including the arrays, inverter structures, concrete foundations and pads, and electrical infrastructure. All fences, graveled areas and access roads shall be removed unless landowner agreement to retain is presented, in writing, in which the property owner agrees for this to remain. The property shall be restored to a condition reasonably similar to its condition prior to development of the SEF. Grading and re-vegetation will comply with all applicable rules and regulations. Exclusions from the decommissioning plan include planting trees, removing internal site roads, and re-grading to previous conditions. All non-utility owned equipment, conduits, structures, fencing, and foundations to a depth of at least 3' below grade shall be removed. Decommissioning activities will follow the CDOT best management practices (BMPs) for erosion and sediment control and stormwater management that are applied during project construction, or any new BMPs relevant at the time.

CBEP Solar 21, LLC will decommission the Project once the contracted lease term is over, if the lease term is not extended or renewed. Decommissioning may also be initiated if the project is no longer viable. CBEP Solar 21, LLC will provide notice to Boulder County prior to commencement of decommissioning the Project.

Estimated Timeline

Decommissioning/reclamation shall commence within 12 months after power production has permanently ceased and be completed within 12 months from the start date of the decommissioning/reclamation work.

Continued Beneficial Use

If prior to decommissioning the Project, the landowner determines that any of the Project components can be beneficially used on the land after disassembly, such items would be exempt from the requirements for decommissioning. If a third party acquires the Project or a portion of the Project, such third party would be responsible for providing evidence of a plan of continued beneficial use for their relevant Project components.

Boulder County

Community Planning & Permitting

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • **www.bouldercounty.gov**

Building Safety & Inspection Services Team

M E M O

TO: Pete L'Orange, Planner II
FROM: Michelle Huebner, Plans Examiner Supervisor
DATE: May 11, 2023

RE: Referral Response, SU-23-0005: HARVEST MOON Solar Energy. Special Review to construct an approximately 10.3-acre Solar Energy facility on an approximately 35.5-acre parcel.

Location: 9770 Isabelle Road

Thank you for the referral. We have the following comments for the applicants:

1. **Building Permit.** A building permit, plan review and inspection approvals are required for the construction of the solar energy (garden) and the associated electrical equipment. The construction documents must be stamped, signed and sealed by a Colorado design professional, electrical engineer, for the solar system and structural for the foundation and frame. A separate building permit is required for the fencing over 6'-0."

   Boulder County's adopted codes are based upon the 2020 editions of the International Codes, along with other amendments, and the latest National Electrical Code ("NEC") as adopted by the State Electrical Board (currently the 2020 edition). Our adopted building codes and code amendments can be found via the internet at:

   Please refer to the county's adopted 2015 editions of the International Codes and code amendments, which can be found via the internet under the link:

   2015 Building Code Adoption & Amendments, at the following URL:
   Amendments to Boulder County Building Code effective June 6, 2022

2. **Design Wind and Snow Loads.** The design wind and ground snow loads for the property are 145 mph (Vult) and 40 psf, respectively.

3. **Plan Review.** The items listed above are a general summary of some of the county's building code requirements. A much more detailed plan review will be performed at the time of building permit application, when full details are available for review, to assure that all applicable minimum building codes requirements are to be met. Our

Solar Photovoltaic Systems Checklist and other Building Safety publications can be found at: Building Publications, Applications and Forms - Boulder County

Please also refer to our Solar Photovoltaic Systems Checklist, which is available at: B46 Solar Photovoltaic Systems Checklist (bouldercounty.gov)

If the applicants should have questions or need additional information, we'd be happy to work with them toward solutions that meet minimum building code requirements. Please call (720) 564-2640 or contact us via e-mail at building@bouldercounty.org

Boulder County

Community Planning & Permitting

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302
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June 21, 2023

TO: Pete L'Orange, Planner II; Community Planning & Permitting, Development Review Team - Zoning

FROM: Anita Riley, Principal Planner; Community Planning & Permitting, Development Review Team – Access & Engineering

SUBJECT: Docket # SU-23-0005: Harvest Moon Solar Energy – 9770 Isabelle Road

The Development Review Team – Access & Engineering has reviewed the original and subsequent submittal materials for the above referenced docket and has the following comments:

Legal and Physical Access

1. The subject property is accessed via Isabelle Road, a paved Boulder County owned and maintained right-of-way (ROW) with a functional classification of Minor Arterial. Legal access has been demonstrated via adjacency to the public ROW.

2. The proposed access road to the facility is locate near the property line. Be aware that no grading may occur within two feet of the property line per Section J108 of the 2015 International Building Code.

3. The proposed access is 26 feet in width, the maximum allowable width for a commercial two-lane driveway. As there will be minimal traffic on the driveway, staff recommends reducing the width to 18 feet. This width will allow convenient access for construction, maintenance, and emergency vehicles.

   Additionally, the proposed access must be designed according to the Boulder County Multimodal Transportation Standards (MMTS), including but not limited to:

   a. Standard Drawing 11 – Private Access

   b. Standard Drawing 18 – Access Turnaround

   c. Standard Drawing 19 – Typical Turnaround & Pullout Locations

   At building permit, submit plans that delineate and note the revised access requirements, including revised width, access cross section, and revised emergency vehicle turnaround.

Drainage and Stormwater

4. The assumption that solar field will not change imperviousness is not consistent with research and recent Mile High Flood District (MHFD) evaluations. Solar panels will concentrate runoff, and "rain shadow" areas beneath panels will not be fully utilized for infiltration. The solar panel orientation plays a large role in how well the runoff infiltrates. Pending MHFD criteria for solar fields use imperviousness of 5% when panels are parallel to

contours, 20% when diagonal, and 40% when perpendicular. Panels that are placed parallel to the contours have the greatest runoff reduction by having a higher infiltration capacity by using all available pervious area.

At building permit, provide revised runoff calculations and detention requirements in light of this information. Post-development runoff numbers must account for the change in runoff from the solar panels.

5. The proposal is subject to full-spectrum detention and permanent water quality controls as identified in Section 1200 of the Boulder County Storm Drainage Criteria Manual (SDCM).

   At building permit, submit plans that demonstrate compliance with Section 1200 of the Boulder County Storm Drainage Criteria Manual.

6. The proposed development will result in approximately seven acres of site disturbance, triggering the need for a stormwater quality permit (SWQP).

   At building permit, submit an application for a stormwater quality permit (SWQP).

   Construction Notes

7. Note that, during construction, all materials, machinery, dumpsters, vehicles and other items associated with the project should be staged within the facility boundaries.

This concludes our comments at this time.

Parks & Open Space
5201 St. Vrain Road • Longmont, CO 80503
303-678-6200 • POSinfo@bouldercounty.org
www.BoulderCountyOpenSpace.org

TO: Pete L'Orange, Community Planning & Permitting Department
FROM: Ron West, Natural Resource Planner
DATE: July 10, 2023
SUBJECT: Docket SU-23-0005, Harvest Moon, 9770 Isabelle Road

Site Conditions

The 33-acre parcel is entirely in agricultural uses, with a residence and attendant outbuildings/farmyard. It is likely that almost all plant species are non-native, which is normal for most agricultural lands.

County Comprehensive Plan Designations

The parcels have the following designations in the Boulder County Comprehensive Plan, or from other resource inventories:

- Significant Agricultural Lands of National and Statewide Importance
- View Protection Corridor – associated with Isabelle Road
- Adjacent to County Open Space – Polsby property, on west

Discussion

Staff primarily has numerous questions about the application. There are many details that are needed, and conflicting statements in the extremely concise application.

The size of the area is to be developed is unclear. Staff estimates the area to be 10 acres, yet the application's "area of disturbance" is stated as 7 acres. It is also stated that construction is "minimally invasive," with installation of steel piles "using rubber track-mounted, state of the art machines." (See construction during poor weather comments, below.)

It is also stated that about 57 percent of the area is designated as Significant Agricultural Lands of National Importance, and 43 percent is of Statewide Importance. In total, it appears that 10 acres of Significant Agricultural Lands would be removed from production. (However, see sheep grazing comments below.)

Staff has concerns about the following quotes from the applicant's website (cloudbreakenergy.com). Most of these are from the Frequently Asked Questions; italics are added:

"How will the land and solar system be maintained during the lease term?
We will visit the site periodically and ensure that the panels are in good working order *as well as handle any weeds or plants that may be growing under the solar panels*. We will visit

the site approximately 4 times per year."

"Can I use the land around the system during the lease?
From the start of construction to the end of the lease term*, you can potentially graze sheep around our equipment, but you will otherwise not be permitted to use the land within the fence line."*

"Construction
This process usually takes 2-3 months from start to finish."

Given these website statements, the following questions need to be answered:

What is the difference between "handl[ing] any weeds or plants that may be growing under the solar panels," and the site's potential use for sheep grazing stated in the application? The application talks of, "…regenerative agriculture techniques such as rotational grazing of sheep and no-till farming." Yet there is no *commitment* for grazing, nor information on who/how it would occur. Thus, there is no commitment to continued agricultural use of the site. Also, how can no-till farming occur if "*you will otherwise not be permitted to use the land within the fence line,"* as quoted above.

The application states that construction should last "about 4-5 months," yet the website states it "usually takes 2-3 months." Why the difference?

Other comments:

The application states that, "…long-term material staging and vehicle traffic will be limited to access roads and staging areas." Where are the staging areas, and what is "long-term" staging. It also states that, "All pre-construction surveys recommended by…(CPW) will be completed, as applicable." Which ones are not applicable, and why not? It also states that, "There will be long-term impacts on fauna." What specifically are these?

Staff questions the need for a 7-foot fence; why is a fence necessary at all? The use of cameras, to be monitored "weekly," is not workable nor acceptable. Who is going to monitor, and what would occur if something is observed?

CPW recommendations are for a wire fence, yet both the detail drawing and the photograph shows a mesh fence. The latter would not be passible by most mid-sized mammals. The CPW recommendation for bird diverters on transmission lines seems moot since the lines will need to be buried.

The application states that, "Construction activities will be limited to good weather days…." How will this be defined and who will make the decision? "Good" weather days may still have water-logged soils. It is the soil conditions that are critical, not the weather. Work on top of, or in, wet soils can permanent destroy soil structure, which cannot be recovered. These would be permanent losses of Significant Agricultural Lands. This work restriction needs to be a Condition of Approval and a stipulation in the contract.

The application does not address either the scenic/visual impacts from Isabelle Road and 95th

Street, nor impacts to the adjacent county open space.

Staff questions whether "soil quality will be maintained or improved" via regenerative agriculture. How is regenerative agriculture defined here, and who would make, for example, grazing timing restrictions? The overgrazing of sheep can have serious agricultural impacts. The "Management Plan" in the application is not adequate; a detailed Agricultural Management Plan for the leased site needs to be a condition of approval.

Sheet C-0002, General Notes –

Note 9 speaks to "site grading." There shouldn't be any.
Note 14 is about areas "not restored with crushed stone." There shouldn't be any crushed stone.
Note 20 is about replacing pavement; no pavement work.

There are two Natural Features notes. One says there are streams, one says there aren't any.

In the Floodplain Notes: "There is a mapped 100 year/500 year floodplain is located with the project area" (sic).

<u>Recommendations</u>

- All items above should be addressed, and questions resolved.

Public Health
Environmental Health Division

May 25, 2023

TO: Staff Planner, Land Use Department

FROM: Jessica Epstein, Environmental Health Specialist

SUBJECT: SU-23-0005: HARVEST MOON Solar Energy project

OWNER: L K LIVING TRUST

PROPERTY ADDRESS: 9770 Isabelle Road

SEC-TOWN-RANGE: 21 -1N -69

The Boulder County Public Health (BCPH) – Environmental Health division has reviewed the submittals for the above referenced docket and has the following comments.

OWTS:

1. BCPH issued a repair permit for the installation of an absorption bed system on 12/28/83. The permit was issued for an onsite wastewater treatment system (OWTS) adequate for a 6-bedroom house. BCPH approved the installation of the OWTS on 1/7/85.

Avoid Damage to OWTS:

1. As shown in the application drawings, the proposed solar array must not be installed on top of the absorption field. Heavy equipment should be restricted from the surface of the absorption field during construction of the solar array and other trenching and excavation activities to avoid soil compaction, which could cause premature absorption field malfunction.

This concludes comments from the Public Health – Environmental Health division at this time. For additional information on the OWTS application process and regulations, refer to the following website: **www.SepticSmart.org**. If you have additional questions about OWTS, please do not hesitate to email HealthOWS@bouldercounty.org.

Cc: OWTS file, owner, Community Planning and Permitting

Environmental Health • 3450 Broadway • Boulder, Colorado 80304 • Tel: 303.441.1564 Fax: 303.441.1468
www.BoulderCountyHealth.org • www.bouldercounty.org

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303.571.3284
Donna.L.George@xcelenergy.com

May 17, 2023

Boulder County Community Planning and Permitting
PO Box 471
Boulder, CO 80306

Attn: Pete L'Orange

Re: Harvest Moon Solar Energy, Case # SU-23-0005

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the special use for **Harvest Moon Solar Energy**. Please be aware PSCo owns and operates existing overhead and underground electric distribution facilities along the east and west property lines. Bear in mind that per the National Electric Safety Code, a minimum 10-foot radial clearance must be maintained at all times from all overhead electric facilities including, but not limited to, construction activities and permanent structures.

The Customer/Applicant must complete the application process for any new 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.

If additional easements need to be acquired by separate PSCo document, a Right-of-Way Agent will need to be contacted.

Donna George
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-571-3306 – Email: Donna.L.George@xcelenergy.com

From: Chris Mestas
To: L"Orange, Pete
Subject: [EXTERNAL] SU-23-0005: HARVEST MOON Solar Energy project at 9770 Isabelle Road.
Date: Monday, May 22, 2023 10:07:43 AM

Pete-
I don't have any comments on this project. Please let me know if you have any questions.

Chris Mestas
Fire Marshal
Louisville Fire Protection District
895 West Via Appia
Louisville CO, 80027
303-666-8809
cmestas@louisvillefire.com

From: Kelly Driscoll
To: L"Orange, Pete
Subject: [EXTERNAL] SU-23-0005: HARVEST MOON Solar Energy
Date: Wednesday, May 31, 2023 4:34:30 PM
Attachments: image001.png

Pete,

Thank you for the opportunity to review the proposed Harvest Moon Solar Energy project at 9770 Isabelle Road. The subject site is outside of the Town's incorporated limits, and over one mile beyond the Town's Planning Area Boundary. For this reason, we have no comments on the proposed project.

Thank you,

Kelly Driscoll | Principal Planner
Planning & Development

Town of Erie
Street Address | P.O. Box 750 | Erie, CO 80516
Phone: 303-926-2774 | Cell: 720-534-1050|
www.erieco.gov | Facebook | Twitter | LinkedIn

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From: Wufoo
To: LU Land Use Planner
Subject: [EXTERNAL] Ask a Planner - Natalie Condon - SU-23-0005 - 10029 Isabelle Rd
Date: Monday, May 15, 2023 10:31:23 AM

Boulder County Property Address : 10029 Isabelle Rd
If your comments are regarding a specific Docket, please enter the Docket number: SU-23-0005
Name: Natalie Condon
Email Address: natalie@isabellefarm.com
Phone Number: (303) 817-6824
Please enter your question or comment: I am writing to request that I be sent a referral packet with more specifics about how the applicant has proposed situating the solar energy facility on their property, as well as what the solar energy facility will consist of (just panels or some other kind of infrastructure.

If the referral packet does not include information about what kind of precedent this solar facility will set, we would appreciate that information as well.

Time is of the essence.

Thank you,
Natalie Condon
Public record acknowledgement:
I acknowledge that this submission is considered a public record and will be made available by request under the Colorado Open Records Act.

From:	Natalie Condon
To:	L"Orange, Pete
Subject:	[EXTERNAL] Docket SU-23-0005
Date:	Monday, June 19, 2023 9:14:39 AM

To Whom It May Concern:

I am writing to express my concern over the Special Review to construct an approximately 10.3-acre Solar Energy facility on an approximately 35.5-acre parcel at 9770 Isabelle Road.

In the not-so-distant past, Isabelle Road was core part of a section of agricultural lands in Boulder County that was deemed a valuable, non-renewable resource and had been designated ag land of national importance and key to regional heritage. Then, the IGA blew up, Erie started its rampant development, and now, with the proposal of this solar farm, it seems the creep of unnecessary development is moving west of Hwy 287 and into Boulder County.

I am writing to ask that this solar farm not be permitted to be placed in this agricultural corridor and that the value of the nonrenewable resource that is farmland be kept intact in this section of the County where contiguous Conservation Easements form a valuable, irreplaceable and nonrenewable tract of agricultural lands.

I appreciate and believe in the value of solar farms, but recommend Boulder County consider rooftops and parking lots as places where such solar arrays can serve multiple, symbiotic functions at once without taking a toll on precious, nonrenewable environment and contiguous spaces of rapidly diminishing agricultural lands: Just a few of the benefits of doing so would not only conserve carbon-sink lands but provide sustainable energy, shade for and protection from hail for vehicles, which would be a benefit to not just residents and businesses, but help to bolster the insurance industry and possibly keep in check rates for citizens in areas affected by rapidly changing weather patterns.

The application says that there will be minimal disturbance to the land and that native grasses will grow under the solar array. As we've seen in other arrays in the region, this simply is not true (note the array on 95th Street in Longmont on ag land). It's not possible to not disturb the vegetation or soil, let alone wildlife migration, use of land by birds of prey and other birds that nest on the ground.

It is not specifically this array's installation on agricultural lands of local, state and nation importance that I find objectionable: It is the installation of any array on productive ag land and open spaces that I find objectionable. There are plenty of paved surfaces and rooftops on which such arrays can be placed without causing further degradation to agricultural lands and open spaces.

Thank you for your time and consideration.

Natalie Condon
303.817.6824

From:	Ann L. Mattson
To:	LU Land Use Planner
Cc:	Roger Mattson; Patrick Mattson; Noelle Schreiber; Dan Gould; Lubbyann@msn.com; Kay Meyer
Subject:	[EXTERNAL] Special Use Review Referral Notification for Docket# SU-23-0005
Date:	Wednesday, June 14, 2023 8:03:21 AM

Thank you for all the communication regarding this proposed Solar Energy Facility to be built in our community. We appreciate the thoughtful development of renewable energy sources in the county and value the partnership between county leadership and residents.

That said, I have the following questions/concerns/comments:

1. Will there be any changes to current power transmission lines as a result of the construction of this facility?

2. What are the plans for decommissioning and eventual deconstruction of this facility? Specifically, will an escrow fund be created to account for these events and if so, can you please provide some specifics of that funding?

3. We request that far more extensive vegetative screening be included in this plan. In this historic rural community, such a large solar installation will run the risk of effecting property values to all surrounding parcels, not just to the north. Additionally, our long-treasured vistas will be forever changed. A vegetative fence for the entire perimeter would mitigate this greatly, particularly to the west where many county residents and visitors routinely drive by and will be within eyesight of this facility.

Thank you in advance for your consideration.

A reply would be most appreciated.

Kindly,
Ann L. Mattson, MD

Co-Owner
New Moon Farms
3298 95th Street
Boulder, Colorado 80301
newmoondoc@gmail.com

From: dan@swirescpa.com
To: LU Land Use Planner
Subject: [EXTERNAL] Solar Farm #SU-23-0005
Date: Thursday, June 15, 2023 12:11:09 PM

Dear Planning Dept,
I forgot to mention that because we are to the east of the proposed solar farm, we will likely get the glare from the panels when the sun hits them from the east in the morning. With it being built on a hill that slopes up, we could get the glare from thousands of panels at different levels from the various rows. I understand that in some states, it is illegal to situate your solar panels so that your neighbors get a glare off of them. Apparently that is not the law in Colorado or you should have not have even accepted this proposal. However, with other states understanding that problem, it should certainly be a consideration.
In their mailing, Cloudbreak claims that they will stowe the panels at an angle to reduce the glare risk and they will treat the panels with an anti-reflective coating. That all sounds good, but unfortunately they can't stowe the panels in a way to prevent glare on all of our property or they would miss the sun's rays during much of the mornings. Coatings wear off and coatings develop holes, especially over 20 years of hail, wind, etc. Their assurances are like putting a cloth bandage on an open wound and hoping for the best.
Thanks,
Daniel L Swires

From: dan@swirescpa.com <dan@swirescpa.com>
Sent: Wednesday, June 14, 2023 2:25 PM
To: 'planner@bouldercounty.org' <planner@bouldercounty.org>
Subject: Solar Farm #SU-23-0005
Dear planning dept,
Here is our letter in opposition to the proposed solar facility.
Thanks,
Daniel L Swires
Link to Firetrace report- https://www.firetrace.com/hubfs/reports/Firetrace-Report-Hidden-Danger-Solar-Farms.pdf

Re: Proposed solar farm at 9770 Isabelle Road (SU-23-0005)
From: Daniel & Susan Swires, 9820 and 9830 Isabelle Road

Dear Reader,

We own two properties that are immediately east of the proposed solar facility. First off, it is difficult to make money farming, perhaps nearly impossible, so we understand being tempted by the dollars that the solar companies are offering to land owners.

For 9830 Isabelle Road, we have about 28 acres of crop land that has historically been farmed together with the 10 acres of Leistikow's land where this proposed solar facility would be. As farm acreage decreases, it becomes more difficult to farm and there are fewer possible uses for the acreage. Our two parcels are contiguous and we have the same irrigation water. Our land is sandy loam which is some of the best ag soil in this area, much better than the clay and shale found in other parts of the county. Taking the 10 acres out of ag production would negatively impact the farming value of our farm. In addition, as a society, we need to keep our good land producing our food and use land that is less suitable for ag for things like producing energy. Our acreage is under an agricultural easement with Boulder County. That department of the county does not view solar facilities as agricultural use, so we could not have a similar facility on our 28 acres even if we wanted to.

For 9820 Isabelle Road, the proposed solar facility is directly west of our house, basically in our backyard (see attached map). One could not put it in a place to more negatively impact our view corridor. The acreage is a hillside with the highest point being the west side of the proposed area, so we would get a view of row upon row of the panels. The facility is not appropriate near expensive homes. Around Sterling, CO or in Texas, I can understand that such a facility might have little impact on the values of the houses in the area, but they have little to look at anyway. However, there was an article in the Wall Street Journal recently about litigation between neighbors trying to stop or remove solar farms in Texas where they are more prevalent than they are here in Colorado, so perhaps there is a negative impact even in Texas. We paid extra for the land to purchase the view, we pay extra real estate taxes due to the higher value of our house due to the views of the mountains and as taxpayers we are paying for the County to purchase land to keep it rural. The County requires homes to be grouped out in the county to maintain the rural aspects of the rest of a farm, which is what we already have in this location. Why would you then put a solar facility inside that group of houses? The prevailing wind is from the west, so all of the noise from the panels adjusting to track the sun during the day will be sent to our house. If there is no vegetation under and around the panels, then we will get the dust because the west wind can be very strong.

When a feedlot is in an area, the neighbors smell manure, but the owner smells money. A similar truism would be that when a solar facility is in an area, the neighbors see an eyesore, but the owner sees money. The location of this proposed facility impacts the neighbors negatively. It is interesting to note that the proposed location is in our backyard instead of surrounding the owner's house, even though they have plenty of acreage in their backyard to put it there instead of where they proposed.

There is a good chance that the solar facility would increase the fire danger for our neighborhood. You can require that they keep the weeds and grass short by mowing or grazing, but people have a tendency to cut corners in order to save money. We have a hard time finding workers, and it takes a lot more time and effort to mow around and under solar panels than it does to mow an open field. We have friends near South Boulder Road that had all of the houses around them burned in the Marshall Fire. Their house is still standing because they mowed their pastures while their neighbors did not. They still suffered from the smoke damage and losing their neighbors for a few years, so they suffered even when they took proper care of their land. If the land is not irrigated, then not much will grow, so then we would have dry weeds and dusty conditions. There is also the danger that the solar facility itself will cause a fire. Attached please see an article from Firetrace about this very real danger that has happened to other solar facilities. Concern about the fire danger should by itself be enough to terminate any and all discussion about putting a solar facility near any homes in Boulder County. We should learn some lessons from the Marshall Fire. The fire danger in Boulder County is much higher than it is in most other places due to our dry climate and gusty winds. Please do not allow a solar facility to be built anywhere near our properties.

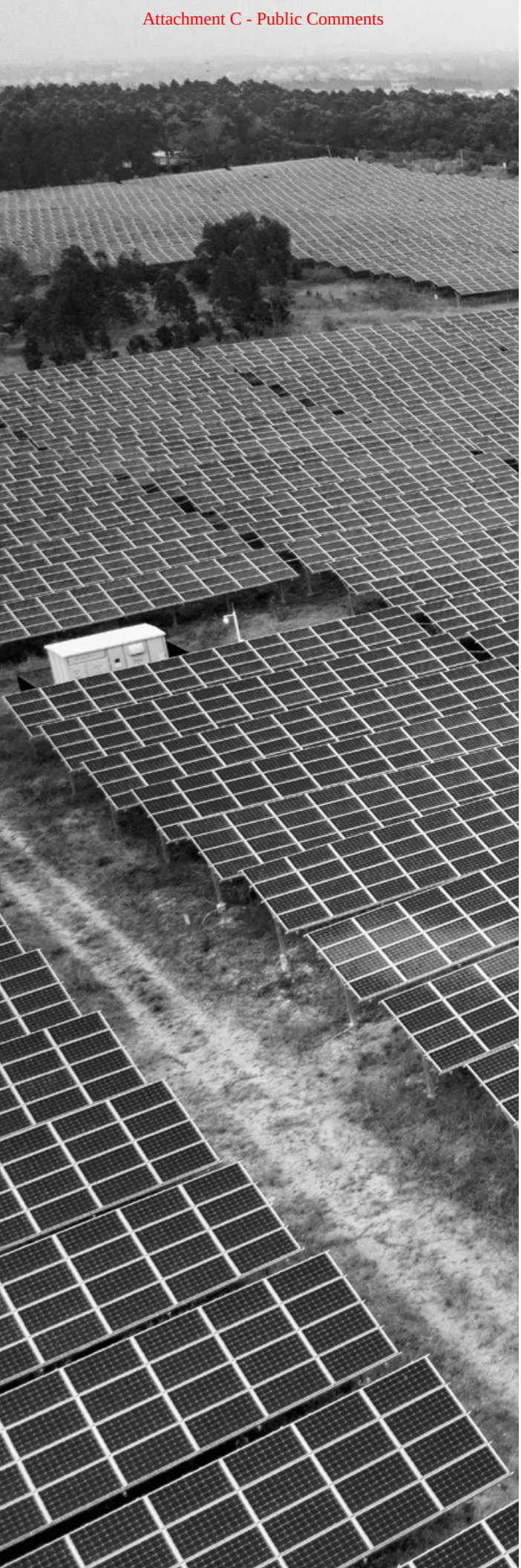
Direct Visual Impact to 9820 Isabelle Road (and other neighbors) of view to the West (Mountains) – red arrow showing line of sight from house on 9820 Isabelle Road. Please note that the proposed owner's house is to the south of the proposed solar farm and has no such negative impact.

FIRETRACE™ International

Halma

HIDDEN DANGER

Why solar farm fire risk could be greater than you think



Summary

The solar industry is potentially underestimating the risk of fire at solar farms.

Why? It's partly because there is a shortage of data on solar farm fires, and partly because research into the issue has given rise to suspicions that fires at solar farms have been under-reported.

This report will look at the solar fire data that is available and analyse what conclusions can be drawn from that data.

In addition, the report will look at:

- The factors that make a fire at a solar farm more likely
- The possible root causes of solar-related fires, and
- The PV components most likely to cause solar farm fires

Finally, the report will also explore what steps you can take to reduce the risk of solar farm fires.

What is certain is that solar farm fire risk is an issue that the solar industry needs to take more seriously. This is particularly the case when you consider how rapidly the global solar industry is expanding.

Data from the International Energy Agency (IEA) – which was published in the IEA Photovoltaic Power Systems Programme's 'Snapshot of Global PV Markets 2022' report – showed that the world's total cumulative installed PV capacity increased 23% in 2021 to 942GW.[1]

With the number of solar installations growing fast – amid concerns that instances of solar fires are being under-reported – now is the time for action to be taken to minimize solar farm fire risk.

1 https://iea-pvps.org/snapshot-reports/snapshot-2022/

How significant is solar fire risk?

There is a severe lack of data on the prevalence of solar farm fires.

Indeed, some studies have concluded that there is a high likelihood that instances of solar farm fires are under-reported.

A study by the UK's BRE National Solar Centre – which was entitled 'Fire and Solar PV Systems – Investigations and Evidence' and detailed an investigatigation into a total of 80 potential PV-related fire incidents – led to the finding that researchers "strongly suspect a degree of under-reporting, especially amongst solar farms and domestic thermal events that were resolved by a solar installer/ maintenance engineer."[2]

With regard to the data that is actually available, the US Department of Energy's Solar Energy Technologies Office has cited a study conducted by European testing and certification company TÜV Rheinland – entitled 'Assessing Fire Risks in Photovoltaic Systems and Developing Safety Concepts for Risk Minimization' – which found that, in approximately half of 430 cases of fire or heat damage in PV systems, the PV system itself was considered the "cause or probable cause."[3]

Meanwhile, the study carried out by the BRE National Solar Centre found that more than a quarter of fires involving solar systems were caused by the photovoltaics and those fires were all "serious fires", meaning fires that were "difficult to extinguish and spread beyond the area of origin."

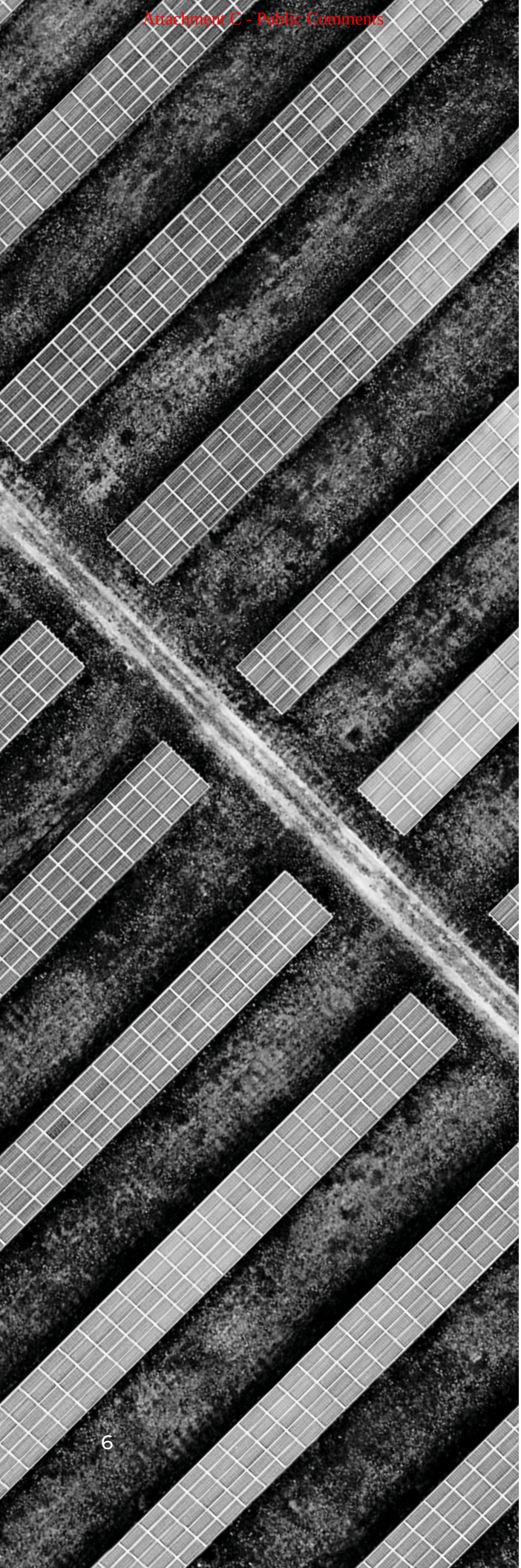
2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786882/Fires_and_solar_PV_systems-Investigations_Evidence_Issue_2.9.pdf

3 https://www.energy.gov/sites/default/files/2018/10/f56/PV%20Fire%20Safety%20Fire%20Guideline_Translation_V04%2020180614_FINAL.pdf

However, as already indicated, the BRE National Solar Centre study did emphasize that the full extent of solar fire risk may have been concealed. Specifically, it highlighted how, in one instance during the course of the study, researchers were "denied access to one site by the insurance company's loss adjuster."

As a result, we cannot rule out the possibility that solar farm fire risk, and occurrences of solar farm fires, may be more prevalent than the available data suggests.

There is a high likelihood that instances of solar farm fires are under-reported.



What statistics are available?

Despite the challenges in obtaining data that provides a comprehensive picture of the extent of solar fires and the prevalence of solar fire risks, there are a number of studies that have attempted to gain an insight into the issue.

For example, one data set released by the US Fire Administration (USFA) found that instances of solar system fires more than doubled during the period 2015 to 2018.

The USFA reportedly does not track fires from solar installations, instead filing them under the 'other' category for causes. In the aforementioned instance, the USFA data was only made available following a specific request from an executive at a solar maintenance company.

The USFA data that was obtained showed that there were 56 solar system fires recorded in 2018, up from 25 in 2015.[4] A third of the fires that were recorded by USFA during the period 2015 to 2018 occurred in California, Arizona and Nevada.

However, while the number of fires recorded by the USFA more than doubled between 2015 and 2018, the number of solar installations in the US increased at a similar rate during the same period – from less than 30,000MWdc to more than 60,000MWdc, according to Solar Energy Industries Association research data – which suggests solar fire risk may not actually be increasing.[5]

Yet, in contrast, data from Australia indicates that the opposite is true – that is, solar fire risk is, in fact, increasing exponentially.

Statistics from the Australian PV Institute show that PV installations in the country increased from around 7.3GW in January 2018 to more than 20.7GW in December 2020.[6] However, while the increase in PV installations in Australia during the period was less than three-fold, data from Fire and Rescue New South Wales (NSW) showed that there was a six-fold increase in the number of solar fires attended by firefighters in the period 2018 to 2020, according to reports.[7] In 2020, Fire and Rescue (NSW) attended 139 solar fires, compared to 22 in 2018.

4 https://onedrive.live.com/?authkey=%21ADZAYZw3zBKJ%5F1k&id=C8BE25A716873030%216383&cid=C8BE25A716873030

5 https://www.seia.org/solar-industry-research-data

6 https://pv-map.apvi.org.au/analyses

7 https://www.smh.com.au/national/nsw/the-irony-s-not-lost-on-me-solar-panel-safety-device-led-to-500-per-cent-rise-in-rooftop-fires-20210129-p56xtp.html

What are the risk factors?

There are three possible root causes for solar farm fires, according to the BRE National Solar Study Report.

They are:

- an error in the system design
- a faulty product (a design or quality issue)
- poor installation practice

The report said DC isolators were found to present the greatest fire risk. Around 30 percent of the incidents recorded in the study were caused by DC isolator malfunctions.

A number of the incidents in question involved ingress of water into DC isolators, all with upward-facing cable glands, the BRE study said. The study also concluded that there was evidence of fires originating within DC isolators with "poor contact design" – that is, originally being designed for AC operation and being re-designated as DC-rated by the manufacturer – and with incorrect internal wiring.

The BRE report said there were three separate issues with DC isolators:

1. **Poorly designed or constructed products**
   Models originally designed for AC are "unlikely to be reliable over the life of a PV system."

2. **Incorrectly specified DC isolators**
   Isolators that are underrated for the current or voltage of the PV strings connected, for example.

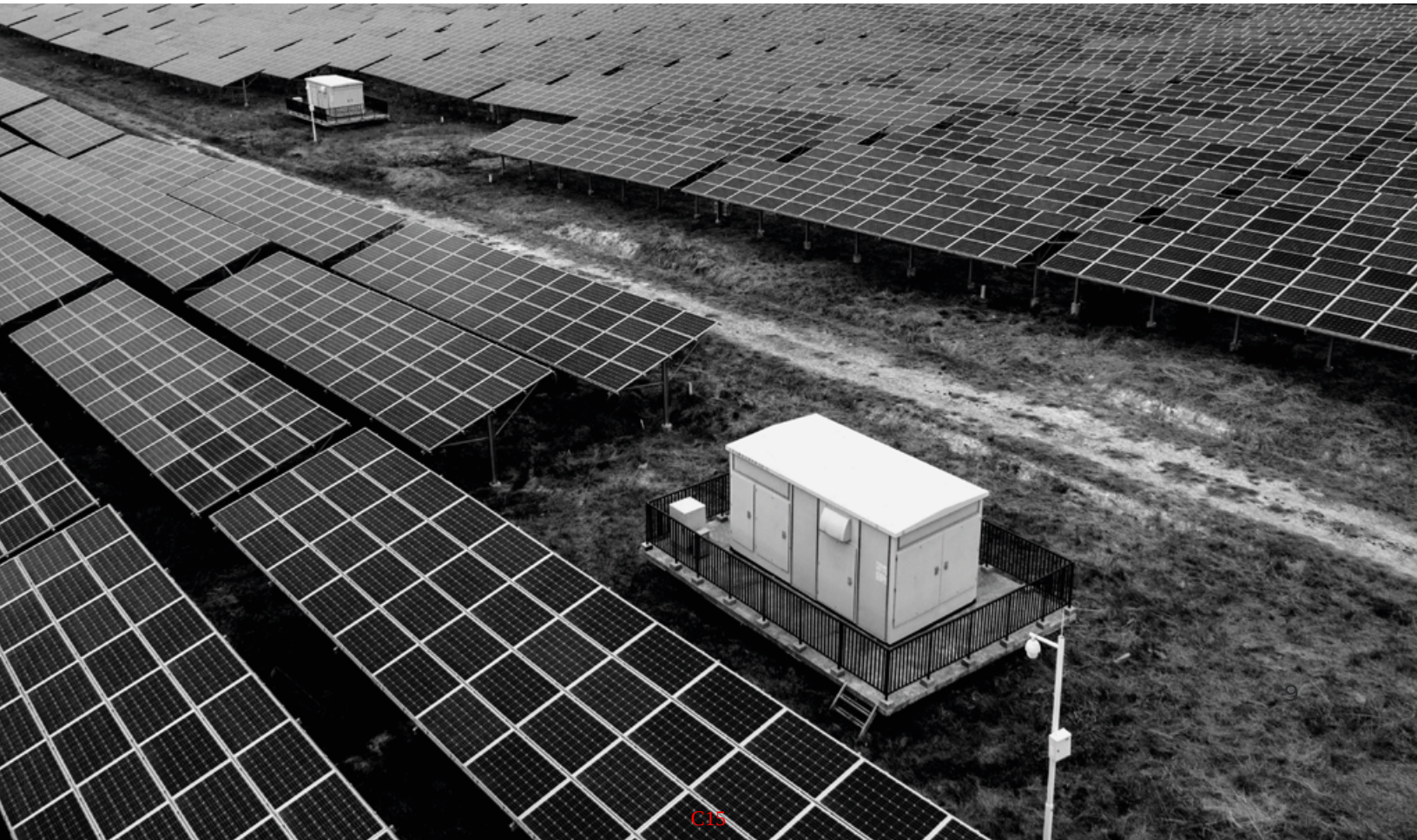
3. **Poor installation practice**
   The BRE report said this category accounted for the "majority of DC isolator failures leading to fires or thermal events." Poor installation frequently caused ingress of water into the isolator casing causing arcing.

Meanwhile, DC connectors are the second most likely PV component to cause a fire.

DC circuits connect the PV modules together, increasing the voltage in a similar way to connecting batteries in series. Parallel strings of PV modules increase the current. The DC circuits are fed back to the inverter, sometimes via a DC isolator.

The metal contacts of DC connectors tend to remain connected by frictional forces, even when the supporting plastic body has been burnt off, the BRE report said. Therefore, any DC connectors that have been subject to arcing should be suspected as a likely source of ignition.

DC isolators were found to present the greatest fire risk.



Inverters: How they cause fires

A number of fires start in inverters, which form the most complex part of a PV system and manage the power that flows through them. Though they have sensors and other safety features, there have been incidents of solar fires logged as initiating in an inverter, according to the BRE report.

The BRE has also highlighted how the use of "faulty inverters" has resulted in solar-related fires.[8] In 2020, there were reports of firefighters called to extinguish a fire in the central inverters of the Ullum photovolataic park – owned by energy company Genneia – in Argentina. In this incident, a number of inverters had caught fire, with firefighters taking an hour and a half to extinguish the blaze.[9]

Meanwhile, an article published by the Solar Power World website highlighted how "electrical abuse" was one of "three main abuse factors" that can send a battery into thermal runaway [meaning a situation where the heat generated within a battery exceeds the amount of heat that is dissipated to its surroundings]. The article added: "Electrical abuse happens during overcharging, undercharging or shorts from the inverter."[10]

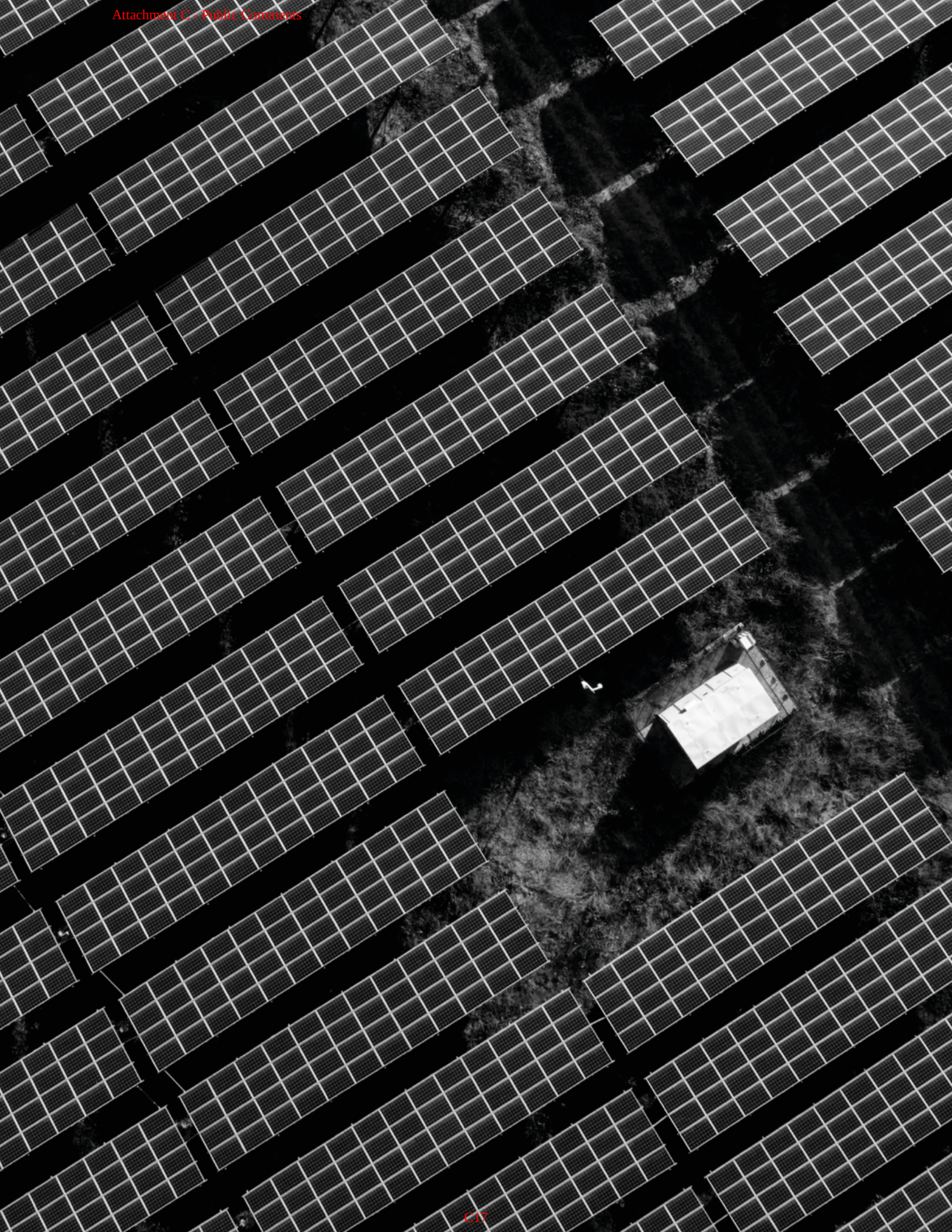
What causes fires in inverters? According to photovoltaic system distributor Solarity, inverters are combustible due to their polymer content.[11] Solarity has also highlighted how, during and after a solar fire, the PV system can potentially produce liquid, solid or smoke emissions and firefighters responding to the incident "could be exposed with dangerous levels of metals such as lead (c-Si) or cadmium and selenium."

8 https://www.bre.co.uk/page.jsp?id=3211

9 https://www.pv-magazine.com/2020/10/21/fire-accident-at-argentinian-solar-parks-central-inverters/

10 https://www.solarpowerworldonline.com/2020/02/just-how-concerned-should-the-solar-industry-be-about-battery-fires/

11 https://solarity.cz/blog/fire-hazards-and-mitigation-in-photovoltaic-systems/#



How can the risk of solar fires be reduced?

Even if quality assurance measures have been implemented for solar systems, it is difficult to completely eradicate the risk of fire.

The TÜV Rheinland study concluded that “despite quality assurance measures, overheating or electric arcs cannot be ruled out 100%.”

So what steps can be taken to minimise the risk of solar farm fires?

Recommendations made in the TÜV Rheinland study included:

1. **Ensure solar systems are regularly tested by independent third parties**
2. **Incorporate additional safety components everywhere possible**
3. **Create standardized quality assurance measures**
4. **Ensure defective or prematurely aged components are promptly replaced**

The report added that electric arc detectors can also reduce risks. However, it also said that it was vital that the electric arc detector remains fully functional over a very long period of time, if possible during the entire service life of the PV system, without itself causing any faults in the system. The report continued: “Protective measures such as an integrated self-test could be helpful here.”

In addition, an electric arc detector is “moreover useful only if it can be assumed to reliably detect electric arcs”, the TÜV Rheinland report concluded.

It added: “Electric arcs in modules produce different noise patterns than those in serial terminals. Different cable lengths greatly differ in their dampening of electric arc signatures. Interference from inverters, switching transients, or coupled radio signals can mask or overlay the noise coming from the electric arc. Only very robust detection algorithms tested on different systems can ensure real added utility here.”

Solar farm operators could also consider addressing the issue of fire risk by incorporating fire suppression systems, for example.

Conclusion

The risk of fires at solar farms is potentially being underestimated due to under-reporting and a lack of available data.

However, a number of studies have indicated that solar fires are on the increase. One US study found that solar system fires had tripled over a three-year period, while data from Australia showed that there had been a six-fold increase in the period 2018 to 2020.

Hence, there is an urgent need for the solar industry to address the issue of fire risk, particularly with data showing that global cumulative installed PV capacity increased by around a quarter in 2021.

Studies have shown that there are three root causes for photovoltaic fires – they are: an error in the system design; a faulty product (a design or quality issue); or poor installation practice.

The photovoltaic component that presents the greatest fire risk are DC isolators, which cause around a third of solar fire incidents.

However, DC connectors and inverters can also pose significant fire risks.

It's difficult to completely eradicate the risk of fire at solar farms, but there are a number of key steps you can take to minimize the risk.

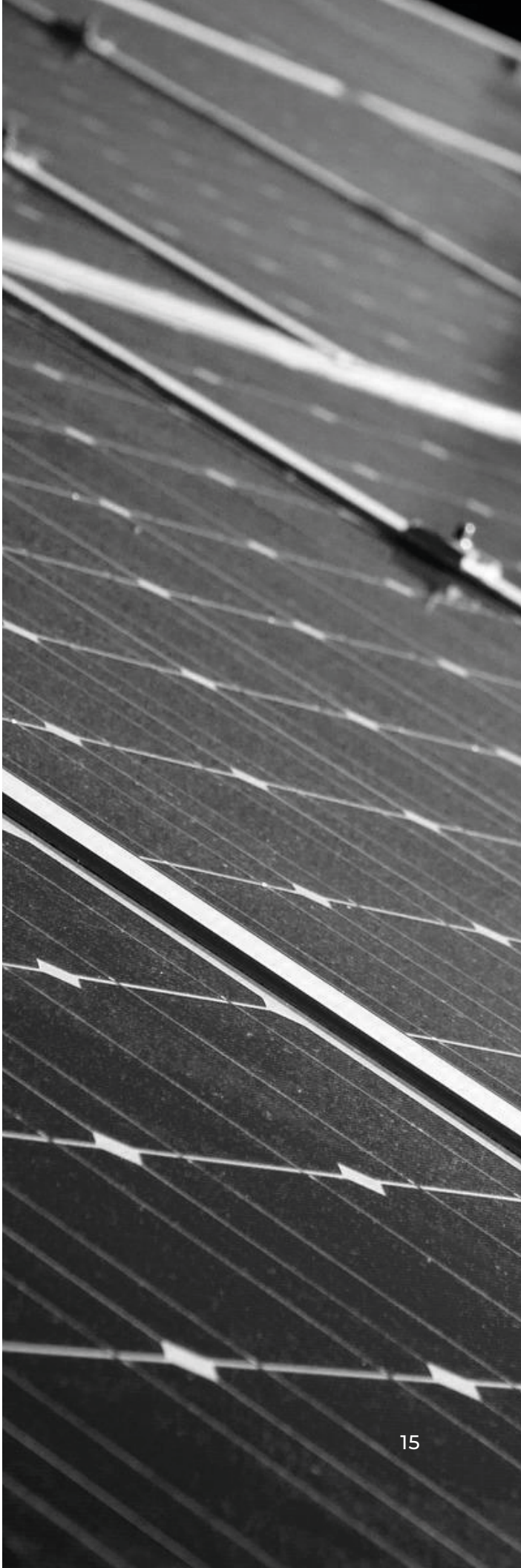
These steps include having solar systems regularly tested by independent third parties and incorporating additional safety components, such as fire suppression systems.

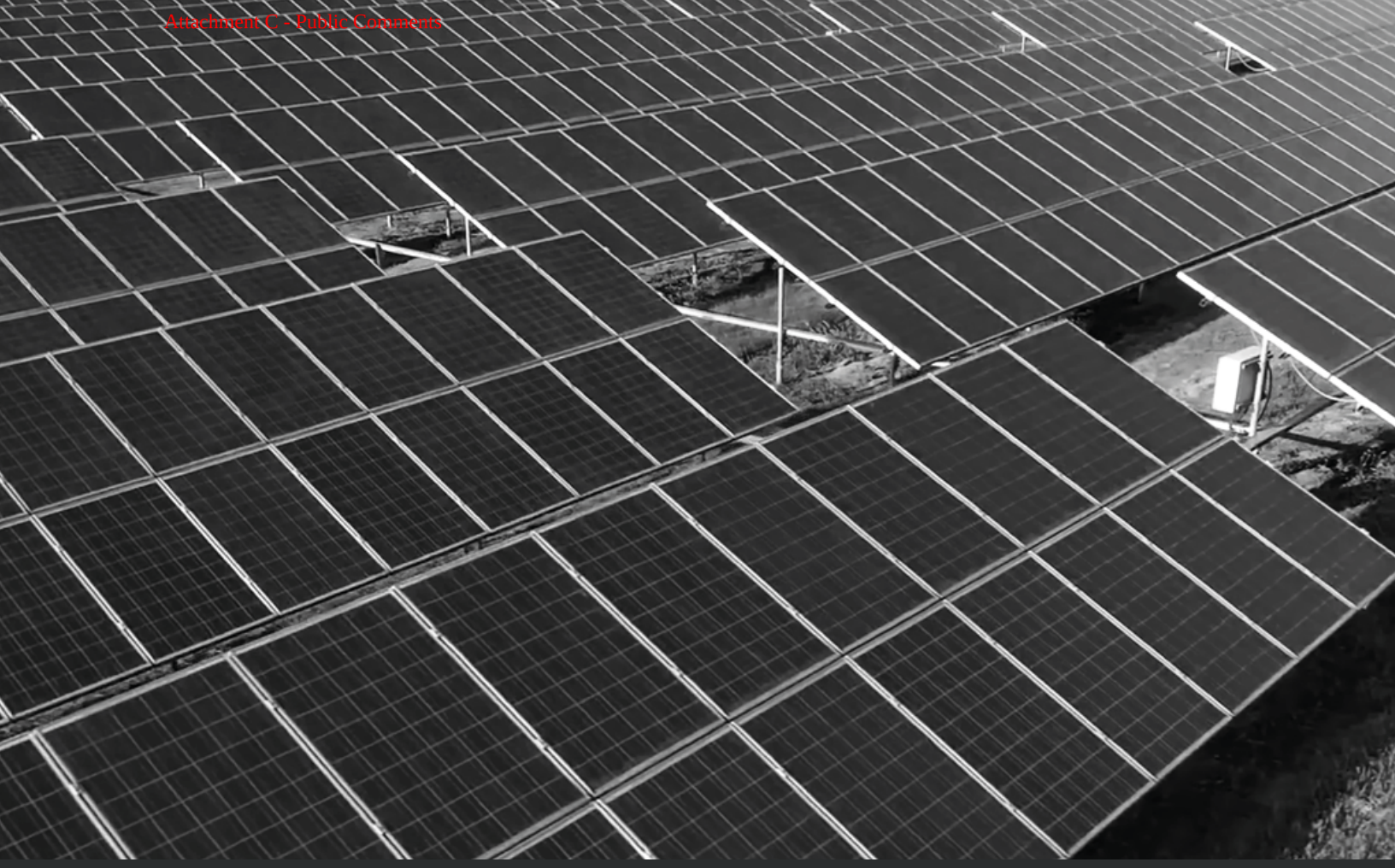
With the number of PV installations dramatically increasing around the world, taking these steps will be vital in order to reduce fire risk.

Would you like to talk about the risks in this report? How about your approach to fire risk in your portfolio?

Get in touch with the Firetrace team today.

www.firetrace.com/contact





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info@350colorado.org

June 27, 2023

To Whom It May Concern,

350 Colorado is a Colorado-based non-profit organization dedicated to building a local grassroots movement to solve the climate crisis and transition to a sustainable future. Founded in 2013, this organization focuses on creating a fossil-free future through creative climate solutions, such as regenerative agriculture and renewable energy, and by way of equitable means. 350 Colorado is committed to centering justice, equity, diversity, and inclusion in everything they do.

350 Colorado looks forward to supporting Cloudbreak Energy Partners' Harvest Moon Solar Project. This Community Solar Garden aligns with our goal of transitioning Colorado from fossil fuels and toward a more sustainable future. In addition to providing Boulder County with clean energy, this project will provide the county with hundreds of thousands of dollars in property tax revenue, provide local Coloradans with jobs for the construction and maintenance of the system, save Xcel customers money on their electricity bills, and improve the resiliency of the electricity grid. The Harvest Moon Solar Project will incorporate and prioritize native and drought-tolerant species into its landscaping design, which will help improve the local ecosystem.

350 Colorado supports Cloudbreak Energy Partner's development of the Harvest Moon Solar Project within Boulder County. This document may serve as a letter of endorsement for Boulder County's permitting bodies.

Sincerely,

Micah Parkin
350 Colorado ~~[Signature here]~~

Ella Nielsen
Membership & Engagement Director
American Solar Energy Society
2525 Arapahoe Avenue, Suite E4-253, Boulder, CO 80302
info@ases.org

June 27, 2023

To Whom It May Concern,

The American Solar Energy Society (ASES) is a 501(c)(3) non-profit that advocates for sustainable living and 100% renewable energy by sharing information, events, and resources to cultivate community and power progress. Since 1954, ASES has been working with individuals and groups to accelerate the transition to renewable energy.

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Sincerely,

Ella Nielsen
Membership & Engagement Director

[Signature here]