

SPECIAL USE PERMIT APPLICATION

# Roadrunner Energy Farm BESS

Morgan County, Colorado

MAY 1, 2024 (AMENDED SEPTEMBER 21, 2024)

PREPARED FOR:



PREPARED BY:

**Westwood**

# Special Use Permit Application

Roadrunner Energy Farm BESS  
Morgan County, Colorado

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## Acronyms and Definitions

Acronym	Definition
<b>APEN</b>	Air Pollutant Emissions Notice
<b>Applicant</b>	Roadrunner Energy Farm, LLC
<b>Application</b>	Special Use Permit Application
<b>BESS</b>	Battery Energy Storage System
<b>BGEPA</b>	Bald and Golden Eagle Protection Act
<b>BMPs</b>	Best Management Practices
<b>CNHP</b>	Colorado Natural Heritage Program
<b>COD</b>	Commercial operation date
<b>CODEX</b>	Colorado Conservation Data Explorer
<b>CPW</b>	Colorado Parks and Wildlife
<b>CWQCA</b>	Colorado Water Quality Control Act
<b>dB</b>	Decibels
<b>dBA</b>	A-weighted decibel scale
<b>ECSWMP</b>	Erosion Control and Storm Water Management Plan
<b>EPC</b>	Engineering, procurement, and construction
<b>ESA</b>	Endangered Species Act
<b>ESS</b>	Energy storage system
<b>FEMA</b>	Federal Emergency Management Agency
<b>FIRMs</b>	Flood Insurance Rate Maps
<b>GHG</b>	Greenhouse gas
<b>HPH</b>	High Priority Habitat
<b>IPaC</b>	Information for Planning and Consultation database list
<b>LGIA</b>	Large Generator Interconnection Agreement
<b>MCEDC</b>	Morgan County Economic Development Corporation
<b>MW</b>	Megawatts
<b>MWac</b>	Megawatts-alternating current
<b>NAAQS</b>	National Ambient Air Quality Standards
<b>NFPA</b>	National Fire Protection Association
<b>NHD</b>	National Hydrography Dataset
<b>NRCS</b>	Natural Resources Conservation Service
<b>NREL</b>	National Renewable Energy Laboratory
<b>NRHP</b>	National Register of Historic Places
<b>NWI</b>	National Wetlands Inventory
<b>OAHP</b>	Office of Archaeology and Historic Preservation
<b>Project Area</b>	2,886 acres in Morgan County, Colorado
<b>Project, Facility, or BESS Facility</b>	Roadrunner Energy Farm BESS
<b>SDS</b>	Safety Data Sheets
<b>Solar Facility</b>	Associated 500 MW Roadrunner Energy Farm Project
<b>SPCC</b>	Spill Prevention, Control, and Countermeasure Plan

<b>Acronym</b>	<b>Definition</b>
<b>SUP</b>	Special Use Permit
<b>SWMP</b>	Storm Water Management Plan
<b>USDA</b>	United States Department of Agriculture
<b>USFWS</b>	United States Fish and Wildlife Service
<b>Wetlands Study Area</b>	2,920-acre desktop wetlands study area
<b>Wildlife Study Area</b>	2,920-acre desktop wildlife study area
<b>Zoning Regulations</b>	Morgan County Zoning Regulations

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## Amendments

Amendment Date	Revisions
7/19/2024	Updated Issued for Permitting plans added to Appendix A; added trip generation information to Section 2.7.1; updated erosion and sediment control measures in Section 3.8.
9/20/2024	Updated landowner information in Appendix A, Exhibit 3; updated to incorporate Hydrologic and Hydraulic Assessment in Sections 3.8 and 4.6 and Appendix J; updated agency correspondence in Appendix N.
9/21/2024	Updated landowner table in Appendix C.
10/4/2024	Updated Exhibits 1-6 and 9 in Appendix A.

## 1.0 Introduction

Roadrunner Energy Farm, LLC (“Applicant”) is proposing an up to 500 megawatt (“MW”), 2,000 megawatt-hour (“MWh”) battery energy storage system (“BESS”) to support the associated 500 MW Roadrunner Energy Farm Project (“Solar Facility”) southeast of Brush, Morgan County, Colorado (**Exhibit 1**). The Roadrunner Energy Farm BESS (“Project,” “Facility,” or “BESS Facility”) is planned to be constructed within a 2,886-acre area (“Project Area”) and will consist of a 230/34.5 kilovolt substation/switchyard (shared with the Solar Facility), laydown yard (shared with the Solar Facility), and 146 inverters in addition to the battery containers. Maps showing the Project location, preliminary layout, and facilities are in **Appendix A**.

Applicant is seeking a Special Use Permit (“SUP”) and all other approvals and authorizations required to construct, install, operate, and maintain the Project. Applicant submits this SUP Application (“Application”) to the Morgan County Planning, Zoning, and Building Department. The SUP application form is in **Appendix B**. The associated Solar Facility is undergoing a separate, concurrent SUP application process.

The Application addresses each section in the Morgan County Zoning Regulations (“Zoning Regulations”), as noted in the headings and tables throughout the Application. Like information is grouped throughout the Application.

### 1.1 Present Use of Property

Land within the Project Area is primarily used for livestock grazing. According to the Morgan County Zoning Map (Morgan County 2023), the Project Area is entirely within the Agricultural Production Zone (A). The A zone is established to maintain and promote agriculture as an essential industry of Morgan County.

### 1.2 Proposed Use of Property

The proposed use is a BESS Facility capable of storing up to 500 MW of power (2,000 MWh) generated from the associated Solar Facility. The general purpose of the Project is to maximize energy production from available solar resources in order to deliver clean, renewable electricity to the bulk power transmission system to serve the needs of electric utilities and their customers. The electricity generated by the associated Solar Facility and stored at the BESS Facility will be transferred to the transmission grid, with execution of a Large Generator Interconnection Agreement (“LGIA”) anticipated in Q2 of 2026.

### 1.3 Additional Information to Demonstrate Project Intent

The Project location was selected based on local interest in renewable energy development, compatible land-use characteristics, rural setting, access to the bulk power transmission system, interest from landowners, and few environmental constraints. The Applicant has leased multiple parcels of land from six individual property owners who signed lease agreements to host the Solar Facility. **Table 1.3-1** lists the leased parcels and participating property owners for the BESS Facility. Currently, approximately 2,908 acres are under contract—approximately 6% of which will house the BESS Facility components.

**Table 1.3-1: Participating Property Owners**

Parcel Number	Property Owner	Property Description	Percent of Total Area
1233-190-00-001	Bonnie Frazier	166 acres, Township 3 North, Range 55 West, 6 <sup>th</sup> PM (Section 19 NW/4)	5.7

### 1.4 Contact Information

The engineering, procurement, and construction (“EPC”) contractor will be hired prior to commencement of construction activities. At this time, the BESS system installer and/or owner/operator will be identified.

## 2.0 Project Narrative

### 2.1 Project Description and Phasing

The Project is located in an unincorporated rural area of Morgan County, Colorado (**Exhibit 2** in **Appendix A**). The Project is located southeast of the city of Brush. Major roads surrounding the Project Area include State Highway 71 to the west, U.S. Route 34 to the north, Morgan County Road 32 to the east, and Morgan County Road K to the south. **Table 2.1-1** identifies the Project location.

**Table 2.1-1: Project Location**

Township, County	Township	Range	Section
Unnamed, Morgan	T3N	55W	19

Property owners within 1,320 feet of the Project Area are shown on **Exhibit 3**, and a list of property owners within 1,320 feet of the Project Area boundary is included in **Appendix C**.

The Project Area encompasses 2,886 acres of private agricultural leased land with a BESS Facility footprint of 8.3 acres. A Public Lands Map is attached as **Exhibit 4** in **Appendix A**. The BESS Facility footprint constitutes less than 1% of the total Project Area.

The BESS Facility will have a system stored capacity of 2,000 MWh and will consist of Tesla Megapack 2 XL Units. The Megapack 2 XL Units will adhere to the following standards: UL1642, UL 1973 and IEC 62619, UL 9540, IEC 62933-5-2, IEC 62109-1, UL 1741, CSA C22.2 #107.1, UL 1998, IEC 60730 Annex H, IEC 61000-6-2, EN 55011, UN 38.3, IEEE 693, and UL 9540A. All integrated design components will adhere to both the International Building Code and National Fire Protection Association (“NFPA”) 855.

The Applicant will strive to secure equipment from U.S. manufacturers when feasible. At this time, a Tesla Megapack 2 XL battery model is proposed; however, all proposed equipment is highly preliminary in nature and is subject to change upon final design and equipment availability. Slopes and proposed grading have not yet been determined and must be verified on-site prior to construction. **Exhibit 5** in **Appendix A** presents the preliminary layout for the Project.



Project construction will commence in Q1 of 2026 and will be completed by Q3 2027. For the full Project development schedule, refer to **Section 2.5**.

## 2.2 Purpose of Request

Zoning applications for new developments must meet the requirements set forth in the Zoning Regulations, as amended. BESS facilities that are designed and operated for uses outside of single residential households are regulated under Chapter 4 of the Zoning Regulations. In accordance with Section 4-850 of the Zoning Regulations, BESS facilities include rechargeable energy storage systems consisting of batteries, battery chargers, controls, power conditioning systems, and associated electrical equipment designed to provide electrical power to a building or to provide electrical grid-related services. Based on conversations with Morgan County, the Project will require a SUP. A checklist showing this Application's compliance with the filing requirements in the Zoning Regulations is included in **Appendix D**. A separate SUP application has been submitted for the proposed Solar Facility.

## 2.3 Impact on Existing Adjacent Uses

The Project is located in a rural, agricultural area in northeastern Colorado. Local infrastructure and land use within the vicinity of the Project primarily includes pastureland, residences, feedlots, and agricultural developments.

The Project is expected to have minimal, and primarily temporary, impacts on local infrastructure and land use. As such, extensive mitigation measures for adjacent land uses are not anticipated or proposed. During the operational phase, the Project's use of public services and infrastructure would likely not be noticeable. Post-construction road use for Project inspections and maintenance is anticipated to be one to two vehicle trips per week.

The proposed Project is also not anticipated to affect the value of land and buildings surrounding the Project Area. According to the National Renewable Energy Laboratory ("NREL"), solar projects—such as the Solar Facility this Project will support—require little-to-no maintenance or on-site employees once constructed. The Applicant intends on utilizing solar modules for this Solar Facility that use a non-reflective glass and are designed to absorb light rather than reflect it—reducing glint and glare to adjacent roadways and residences. Further, the noisiest components of solar projects are the inverters, which generate a low buzzing sound as they convert electricity from DC to AC. However, this noise is generally not audible above ambient noise outside of the Solar Facility perimeter fence. Finally, the proposed Project would remove land from agricultural production on the leased properties only, and no effects to surrounding agricultural or residential areas are expected.

## 2.4 Off-site Impacts and Proposed Mitigation Measures

The proposed Project will result in minimal impacts to off-site areas. In an effort to mitigate any potential adverse impacts, the Project may implement the following techniques:

- Limit vegetation disturbance to that which is critical for Project construction and maintenance.
- Implement stormwater best management practices ("BMPs") to minimize stormwater-related impacts resulting from construction activities.

- Install an eight-foot-tall smooth top chain link fence to enclose the associated solar array and prevent wildlife from entering the site.
- Manage non-native vegetation and noxious weeds as necessary for Project operation.
- Revegetate the site and protect newly established vegetation from wind and water erosion with appropriate BMPs. The exact method of vegetative establishment will be dependent upon the time of year and site conditions.
- Adhere to any BMPs specified in the Facility Storm Water Management Plan (“SWMP”), Erosion Control and Storm Water Management Plan (“ECSWMP”), and Spill Prevention, Control, and Countermeasure (“SPCC”) Plan, as applicable.

**2.5 Project Development Schedule**

Upon approval of the proposed Project by the Board of County Commissioners, the Applicant is anticipating a commercial operation date (“COD”) by September 2027. To meet the Project’s COD, construction activities are proposed to start in Q1 of 2026 and end with Facility commissioning and energization in Q3 of 2027. This Project schedule is an estimate based on information known at the time of Application. The actual timeline for each activity will be determined by several factors including, but not limited to, timing and completion of LGIA arrangements, interconnect facilities, equipment availability and permitting timelines.

The duration of construction for the Project is estimated to be 12-18 months. This timeline is in part dependent on winter weather conditions and the ability to work through the winter months. If the winter is mild, activities such as driving posts, installing of racking, and installing inverter pads could be accelerated. The construction timeline will be finalized after an EPC contractor is hired.

The following provides a description of the anticipated development and construction sequence for the Project:

Milestone Schedule	Date
Site Control Obtained	October 2022
Permit Application Submittal	Q1 2024
Interconnection Process Initiated	Q2 2024
Obtain Federal, State, and County Discretionary Permits	Q1 2025
Execution of Construction Contracts	Q1 2025
Execution of Interconnection Agreement	Q1 2026
Notice to Proceed	Q1 2026
Procurement of Major Equipment	Q1 2026
Construction Start Date	Q1 2026
Foundations for All Facilities Installed	Q3 2026
Delivery/Installation of GSU at Site	Q1 2027
Interconnection Facilities Capable of Energization	Q1 2027
Start-up Testing of Facility Commencement	April 2027
Commercial Operation Date	September 2027

**2.6 Anticipated Permit Timeframe**

According to Section 4-880 of the Zoning Regulations, a use permit for a BESS is valid for three years from the date of approval. The owner and/or operator may seek an extension of the

approval period by demonstrating a need for such extension and filing an application with Morgan County. Applicant understands the approval extension period may not exceed six years from the date of the original approval of the use permit.

## 2.7 Required Public Improvements

### 2.7.1 Public Roads and Haul Routes

Prior to construction, the Applicant will coordinate with applicable local and state road authorities to ensure that the weights being introduced to area roads are acceptable and to obtain all relevant permits. It is anticipated that a combination of state and local roads will need to be widened or otherwise modified to ensure deliveries and to protect existing transportation infrastructure. Such modifications may include installing longer culverts to accommodate a temporary widening of roadways, fortifying road shoulders, widening intersections for larger turning radii, widening or improving bridges where applicable, and increasing aggregate thickness of road surfaces. Applicant will also coordinate with applicable road authorities regarding public road closures. At the time of Application submittal, haul routes are anticipated to include Interstate Highway 76 to State Highway 71, as well as County Road O.5. Potential haul routes, road surface material, measures for dust control, traffic plan, and proposed road maintenance schedules or programs will be identified in a Haul Route Plan/Traffic Impact Analysis, as well as any applicable Road Use Agreements. All public improvement obligations are dependent upon final design and will be defined by the EPC contractor prior to construction.

Westwood Professional Services completed a Trip Generation Analysis for the Project in support of this Application. This analysis included estimates of total vehicle trips per day and peak hour volumes generated by the proposed development. Trip generation estimates were developed for each construction phase based on the anticipated number of construction employees and truck deliveries:

- Maximum number of employees on-site per day:
  - Phase 1: 130
  - Phase 2: 480
  - Phase 3: 40
- Proposed work schedule:
  - 6:00 AM – 3:00 PM
- Maximum number of deliveries per day:
  - Phase 1: 72
  - Phase 2: 252
  - Phase 3: 20
- Daily Passenger Car Equivalent trips:
  - Phase 1: 274
  - Phase 2: 984
  - Phase 3: 80

### 2.7.2 Water Supply

During construction, water used for dust control measures will be sourced from permitted off-site commercial suppliers. Refer to **Section 3.2** for more information on dust mitigation measures.

### **2.7.3 Sanitary Sewer**

The proposed Project is not anticipated to adversely impact local sewage demands and would not necessitate additional wastewater facilities. During construction, site personnel will utilize portable sanitary units. During operations, the Facility will be unmanned and remotely monitored. As such, the proposed use of the Project will not require septic services at the site and will not release wastewater during any phase of the Project.

### **2.7.4 Utility Location and Crossing Agreements**

Prior to construction, Applicant and its contractors will use the Colorado Diggers Hotline to identify all utilities within the path of construction, including electric, gas, communications, water, and sewer to avoid impacts to those services. Applicant will also coordinate directly with applicable utility owners well in advance of Project construction to obtain any required crossing agreements.

### **2.7.5 Drainage Ditches**

A desktop assessment identified no drainage or irrigation ditches within the Project Area. If ditches are identified in the field at a later date, this Application will be amended accordingly.

## **2.8 Compliance with the Morgan County Comprehensive Plan**

As part of the Morgan County Comprehensive Plan's goal to preserve both the man-made and natural environment in an effort to enhance the quality of life in the region, Morgan County encourages the use of renewable resources in its land use planning efforts (Morgan County 2008). According to the Morgan County Comprehensive Plan, the zoning around Brush ranges from industrial to commercial to residential and planned development.

The area to the south of Brush consists of estate residential, rural residential, mobile home, commercial, and light industrial uses. County zoning to the south of the city of Brush mainly consists of agriculture. Certain pertinent goals for these land use planning areas include maintaining open space buffers near livestock areas, preservation of agricultural production land, and encouraging developers to obtain letter of map amendment or letter of map revision to remove some areas from floodplain areas. For utilities planning in the region, it is a goal of the Morgan County Comprehensive Plan to ensure that all developments in Morgan County have sufficient infrastructure and plans to expand utilities in the region for future growth.

Consistent with Zoning Regulations §§ 2-145 and 2-395(A), the Project use and location are in conformance with the Morgan County Comprehensive Plan. The proposed BESS Facility will support the operation of the associated Solar Facility, with solar energy generation being a clean, renewable energy that will not contribute to pollution in the Project vicinity. The Project will take steps during both the construction and operational phases of the Project to minimize and mitigate any adverse effects to the local environment. Refer to **Section 3.0** of this Application for more information on natural environment preservation and impact mitigation.

## **2.9 Compliance with Special Use Permit Review Criteria**

A checklist showing this Application's compliance with the filing requirements in the Zoning Regulations is included in **Appendix D**.

## 3.0 Environmental Information

### 3.1 Air Quality

The Project will not produce adverse, long-term impacts to air quality within or near the Project Area. In general, solar energy is a clean and cost-effective form of renewable energy, with no toxic emissions during operation. Consequently, solar facilities limit greenhouse gas (“GHG”) emissions significantly and are useful in curtailing the negative effects of climate change.

However, minor emissions are associated with the construction and decommissioning phases of solar energy development—including installation of BESS facilities. Specifically, large earth-moving equipment and other mobile sources are powered by diesel or gasoline and are common sources of combustion emissions. These emissions include nitrogen oxides, carbon monoxide, volatile organic compounds, particulate matter, small amounts of sulfur dioxide, trace amounts of hazardous air pollutants, and GHG. To comply with state and federal air quality regulations, the Applicant will adhere to the National Ambient Air Quality Standards (“NAAQS”) as promulgated by the Environmental Protection Agency and administered by the state of Colorado. The NAAQS identify six key pollutants that, in quantities in excess of such standards, are detrimental to human health. For developments of 25 contiguous acres or more—or with a development timeframe of six months or more—an Air Pollutant Emissions Notice (“APEN”) and an air permit are generally required. As such, the Applicant will submit an APEN prior to the initiation of any earth disturbing activities. The APEN documents basic information about the Project (e.g., description, location, size, and duration of the proposed Project) and potential pollution impacts to air quality.

### 3.2 Dust and Odor

Dust and odor are possible as temporary impacts during construction but are not anticipated to be continuing factors during the operation of the BESS Facility. Fugitive dust emissions during construction will be primarily caused by increased traffic on dirt roads and the construction area. The amount of dust generated will be dependent upon the type of construction activity, soils, soil moisture content, wind speed, precipitation, vehicle type and traffic levels, and road surface materials. More significant dust emissions can be expected during dry periods and in locations where finer soils are subject to disturbance. Dust emissions are currently experienced because of nearby agricultural activities. The following BMPs will be utilized to minimize the amount of dust generated by construction activities:

- Minimize grading and disturbance to the extent feasible;
- Water disturbed areas regularly during construction;
- Control Project traffic speeds on dirt roads and disturbed areas; and
- Cover or water stockpiled soils to minimize wind erosion.

During construction, water used for dust control measures will be sourced from off-site commercial suppliers. The minimal particulate dust emissions generated during construction activities will be limited to an estimated 12-to-18-month duration. During the operations phase of the Project, particulate dust emissions will be near zero.

### 3.3 Noise

Solar generation facilities with battery storage emit low sound levels unlike other power facilities, and noise is not a significant concern of solar energy facilities since their operation is during daylight hours. Nonetheless, potential sound emitting equipment, such as inverters, will be located away from residences to minimize any additional sound increases at those locations.

BESS facility projects have the potential to create temporary increases in noise during construction from operation of construction vehicles and equipment. Though batteries do not generate significant noise emissions, the BESS's transformers, heating ventilation, and power inverters will produce noise during operation. The nearest residence is 0.29 mile from the BESS Facility, as identified in a preliminary desktop assessment of aerial imagery. The Project will utilize a 500-foot buffer from all residences when placing operating equipment.

Sound is measured in units of decibels (“dB”) on a logarithmic scale. The A-weighted decibel (“dBA”) scale is used to reflect the selective sensitivity of human hearing and puts more weight on the range of frequencies that the average human ear perceives and less on those humans do not receive as well (e.g., very high or low frequencies). Some typical sound sources in an agricultural area may include farm equipment, roadway traffic, wildlife, and wind.

The noise standards adopted by the state of Colorado are set forth in CRS §§ 25-12-101 – 110. These regulations include distinct standards for daytime and nighttime hours and vary depending on the zone classification (i.e., residential, commercial, light industrial, or industrial). The noise levels permitted in the hours between 7:00 AM and the following 7:00 PM may be increased by 10 dBA for a period not to exceed 15 minutes in a given one-hour period. For the purposes of these noise regulations, construction projects are subject to the noise standards specified for industrial zones for the period during which construction is to be completed. **Table 3.3-1** below depicts the statewide noise standards.

**Table 3.3-1: Colorado Noise Standards**

Zone	7:00 AM to 7:00 PM	7:00 PM to 7:00 AM
Residential	55 dBA	50 dBA
Commercial	60 dBA	55 dBA
Light Industrial	70 dBA	65 dBA
Industrial	80 dBA	75 dBA

During construction of the Project, noise levels will adhere to the decibel limits established for industrial settings. Construction activities will generally take place during regular working hours between 7:00 AM and 7:00 PM. Any activities that take place outside of this timeframe will be kept to a minimum and will maintain compliance with CRS § 25-12-103. The proposed haul routes will ensure that noise levels remain unchanged. The sound emitted from the type of inverter that will be present at the Facility during operation is comparable to that of an air conditioning unit, which noticeably, rapidly decreases with distance. An individual standing outside of the Facility’s perimeter fence line would not likely be able to distinguish such a sound during operations. Due to the distance of the BESS from public roads and private residences, noise impact mitigation of BESS components is not anticipated to be necessary.

### 3.4 Existing Vegetation

The Project is located in the Rolling Sand Plains Level IV ecoregion of Colorado (Chapman, et al. 2006). The Rolling Sand Plains ecoregion is an area of grass-stabilized sand plains, sand dunes, and sand sheets. A sandsage prairie natural vegetation type is supported by the sandy soils formed from the eolian deposits. Sand sagebrush (*Artemisia filifolia*), rabbitbrush (*Ericameria nauseosa*), sand bluestem (*Andropogon hallii*), prairie sandreed (*Calamovilfa longifolia*), and Indian ricegrass (*Achnatherum hymenoides*) were typical plants within the native community.

Sandsage prairies are also called Western Great Plains Sandhill Steppe, which are characterized by sparse to moderately dense woody layer of sandsage and rabbitbrush shrubs. The ground between shrubs is often dominated by a sparse to moderately dense layer of tall, mid-, or short grasses. Other common grass species found include threeawn (*Aristida* spp.), grama (*Bouteloua* spp.), needle-and-thread (*Hesperostipa comata*), and sand dropseed (*Sporobolus cryptandrus*) (Decker, et al. 2020). **Table 3.4-1** provides the total area percentage of each land cover type within the BESS Facility footprint.

**Table 3.4-1: Estimated Land Cover Types Within BESS Facility Footprint**

National Land Cover Database Classification	Percent of BESS Facility Footprint
Herbaceous	100

Existing agricultural land will be converted from an agricultural use to BESS use for the lifetime of the Project; however, a majority of the land will be preserved, and soils will be allowed to regenerate. Approximately five acres of agricultural land will serve as temporary storage areas during the construction phase of the Project. These storage areas will be returned to their pre-construction conditions following construction.

Construction activities will result in short-term impacts on existing vegetation, including soil disturbance and soil compaction. Approximately 8.3 acres will be utilized for the BESS Facility, subject to final design. Very limited tree clearing will also be required in array areas; however, trees along the perimeter of the Project will remain undisturbed. Construction will also have long-term impacts on existing vegetation as a result of permanent removal of vegetative structures within the Project Area and right-of-way. Where possible, impacts to woody vegetation will be minimized by avoiding these areas.

The Applicant will revegetate the Project Area with a native seed mix that will include both native grasses and wildflowers. The establishment of this vegetation will provide a pollinator-friendly Solar Facility with native perennial vegetation and bird foraging habitat.

### 3.5 Wildlife

The Applicant contracted with Westwood Professional Services to complete a desktop review (**Appendix E**) to identify protected species that may occur in or near an approximately 2,920-acre Wildlife Study Area (“Wildlife Study Area”). A list of protected species that could occur within the Wildlife Study Area was developed using the United States Fish and Wildlife Service (“USFWS”) Information for Planning and Consultation (“IPaC”) database list and the Colorado Conservation Data Explorer (“CODEX”) from the Colorado Natural Heritage Program (“CNHP”). The dominant National Land Cover Database (2023) land cover type within the

2,920-acre Wildlife Study Area is grassland/herbaceous, accounting for approximately 90% of the land within the Wildlife Study Area.

Westwood Professional Services investigated the probability of occurrence (i.e., zero, low, moderate, or high) in the Wildlife Study Area for species of wildlife and plants that are federally or state listed as endangered or threatened. The results from the IPaC inquiry identified eight species listed as federally threatened, endangered, candidate, or proposed endangered that may occur within the Wildlife Study Area. The species and their listing status are named in **Table 3.5-1**. Please note that candidate and proposed threatened and endangered species are not currently afforded protections under the Endangered Species Act (“ESA”). Although not identified by the IPaC, the Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) are federally protected under the Bald and Golden Eagle Protection Act (“BGEPA”) and were reviewed for potential occurrence within or near the Wildlife Study Area.

**Table 3.5-1: Federally protected species identified in the IPaC with the potential to occur within the Wildlife Study Area**

Common Name ( <i>Scientific Name</i> )	Name Status (Federal/State)
<b>Mammals</b>	
Gray Wolf ( <i>Canis lupus</i> )	FE/SE
Tricolored Bat ( <i>Perimyotis subflavus</i> )	PE/--
<b>Birds</b>	
Piping Plover ( <i>Charadrius melodus</i> )	FT/ST
Whooping Crane ( <i>Grus americana</i> )	FE/SE
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	BGEPA/SC
Golden Eagle ( <i>Aquila chrysaetos</i> )	BGEPA/--
<b>Fish</b>	
Pallid Sturgeon ( <i>Scaphirhynchus albus</i> )	FE/--
<b>Insects</b>	
Monarch Butterfly ( <i>Danaus plexippus</i> )	C/--
<b>Plants</b>	
Ute Ladies'-tresses ( <i>Spiranthes diluvialis</i> )	FT/--
Western Prairie Fringed Orchid ( <i>Platanthera praeclara</i> )	FT/--

FE= Federally Endangered; FT= Federally Threatened; PE = Proposed Endangered; FC= Federal Candidate Species; BGEPA= Bald and Golden Eagle Protection Act; SE= State Endangered; ST= State Threatened; SC= State Special Concern

The results from the CODEX inquiry identified six species listed as state threatened or state special concern that may occur within the Wildlife Study Area. The species and their listing status are named in **Table 3.5-2**. Please note that state special concern species are not currently afforded protections but may have disturbance buffers or mitigation requested by Colorado Parks and Wildlife (“CPW”).

**Table 3.5-2: Federally protected species identified in the CODEX with the potential to occur within the Wildlife Study Area**

Common Name ( <i>Scientific Name</i> )	Name Status (Federal/State)
<b>Mammals</b>	



Black-tailed Prairie Dog ( <i>Cynomys ludovicianus</i> )	--/SC
<b>Birds</b>	
Golden Eagle ( <i>Aquila chrysaetos</i> )	BGEPA/--
Burrowing Owl ( <i>Athene cunicularia</i> )	--/ST
Ferruginous Hawk ( <i>Buteo regalis</i> )	--/SC
Mountain Plover ( <i>Charadrius montanus</i> )	--/SC
Long-billed Curlew ( <i>Numenius americanus</i> )	--/SC
Greater Prairie-chicken ( <i>Tympanuchus cupido</i> )	--/--

BGEPA= Bald and Golden Eagle Protection Act; ST=State Threatened; SC=State Special Concern

Additionally, Westwood Professional Services reviewed High Priority Habitat (“HPH”) mapping compiled by CPW. No areas of HPH were mapped within the Wildlife Study Area; however, mule deer winter and severe winter concentration areas are mapped immediately adjacent to the west of the Wildlife Study Area. A detailed summary of the identified species, their conservation status, habitat preferences, probability to occur within the Wildlife Study Area, and potential to be affected by Project construction and operation as determined by desktop review are included in the Desktop Threatened & Endangered Species Review in **Appendix E**.

Desktop review of the Wildlife Study Area and surrounding region identified 16 species listed as federally or state endangered, threatened, proposed, candidate, special concern, or protected under the BGEPA as potentially occurring within the Wildlife Study Area. Of these, Westwood Professional Services identified seven as having a moderate or higher probability of occurrence and/or potential to be affected.

Westwood Professional Services provides the following suggestions:

- CPW recommends buffering raptor nests by up to 0.5-mile, depending upon the species. Although limited nesting substrate appears present within the Wildlife Study Area, woody vegetation surrounding the Project may provide suitable nesting habitat. Therefore, springtime stick nest surveys should be considered.
- CPW recommends implementing a 0.6-mile permanent and 2.2-mile seasonal lek avoidance buffer. Due to species records within one mile of the Project and potentially suitable habitat on-site, Westwood Professional Services recommends targeted lek surveys.
- Aerial imagery suggests the potential presence of prairie dog colonies—the preferred habitat for the state-threatened Burrowing Owl. Westwood Professional Services recommends completion of targeted Burrowing Owl surveys if prairie dog colonies and an associated 0.25-mile buffer cannot be avoided from March 15 – October 31.
- Although suitable habitat is not readily apparent based on the desktop review, avoidance of any delineated wetlands will further reduce risk of adverse impacts to rare plants.
- Based on the mapped mule deer winter and severe winter concentration areas immediately adjacent to the Wildlife Study Area, movement of big game near the Project is likely. In order to minimize impacts to any movement corridors and minimize risk of wildlife/vehicle collisions, Westwood Professional Services recommends that study design incorporates strategic fencing techniques and adequate spacing between arrays to ensure safe passage of wildlife.

Field studies may help refine the presence or absence of suitable habitat and, in turn, the probability of impacts to the species discussed above. Additionally, Westwood Professional Services has submitted a letter to CPW requesting their comment on the species above and nearby HPH identified in this review (**Appendix E**). Their response is pending and may contain further recommendations.

The Applicant and Westwood held a request for comment preliminary meeting with the CPW on February 22, 2024, to discuss the potential Solar Project. The Applicant presented information to CPW about the Project, such as land cover within the Project Area, known water resources within the Project Area, as well as any known potential wildlife concerns at the time of the meeting. Several items were discussed with the CPW during the meeting, including fencing, lighting, BMPs, and surveillance while the Project is operational. RAI will continue to work with CPW to ensure avoidance of major impacts to rare species. Refer to the referral agency response letter in **Appendix N** for more information and correspondence with CPW.

### 3.6 Wetlands

The Applicant contracted with Westwood to complete a desktop review of wetlands and waterbodies within the approximately 2,920-acre Wetlands Study Area (“Wetlands Study Area”; **Appendix F**). The desktop wetland determination used historical aerial photography as well as available desktop resources and was completed on December 29, 2023.

Desktop resources reviewed include the National Wetlands Inventory (“NWI”), National Hydrography Dataset (“NHD”), Federal Emergency Management Agency (“FEMA”) Flood Insurance Rate Maps (“FIRMs”), and the Natural Resources Conservation Service (“NRCS”) SSURGO2 Web Soil Survey for Morgan County. The reviewed sources identified one freshwater pond from NWI mapping services, one NHD flowline, and FEMA FIRM maps indicating that the entire Wetlands Study Area is outside of the 100-year and 500-year floodplains.

The desktop wetland determination completed by Westwood, using the above resources as well as historical aerial photography data, mapped 25 potential wetlands totaling approximately 10.9 acres within the Wetlands Study Area. Applicant will avoid work in any suspected wetlands to the extent practicable.

### 3.7 Water Resources

Solar facility projects and associated BESS facilities have the potential to impact water resources and floodplains. This Project could directly impact water resources if these features cannot be avoided through Project design. During construction, disturbance of soils and vegetative cover could affect water quality in adjacent water resources, which could in turn affect habitat for wildlife and threatened and endangered species. However, the Project will not produce adverse, long-term impacts to water quality within or near the Project Area. In general, solar energy is a clean and cost-effective form of renewable energy, with no significant water input requirements during operation.

The BESS Facility falls within one major watershed—101900130408. Drainage from the Facility generally flows west towards Beaver Creek, the segment for which does not have any construction-related impairments. The proposed Project is not expected to impact hydrologic flow of surface water or groundwater (**Exhibit 6**). Groundwater recharge will also remain

unchanged as a result of construction activities. The NRCS soil survey data for the BESS Facility shows the water table occurring in excess of 200 centimeters. However, the proposed Project is not anticipated to impact groundwater since it will not require groundwater wells, construction activities will not take place below the water table, and the minimal impervious surfaces on-site will not affect recharge of the underlying alluvium.

The Project Area is entirely located outside of the effective FEMA Special Floodplain Hazard Areas and lies within FIRMs panels 08087C0654D, 08087C0675D, and 08087C0652D. The results of this analysis indicate that the Project Area is not located within any mapped FEMA Flood Hazard Area.

### 3.8 Stormwater Runoff

Solar and battery storage projects differ greatly from other types of commercial, residential, or industrial developments due to the disconnected, semi-impervious nature of single axis tracking PV panels. When constructed, solar and storage projects typically include solar panels, at-grade gravel access roads, and other electrical equipment. The PV panels are mounted above the ground, typically with a low-maintenance perennial meadow grass established beneath them. Solar panels generally constitute “disconnected” impervious surfaces due to the fact that stormwater sheet flows off each panel, discharging to the pervious ground below and between the arrays—allowing for infiltration prior to reaching an impervious surface. As such, solar facilities often take advantage of existing “green infrastructure” on-site, which results in mitigation of impervious surface impacts and enhancement of water quality outcomes.

Further, solar projects often improve landcover from pre- to post-construction conditions. For example, solar installations usually enable preservation of topsoil and, following panel installation, allow for establishment of native, pollinator-friendly vegetation (NREL 2023). Such native vegetative species have deep root systems, which retain more water than turf grass or gravel during both heavy rainfall and drought periods. These types of species also assist with topsoil retention and can improve soil health over time. The preserved topsoil can then be reapplied during final grading for vegetation establishment, and efforts will be made during grading activities to prevent mixing or contaminating topsoil with subsoils. Due to the change of landcover from shrub/scrub to meadow grass at the proposed Project, the conveyance factor will likely be reduced in proposed conditions.

It is not anticipated that the Project will impact surface water quality conditions. The construction phase of the Project could result in minimal erosion and sediment releases within and around the Project Area. Prior to commencement of earth disturbing activities, the Applicant will obtain a permit for any stormwater discharges occurring during the construction phase of the Project in compliance with the COR400000 General Permit under the Colorado Water Quality Control Act (“CWQCA”). Further, the Applicant will manage temporary facilities to control erosion and sediment releases and to protect Project facilities from flooding during construction in accordance with the COR400000 General Permit. The Applicant will comply with the COR400000 General Permit by preparing and implementing a grading and erosion control plan and a SWMP that identify possible pollutant sources that may contribute pollutants to stormwater and prescribe BMPs that would reduce or eliminate potential water quality impacts. The final SWMP would be developed and submitted to Morgan County in conjunction

with the construction permit(s) required for the Project. A SPCC Plan will also be completed to manage on-site spills during the construction and operations phases as needed.

The following erosion control BMPs may be implemented to minimize soil loss from the construction site area, with the goal of minimizing soil from being transported from water and wind, as well as aiding in establishment of temporary and permanent vegetation:

- Construction phasing;
- Compost blanket and filter berms;
- Temporary and permanent seeding; and
- Erosion control matting.

The following sediment control BMPs may be implemented to minimize sediment discharge, capture sediment in suspension, and minimize sedimentation off-site:

- Silt fence;
- Vehicle tracking controls;
- Sediment control logs;
- Stockpile stabilization; and
- Rock socks.

The following run-on and runoff control BMPs may be implemented to minimize scour, transport water across or down deep slopes or critical areas, divert clean water, and/or provide temporary conveyances to maintain drainage:

- Temporary outlet protection;
- Rock filter dams; and
- Culvert crossings.

Refer to **Section 4.6** for more information on the Project Hydrologic & Hydraulic Assessment.

### 3.9 Cultural Resources

A desktop due-diligence study of the preliminary Project Area was completed to identify cultural resources located within one mile of the proposed Project (**Appendix G**). The desktop review consisted of a file search request to the Colorado Office of Archaeology and Historic Preservation (“OAHP”). This was followed by a review of Compass, Colorado’s Online Cultural Resources Database, as needed. Geospatial datasets for the National Register of Historic Places (“NRHP”) were also examined. Additional resources examined included historic contexts, historic maps and atlases, aerial photographs, and various online sources. A request was submitted to the OAHP on December 19, 2023, which reviewed the Project Area plus a one-mile buffer.

No cultural resources were identified within the Project Area from a review of the above sources. There were three cultural resources identified adjacent to the Project Area boundary and 11 additional cultural resources in the one-mile buffer. The known cultural resources will not be directly impacted by the Project. Additionally, there is generally a low potential for unrecorded, significant historic resources within the Project Area and the one-mile buffer.

### 3.10 Visual Amenities

Solar facilities with battery storage have the potential to affect the visual amenities and aesthetics of an area if they contrast with the surrounding landscape or designated scenic resources (e.g., federally or state-designated trails and byways). However, the proposed Project will not encroach on the visual expansiveness of the Eastern Plains region in the same way as other types of developments would, such as residential or commercial properties. There are an estimated 25 residences within 0.25-mile of the Project Area—with the nearest residence situated approximately 0.29 mile from the BESS Facility.

The proposed Project will be situated on rural land that is adequately set back from these nearby residences, thereby reducing impacts to the surrounding viewshed. Further, portions of the Project along public rights-of-way or near private residences will be adequately screened per local requirements. Additionally, the PV panels that will be installed at the associated Solar Facility are designed to absorb light rather than reflect it, and the panels are coated with anti-reflection coating to further reduce the potential for impacts to adjacent roadways or residences associated with reflective glare. As such, potential impacts to the visual environment will be achieved through minimization and avoidance measures.

### 3.11 Landforms

Construction and operation of solar facility projects with battery storage have the potential to impact geology and landforms through temporary, construction-related impacts, and/or long-term impacts. Installation of structure foundations could also impact bedrock.

The Project is located within the Colorado Piedmont subsection of the Great Plains Section of the Interior Plains region (Fenneman 1928). The Colorado Piedmont is a hilly region located between the plains and the Front Range in Colorado with an elevation between 4,000 and 5,000 feet above mean sea level. The Project Area is underlain by eolian (wind-blown) dune sand and silt deposited during the Quaternary Period (Tweto 1979).

The proposed Project is not likely to significantly impact available geologic resources. Excavation or blasting of bedrock is highly unlikely due to the thickness of surficial materials present. Since impacts to geologic resources are not expected, mitigation is not anticipated to be necessary.

### 3.12 Soils

Soil characteristics within the BESS Facility footprint were assessed using the NRCS SSURGO database. The SSURGO database is a digital version of the original soils surveys developed by NRCS for use with geographic information system programs. The SSURGO database provides the most detailed level of soils information for natural resource planning and management. Soil maps are linked in the United States Department of Agriculture (“USDA”) SSURGO database to information about the component soils and their properties. **Table 3.12-1** inventories the soils within the BESS Facility footprint.

**Table 3.12-1: BESS Facility Footprint Soils**

Map Unit Symbol	Map Unit Name	Percent of BESS Facility Footprint	Percentage Soil Unit Hydric	Farmland Classification
VmB	Vona loamy sand	86.5	0	Farmland of statewide importance
VmD	Vona-Dwyer loamy sands	13.5	0	Not prime farmland

The soils in the BESS Facility footprint are non-hydric, coarse-loamy eolian sands. None of the soils are classified as prime farmland, but 86.5% of the soils within the BESS Facility footprint are classified as farmland of statewide importance. The entirety of the soils within the BESS Facility are classified as well drained.

Impacts to soils will occur during both the construction and, to a much lesser degree, operational stages of the Project. Grading impacts will primarily be with the construction of foundations for the Project substation and BESS Facility. Use of direct-embedded pier foundations for the inverters will minimize impacts to soil.

Because the Project is located on relatively level topography, a relatively small amount of grading will be necessary for the Project overall given its size. Soil compaction will be mitigated by use of low-impact equipment and methods, regrading and tilling these areas following construction where necessary.

During operation of the Project, ongoing soil compaction could occur from the use of access roads. This impact is expected to be negligible, confined to the roadbed and mainly from relatively light-duty maintenance vehicles. Overall, the Project is expected to reduce the potential for erosion by establishing permanent vegetation comparable to the current amount of exposed soils common to existing field conditions. Potential erosion will be further minimized by dressing access roads with gravel and installing culverts under access roads where necessary to redirect concentrated surface water runoff.

Applicant will submit the Notice of Intent and ECSWMP to CWQCA for review and approval prior to construction and obtaining coverage under the COR400000 General Permit program. BMPs will be used during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion from water or wind. Practices may include containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust. The ECSWMP will be developed for the Project prior to construction that will include BMPs such as silt fencing (or other erosion control devices), revegetation plans, and management of exposed soils to prevent erosion.

## 4.0 Site Maps and Plans

### 4.1 Special Use Plan Map

The Special Use Permit Map depicting development plans for this special use is attached as **Exhibit 5** in **Appendix A**.

### 4.2 Electrical Diagram

The Electrical Diagram depicting the BESS layout, associated components, and electrical interconnection methods is attached as **Exhibit 8** in **Appendix A**.

### 4.3 Specification Sheet

The Specification Sheet detailing the proposed BESS components, inverters, and associated electrical equipment is included in **Appendix H**. Please note that at the time of Application submittal, no equipment has been procured; as such, the proposed equipment is highly preliminary in nature and is subject to change upon final design and equipment availability.

### 4.4 Maintenance Plan

The following maintenance procedures are applicable to the Powerpack Systems anticipated to be utilized at the BESS Facility. However, this equipment is subject to change upon final design and equipment procurement. It is recommended that all maintenance, service, and repairs of BESS equipment be performed by manufacturer-approved service personnel or manufacturer-authorized repair facilities. This includes all proactive and corrective maintenance over the lifetime of the BESS Facility. Improper service or repair by personnel that are not approved nor authorized by the manufacturer may void the product's limited warranty, lead to failure of the system, and potentially result in development of an unsafe condition and unexpected electrical events. The Industrial Lithium-Ion Battery Emergency Response Guide is included in **Appendix I**.

### 4.5 Fire Mitigation Plan

The proposed Project lies within the Brush Rural Fire Protection District. Prior to the issuance of the Board of County Commissioners' ultimate decision on the Application, the Applicant intends to engage with the Brush Rural Fire Protection District to obtain written confirmation that the Project has been evaluated for fire risks and has sufficiently mitigated such risks. The draft Fire Mitigation and Emergency Response Plan is included in **Appendix I**.

#### 4.5.1 General Precautions and Standards

In general, BESS facilities are comprised of equipment that pose dangers if mishandled. Under normal conditions of use by trained personnel—provided the battery integrity is maintained and seals remain intact—the electrode materials and electrolyte contained within the system are not exposed. In this case, risk of exposure is primarily limited to cases of abuse (i.e., mechanical, thermal, or electrical). The Industrial Lithium-Ion Battery Emergency Response Guide and the NFPA Quick Reference Guide for BESS Emergencies are included in **Appendix I**.

NFPA Standard 855, Standard for the Installation of Energy Storage Systems, is comprised of criteria for the fire protection of energy storage system (“ESS”) facilities. According to the NFPA, Standard 855 “provides requirements based on the technology used in ESS, the setting where

the technology is being installed, the size and separation of ESS installations, and the fire suppression and control systems that are in place” (Pickerel 2019). This standard constitutes an industry best practice and may be implemented during construction of the Project.

#### **4.5.2 Hazards Associated with Elevated Temperature Exposure**

The proposed battery model (subject to final design and equipment procurement) is designed to withstand operating ambient temperatures up to 122°F with up to 100% operating humidity (condensing). Further, the batteries are designed to withstand storage temperatures up to 140°F and up to 95% relative humidity (non-condensing) for up to 24 hours without affecting the health of the system. Prolonged exposure of the system to conditions beyond these limits may increase the potential of thermal runaway and result in a fire. Exposure of battery packs to localized heat sources (e.g., flames) may result in thermal runaway reactions and should thereby be avoided.

#### **4.5.3 Hazards Associated with Vented Electrolyte**

Venting of electrolyte is not likely to occur under normal usage conditions since lithium-ion cells are sealed units. However, if subjected to abnormal heating or other abuse, electrolyte and electrolyte decomposition products can vaporize and be vented from the cells. Such vented gases are an early indicator of a thermal runaway reaction.

Regulatory testing has indicated that products of combustion of lithium-ion batteries may include both flammable and nonflammable gases. This testing indicated that the potential flammable gases are below their lower flammable limit and, as such, do not pose a deflagration or explosion risk to first responders or the general public. The nonflammable gases were found to be comparable to smoke encountered in a Class A structure fire and do not produce gases that differ from what would result from the combustion of modern combustible materials. Ignition sources—including an open flame, spark, or sufficiently heated surface—should be isolated from potential vented electrolyte to prevent ignition on contact.

#### **4.5.4 Responding to a Venting Product**

Smoke or suspicious odors emanating from the BESS Facility can be an indication of an abnormal and hazardous condition, and battery thermal runaway fires are typically preceded by smoke. If fire, smoke, or suspicious odor is observed near the BESS Facility, the following measures should be taken:

1. Power off the system, if possible;
2. Evacuate all non-emergency personnel;
3. Contact the battery manufacturer’s technical support team;
4. Maintain a safe distance from the unit and monitor for evidence of continued smoke venting or fire;
  - a. Complete area size-up and establish water supply;
  - b. Position attack lines to protect neighboring exposures and battery enclosures if a fire has not yet developed;
  - c. If a fire has developed:
    - i. Allow the affected unit to consume itself as designed (water application will only slow its eventual combustion);
    - ii. If advised by the manufacturer, use a wide-fog stream at the lowest volume possible to achieve desired cooling of neighboring battery enclosures while simultaneously maintaining contact with the



- manufacturer; if communication cannot be established with the manufacturer, apply water at the discretion of first responders;
- iii. At the discretion of first responders, apply water to other neighboring exposures;
  5. Allow the battery pack to cool down (which may take more than 48 hours) while still maintaining contact with the manufacturer for guidance;
  6. Monitor the temperature of the battery pack using a thermal imaging camera to determine if it is safe to interact with the unit; and
  7. Contact the manufacturer's technical support team for next steps.

#### **4.5.5 Firefighter Personal Protective Equipment**

It is recommended that firefighters responding to an emergency wear self-contained breathing apparatus and structural firefighting gear. Industry testing has demonstrated that such standard structural firefighting gear provides sufficient protection.

#### **4.6 Drainage Plan**

The BESS Facility falls within one Hydrologic Unit Code-12 watershed—101900130408. Drainage from the Project currently flows west towards Beaver Creek. The proposed Project activities will not significantly affect pre-existing drainage patterns or topography post-construction. Further, Project infrastructure will strategically avoid areas of channelized flow on-site where feasible. Accordingly, the Project will not contribute significant increase in flow to immediate receiving waters. Prior to the commencement of construction, the Applicant will obtain a permit for stormwater discharges associated with construction activities as required by the CWQCA. There are no anticipated facilities or infrastructure proposed for the Project that would impact site flood elevations or floodplains. Additional permanent impervious areas on-site will be minimal, so pre-construction stormwater runoff and drainage patterns will be preserved.

A Hydrologic & Hydraulic Assessment was completed by Sierra Overhead Analytics, with a report dated September 16, 2024. In this analysis, pre- and post-construction runoff was calculated using the NRCS Runoff Equation. Using the average pre- and post-construction curve numbers for the site outline—62.6 and 67.2, respectively—and the National Oceanic and Atmospheric Administration Atlas 14 100-year 24-hour precipitation depth (4.46 inches), pre-construction runoff depth was 1.16 inches, and post-construction runoff depth was 1.46 inches.

Potential pile scour depth was calculated using the methods of Chapter 7 of the HEC 18 Scour Manual.  $K_1$ ,  $K_2$ , and  $K_3$  were calculated to be 1.1, 1.3, and 1.1, respectively, and a box pile of dimensions  $a=1/3''$  and  $L=1/2''$  were used. For simplicity, the angle of attack was assumed to be zero for all piles.

During the 100-year 24-hour pre-construction storm event, on-site flow depths reached approximately 6.2 feet in a depression in the northeast area of the site outline. The highest on-site velocity—approximately 3.4 feet per second—occurred in the southwest area of the site outline, just east of the Heartland Expressway. Flow velocities were, on average, less than one foot per second across the remainder of the site. The highest on-site pile scour potential—approximately 1.2 feet—occurred in the same area where velocity was highest but were, on average, less than 0.75 feet across the rest of the site.

During the 100-year 24-hour post-construction storm event, on-site flow depths reached approximately 7.4 feet in a depression in the south-central area of the site outline. On average, depths in the site outline were less than one foot. The highest on-site velocity—approximately 3.8 feet per second—occurred near the site outline’s southwest border, east of the Heartland Expressway. Flow velocities were, on average, less than one foot per second across the remainder of the site outline. The highest on-site pile scour potential—approximately 1.25 feet—occurred where post-construction velocities were highest but were, on average, less than 0.75 feet.

Refer to the full Hydrologic & Hydraulic Assessment in **Appendix J** for more information.

#### **4.7 Decommissioning Plan**

At the end of the Solar Project’s useful life, Applicant will either take necessary steps to continue operation of the Project (e.g., re-permitting and retrofitting) or will decommission the Project and remove facilities. The preliminary Decommissioning Plan is included in **Appendix K**. This Decommissioning Plan is based on equipment anticipated at the time of Application and is subject to change upon final design and procurement.

#### **4.8 Emergency Operation Plan**

The objective of the Fire Mitigation and Emergency Response Plan in **Appendix I** is to establish a framework for managing emergency incidents at the Project, ensure safety, minimize risks, and protect the environment. This Fire Mitigation and Emergency Response Plan applies to all operations at the Project involving the use of batteries and is designed to be flexible to accommodate equipment procured prior to construction that shares similar safety and operational characteristics.

##### **4.8.1 Safe Shutdown, De-energizing, or Isolation of Equipment**

Emergency shutoff is provided at multiple levels; however, the local fire department should not engage with E-stops as BESS shutdown may adversely affect the electrical grid. For major faults within the battery modules—such as overtemperature, overcharge, or ground fault—the faulted modules will be isolated by DC converters, disconnects, and/or DC fuses, and an alarm will be generated. This may not result in a complete shutdown of the system. If a large propagating thermal runaway occurs, the faulted Megapack unit is isolated by opening its AC contactors and overtemperature loss faults will be sent to the service team. Each Megapack unit is equipped with AC circuit breakers located within the Megapack Customer Interface Bay door and is to be used only by authorized maintenance or operations personnel.

##### **4.8.2 Inspection and Testing**

The manufacturer conducts extensive testing and analysis to assess fire risks related to its battery systems. It is recommended that regular inspections of the battery installations occur to detect signs of damage or leakage using non-contact methods and as detailed in the manufacturer's guidance in **Appendix I**.

##### **4.8.3 Emergency Response Procedures and Notifications**

In the event of an emergency at the BESS facility, the response will be spearheaded by the designated Project Emergency Response Team, which is staffed by the Applicant’s Network Operation Center. The following responses to events are considered:

- General facility emergency shutdown;
- Lightning storm;
- Tornado;
- Medical emergency;
- Chemical spill;
- Unauthorized individual; and
- Fire or thermal event.

All alarms from the Project will be under 24-hour central monitoring by the Network Operation Center, who will coordinate all response in any event. The Network Operation Center will directly contact local emergency responders, including the fire department, as soon as an event requiring emergency response is reported.

**4.8.4 Safety Data Sheets**

Safety Data Sheets (“SDS”) are available for materials present in the proposed BESS Facility equipment. Refer to the Industrial Lithium-Ion Battery Emergency Response Guide in **Appendix I** for more information on SDS.

## 5.0 Property Interests, Rights, and Policies

### 5.1 Ownership

The title insurance commitments (last 6 months) for participating landowners within the Project Area are included in **Appendix L**.

### 5.2 Vested Rights

Vesting rights are not applicable to the proposed Project.

### 5.3 Easements and Agreements

Land contracts in the form of options to lease, distribution easements, or gen-tie easements are in place with six landowners of the Project Area, one of which will house the proposed BESS Facility (**Table 5.3-1**). The owners of the properties subject to the solar easement agreements will continue to own their properties and will be able to continue to utilize their portions of their properties located outside of the Project infrastructure area for agricultural or feedlot purposes during the life of the Project. All participating landowners currently utilize their land for livestock grazing or feedlot operations.

**Table 5.3-1: Landowner Agreement Type and Status**

Landowner(s)	Contract Type	Approx. Size	Status
Bonnie Frazier	Option to Lease	166 acres	Signed

### 5.4 Notification to Mineral Rights Holders

The mineral right holders within the Project Area boundaries will be provided with a preliminary notice advising them of their right to comment or request information from Morgan County. At this time, a hearing date has not yet been scheduled. The Applicant will notify the individual mineral right holders within the Project Area in advance of the scheduled hearing as

required by Morgan County and statutory notification requirements. Upon finalization of the hearing schedule, the Applicant will coordinate with Morgan County to ensure all appropriate mineral right holders are properly given notice of the scheduled hearing and an opportunity to provide comments. A preliminary list of the mineral right holders that will be notified in advance of the scheduled hearing is included in **Appendix M**.

### 5.5 Right to Farm Policy

Landowner signatures certifying the receipt, review, and understanding of the Morgan County Statement of Policy and Notice regarding the Right to Farm are provided on the SUP Application Form in **Appendix B**.

### 5.6 Liability Insurance

Applicant will carry liability insurance to cover loss or damage to persons and structures during construction and operation of the Project. The title insurance commitments for participating landowners within the Project Area are included in **Appendix L**.

## 6.0 Utilities and Access

### 6.1 Water System

The Project will not require the use of a private well or public water supply system. All water needed during construction (e.g., dust control) will be hauled in by trucks and sourced off-site.

### 6.2 Sewer/Septic

The Project will not require the use of a septic system. All on-site sanitary waste will be handled by portable toilets.

### 6.3 Electric

The electric service provider for the proposed Project will be selected closer to commencement of construction. At this time, proof of an electric bill or a letter of commitment from the electricity provider will be made available to Morgan County as part of this Application.

### 6.4 Driveway Permit

A driveway permit will be obtained by the Applicant as required by the Colorado Department of Transportation and Morgan County Road & Bridge.

### 6.5 Ditch Company

Proof of contact with the appropriate ditch company will be provided if ditches are identified on or adjacent to the Project Area at a later date. Refer to **Section 2.7.5** of this Application for more information.

### 6.6 Architecture Control Approval

Proof of architecture control approval will be provided if required by Morgan County.

## 6.7 Wells

A review of the Colorado Division of Water Resources Well Permit Research Viewer indicates the presence of 20 water wells are located within the Project Area, none of which fall within the BESS Facility footprint. The Water Wells Map for the overall Project Area is attached as **Exhibit 9** in **Appendix A**.

## 7.0 Public Outreach

Applicant is committed to working closely with landowners and other key stakeholders in Morgan County that have considerable knowledge of the area. The development, construction, and operation of the proposed Project will bring further economic benefits to the community, stimulate local business, and generate additional tax revenue for Morgan County. The Applicant is excited to work with both the city of Brush and Fort Morgan, as well as the surrounding areas, to ensure the Project results in a substantial, positive contribution to the community.

The Applicant has conducted multiple in-depth conversations with key stakeholders in the Fort Morgan and Brush communities to gain a high-level understanding of local concerns. Meetings held to date include Morgan County Economic Development Corporation, Brush Rural Fire Department, Brush Chamber of Commerce, Morgan County Quality Water District, as well as one-on-one conversations with multiple landowners in the region, including landowners adjacent to the Project.

As part of its commitment to the community, the Applicant plans on funding training and mentorship for local high school and college graduates who are interested in joining the growing renewable energy sector. Further, the Applicant plans to provide direct cash support to local non-profits, as well as other regional programs that benefit the local community. For all these reasons, the Applicant is dedicated to serving as a long-term partner in the region's small-town community priorities and will give future generations in Morgan County the opportunity to steward and fulfill community needs not yet imagined.

The Applicant pledges to provide regular updates on the Project's progress and engage with stakeholders through public meetings, the Project website, and other channels. Throughout this public outreach process, the Applicant intends to respond to any stakeholder concerns promptly and transparently. Public outreach materials to date are in **Appendix N** and are summarized as follows:

- In August 2023, Applicant commenced preliminary discussions with the Morgan County Planning, Zoning, and Building Department to discuss the upcoming Project and any potential permitting requirements. In addition, the Applicant began a series of informal conversations with local stakeholders to gain an understanding of high level concerns and issues to address in the development process.
- In August 2023, Applicant commenced preliminary discussions with the Morgan County Economic Development Corporation ("MCEDC"). In February 2024, Applicant became a full member in the MCEDC, and has been working with the organization to launch several public meetings.
- In February 2024, Applicant:
  - Met with Brush Rural Fire Protection District board members, as well as Chief Anderson and Assistant Chief Uhrick;

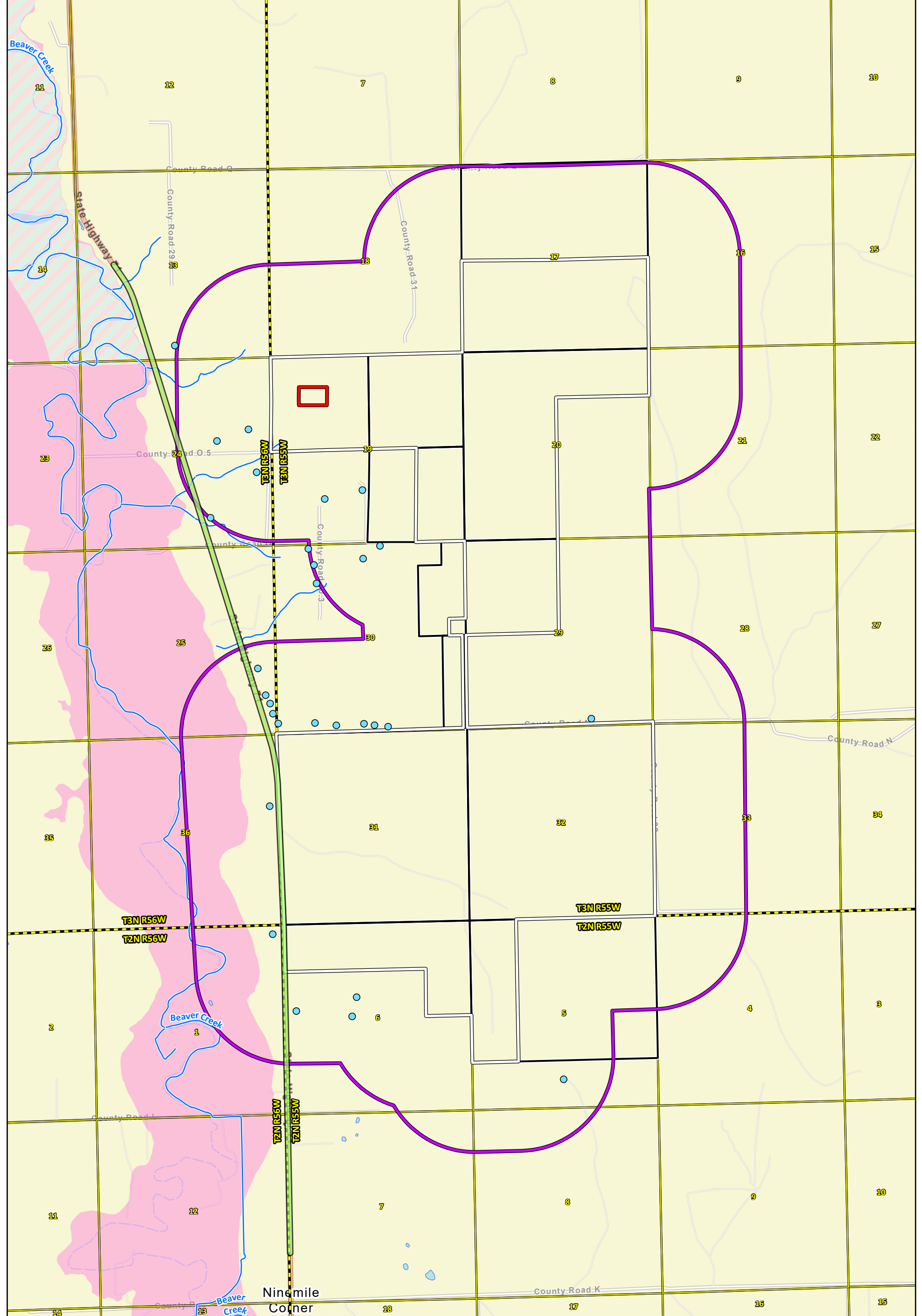
- Met with Morgan County Quality Water District General Manager, Kent Pflager;
- Met with City of Brush Chamber of Commerce and Community Development Director, Tyler Purvis;
- Began one-on-one meetings with nearby neighbors to the Project to discuss the Project and hear concerns in advance so that the Applicant can proactively address issues throughout the development process; and
- Met with the Morgan County Planning Department Planning Administrator for a pre-application meeting to begin the Morgan County Special Use Permit Process.
- The Project website launched in March 2024 (<https://roadrunnerenergyfarm.com/>).
- On March 26, 2024, the Applicant held a public open house meeting in Brush, Colorado, where neighbors and elected officials were invited to meet the Project team and learn more about the proposed Project. Refer to **Appendix N** for the full open house summary.

## 8.0 References

- Chapman et al. 2006. Ecoregions of Colorado.  
[https://store.usgs.gov/assets/MOD/StoreFiles/Ecoregion/205792\\_co\\_front.pdf](https://store.usgs.gov/assets/MOD/StoreFiles/Ecoregion/205792_co_front.pdf).
- Colorado Natural Heritage Program (CNHP). 2023. Colorado Conservation Data Explorer (CODEX). <https://cnhp.colostate.edu/maps/codex/>.
- Decker et al. 2020. Guide to the Ecological Systems of Colorado.  
<https://cnhp.colostate.edu/download/documents/EcolSystems/EcologicalSystemsofColorado2020.pdf>.
- Fenneman, Nevin. 1928. Physiographic Divisions of the United States.  
<https://www.jstor.org/stable/2560726>.
- Morgan County. 2008. Comprehensive Plan.  
<https://morgancounty.colorado.gov/sites/morgancounty/files/Comprehensive-Plan-2008.pdf>.
- Morgan County. 2023. Maps and Apps.  
<https://www.arcgis.com/apps/PublicGallery/index.html?appid=304b45eace5f42adbe9877693f978405>.
- NREL. 2023. Beneath Solar Panels, the Seeds of Opportunity Sprout.  
<https://www.nrel.gov/news/features/2019/beneath-solar-panels-the-seeds-of-opportunity-sprout.html#:~:text=With%20low%2Dimpact%20solar%20development,and%20other%20pollinators%E2%80%94is%20planted>.
- Pickerel, Kelly. 2019. NFPA releases fire-safety standard for energy storage system installation.  
<https://www.solarpowerworldonline.com/2019/09/nfpa-releases-fire-safety-standard-for-energy-storage-system-installation/>.
- Tweto, Ogden. 1979. The Rio Grande Rift System in Colorado.  
<https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/SP014p0033>.

**Appendix A: Maps**





Data Source(s): Westwood (2024); ESRI WMS World Streets Basemap (Accessed 2024); U.S. Census Bureau (2023); OpenStreetMap (2023); PLS (2023); NHD (2024); FEMA (2023).

### Legend

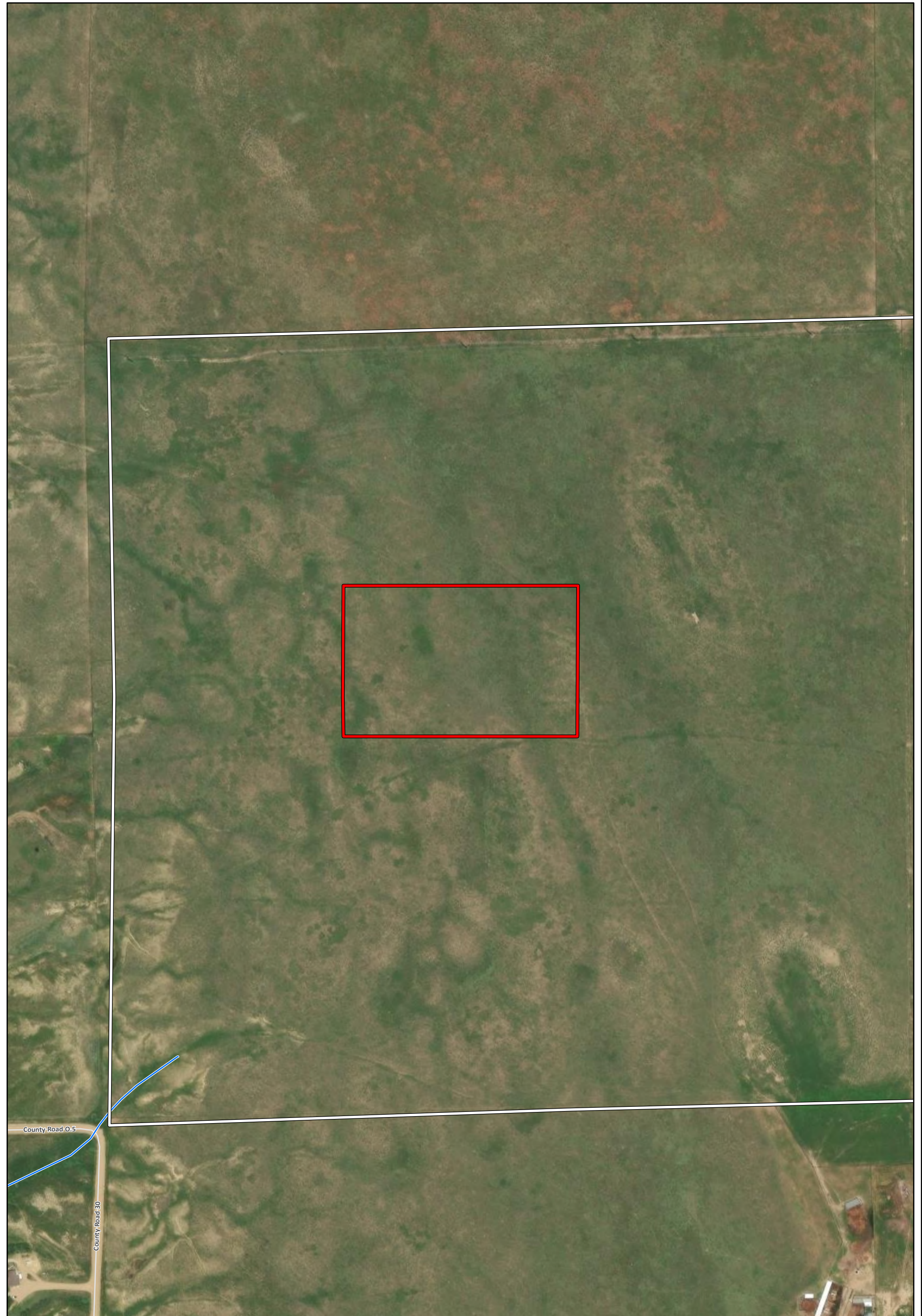
- |   |  |  |                          |
|---|--|--|--------------------------|
|   |  |  |                          |
| <b>Westwood</b>   |  |  | <b>FEMA Flood Hazard</b> |
| Toll Free (888) 937-5150 westwoodps.com<br>Westwood Professional Services, Inc. |  |  |                          |
|   |  |  |                          |

## Roadrunner Energy Farm

Morgan County, Colorado

Vicinity Map

EXHIBIT 1 OF 9



Data Source(s): Westwood (2024); ESRI WMS World Imagery Basemap (Accessed 2024); U.S. Census Bureau (2023); OpenStreetMap (2023); NHD (2024).

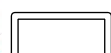
### Legend

0 300 Feet



BESS Area

— NHD Flowline



Project Area

— Road

**Westwood**

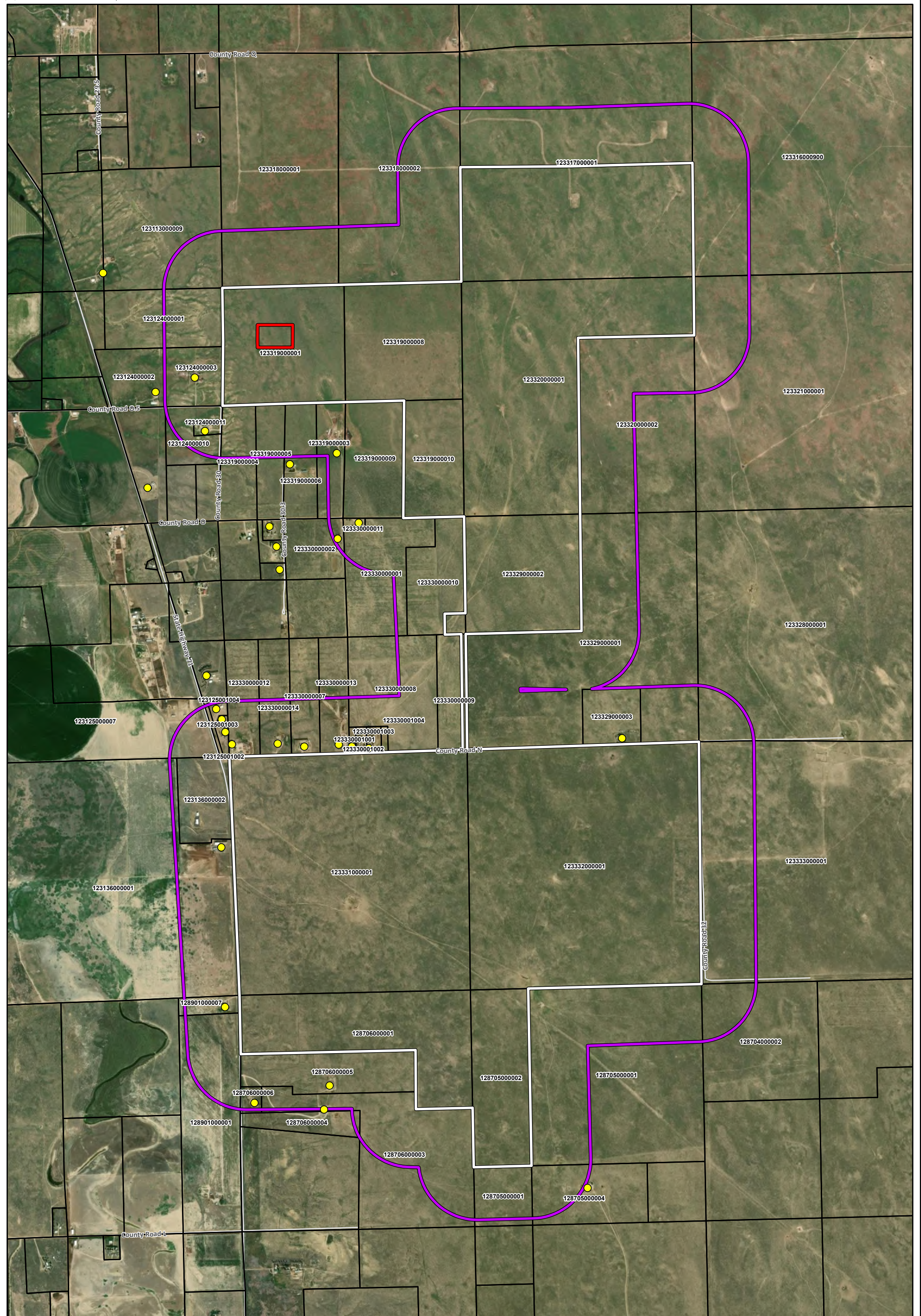
Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

## Roadrunner Energy Farm

Morgan County, Colorado

Project Location Map





Data Source(s): Westwood (2024); ESRI WMS World Imagery Basemap (Accessed 2024); OpenStreetMap (Accessed 2023) Morgan County (2023).

### Legend

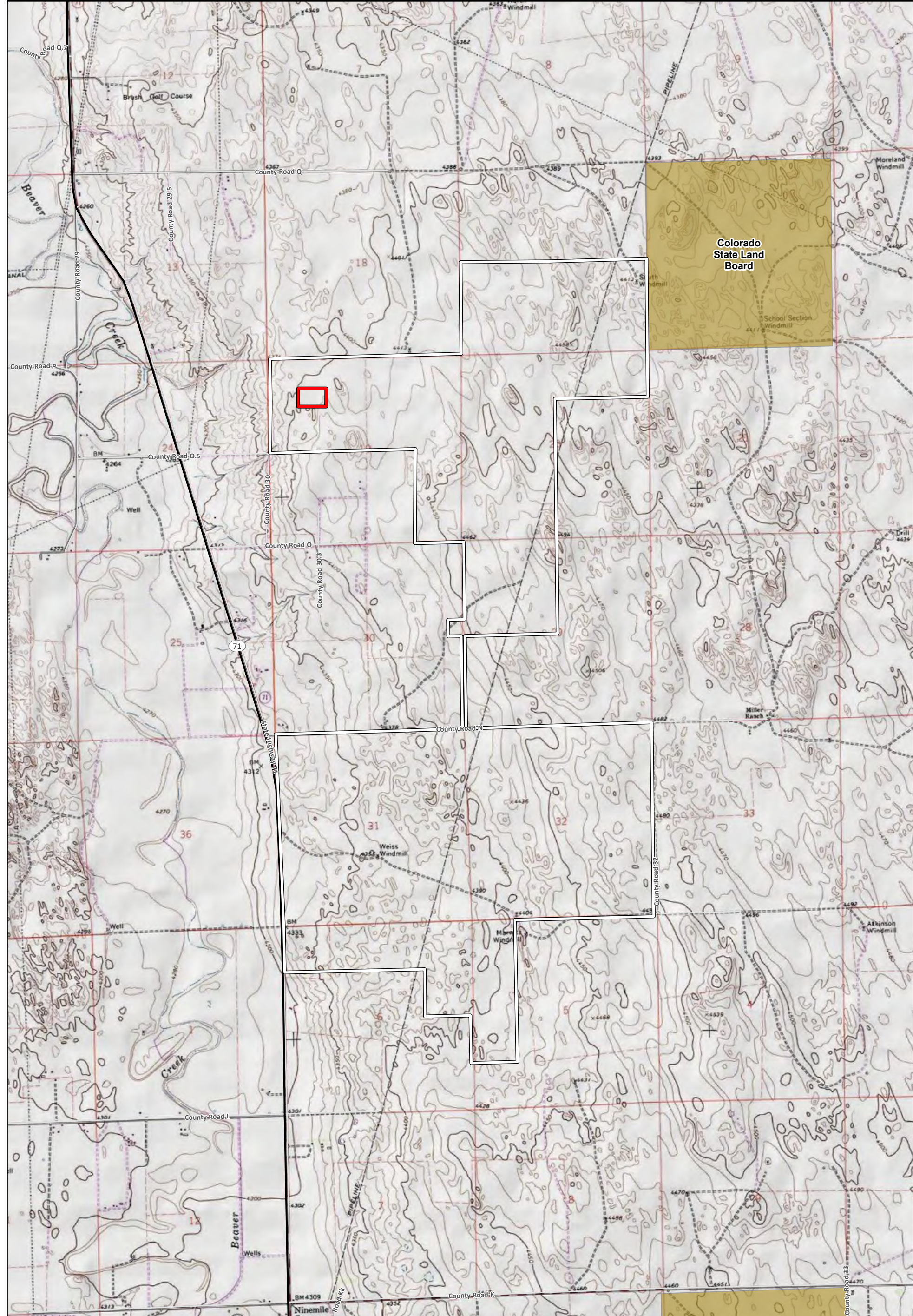
- Feet  
0 2,000
- BESS Area
- Project Area 1,320-ft Buffer
- Project Area
- Parcel Boundary
- Road
- Residence

## Roadrunner Energy Farm

Morgan County, Colorado

### Adjacent Landowner Map





Data Source(s): Westwood (2024); ESRI WMS U.S. Topography Basemap (Accessed 2024) OpenStreetMap (2023); PADUS (2024).

### Legend

0 2,500 Feet

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

- BESS Area
- Project Area

- Major Road
- Road

- PADUS Designation**
- State Resource Management Area



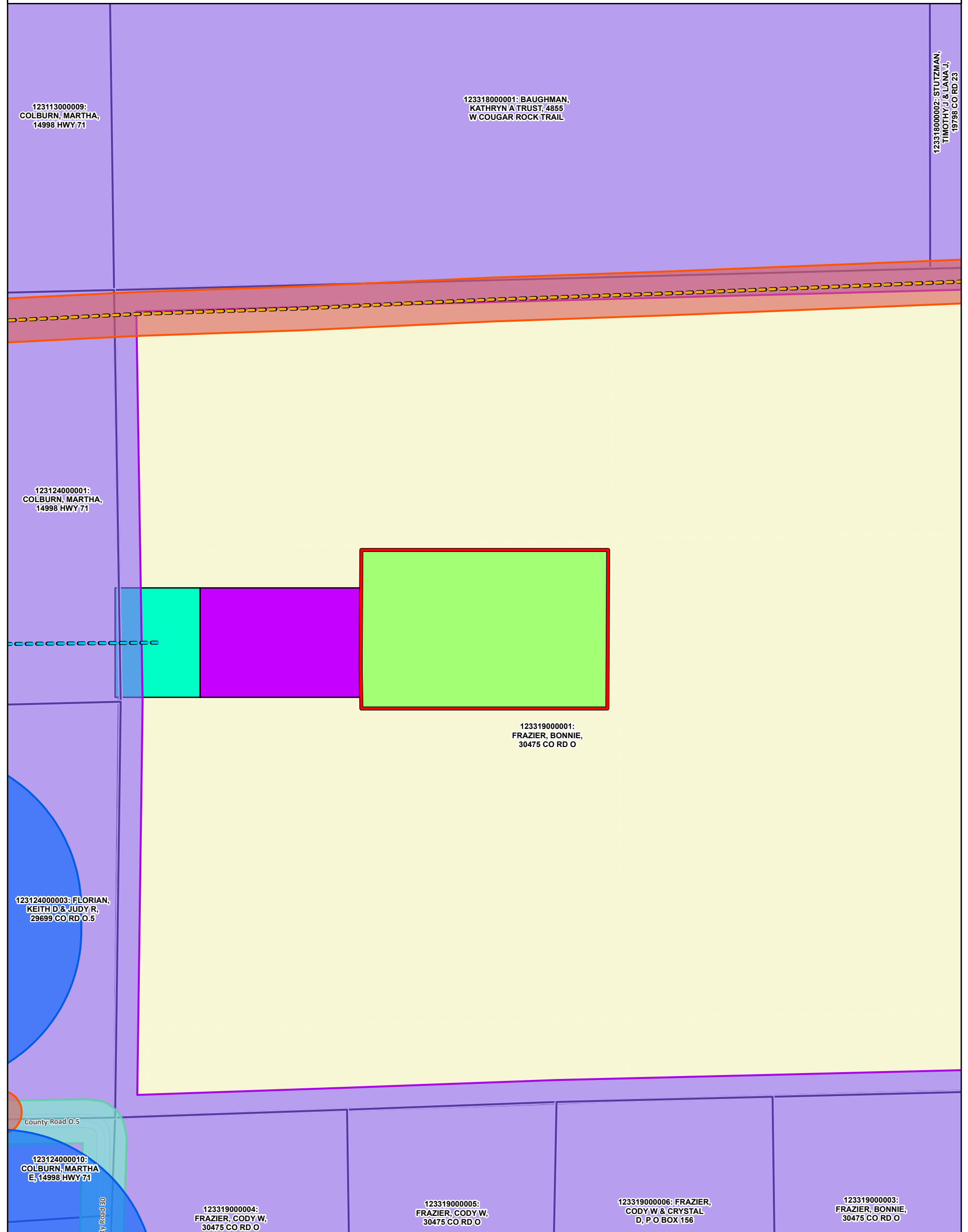
## Roadrunner Energy Farm

Morgan County, Colorado

Public Lands Map

EXHIBIT 4 OF 9

**Note: As part of this Application, a variance from internal setback requirements is being sought; as such, internal setbacks are not shown.**



**OFFICIAL USE ONLY:**

**Prepared On:** 10/2/2024

**Applicant Name:** RAI Energy

**Applicant Address:** 1875 S. Bascom Ave, Suite 2400, Campbell, CA 95008

Data Source(s): Westwood (2024); ESRI WMS World Streets Basemap (Accessed 2024); Morgan County (2023).

**Legend**



- BESS Area
- Project Area
- Parcel Boundary
- Proposed BESS
- Proposed Substation
- Proposed Switchyard
- Existing Utility Line
- Proposed Collection Line
- Road

**Setback**

- Public Road 70-ft Setback
- Utility Line 70-ft Setback
- Inhabitable Building 500-ft Setback
- Property Line 70-ft Setback

**Roadrunner Energy Farm**

Morgan County, Colorado

Special Use Permit Map

EXHIBIT 5 OF 9





Data Source(s): Westwood (2024); ESRI WMS U.S. Topography Basemap (Accessed 2024); NHD (2024).

### Legend

- Feet
- BESS Area
- Watershed Boundary
- NHD Flowline
- Project Area
- NHD Waterbody
- Road

### Roadrunner Energy Farm

Morgan County, Colorado

Topographic Map

EXHIBIT 6 OF 9





CONTOUR LEGEND	
--- 110 ---	(E) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)

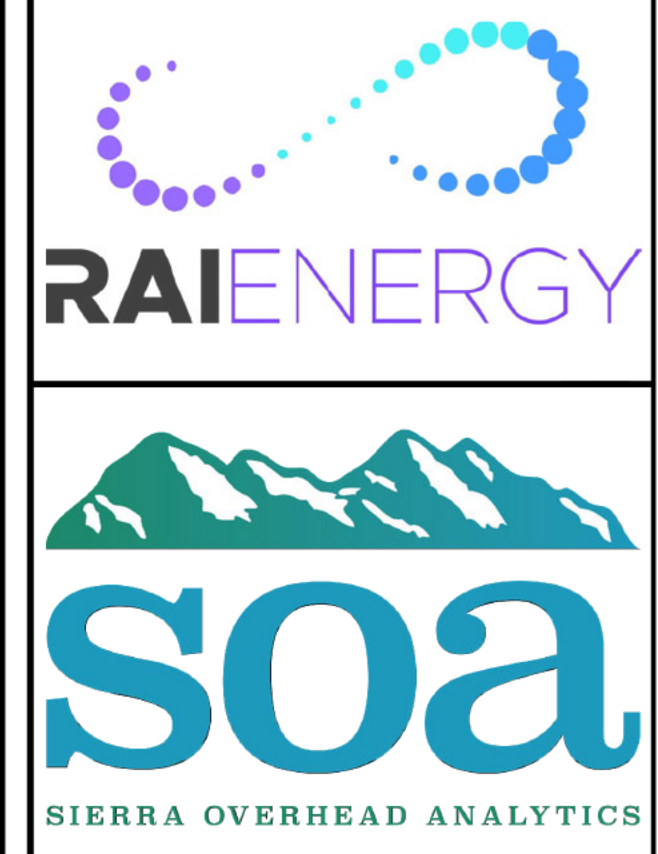
LEGEND	
— OHD —	OVERHEAD LINE
	(E) WETLAND
	E PUBLIC ROAD
	(E) PIPELINE
	PROPERTY LINE
	OFFSET/EASEMENT
	OFFSET/EASEMENT
	PARCEL LINE

GENERAL NOTES	
1. PARCEL LINES PROVIDED BY MORGAN COUNTY AND ARE SUBJECT TO CHANGE PENDING FINAL ALTA.	

SETBACK TABLE	
LOCATION	DISTANCE
ROW	35'
FRONT	30'
REAR	20'
SIDE	25'



PE STAMP:

KEY PLAN: 1" = 9,000'

REVISIONS:		
NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

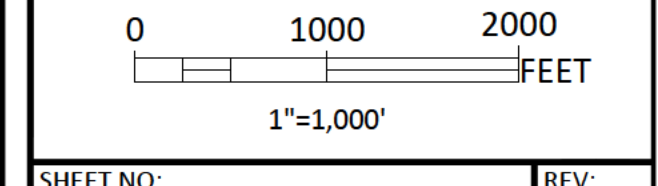
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**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

SHEET TITLE & DESCRIPTION:  
**EXISTING CONDITIONS**

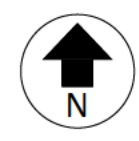
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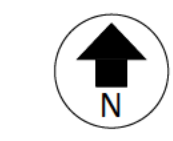
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DES:  
DWN: MM  
CHK: DG  
APV:  
DATE: 7/8/2024



SHEET NO: **C-1-1-000** REV: **0**

**NOT FOR CONSTRUCTION**





**CONTOUR LEGEND**

--- 110 ---	(E) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
--- 112 ---	(P) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(P) MINOR CONTOUR (2' INTERVAL)

**LEGEND**

— OHD —	OVERHEAD LINE
— (P) —	ARRAY AREA
— (E) —	WETLAND
— (P) —	ROAD
— (E) —	PUBLIC ROAD
— (E) —	PIPELINE
— (P) —	FENCE
—	PROPERTY LINE
—	OFFSET/EASEMENT
—	OFFSET/EASEMENT
— (P) —	SUBSTATION 1
— (P) —	SUBSTATION 2
— (P) —	BESS
—	PARCEL LINE
— (P) —	GRADING BOUNDARY
— (P) —	POTENTIAL BASIN/BERM AREA
— SF —	SILT FENCE

**CUT FILL SUMMARY**

CUT (CU. YD)	FILL (CU. YD)	NET (CU. YD)
158,000	145,000	13,000 (CUT)

- GENERAL NOTES**
- EARTHWORK QUANTITIES ARE BASED ON GRADING FOR BRINGING THE RACKING INTO TOLERANCE.
  - CUT & FILL SUMMARY IS 1:1 RATIO.
  - STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT EACH ENTRY POINT TO THE SITE FROM PUBLIC ROADWAYS.
  - SILT FENCE SHALL BE INSTALLED DOWN SLOPE OF ALL DISTURBED AREAS BEFORE START OF CONSTRUCTION.
  - EROSION MATTING SHALL BE INSTALLED ON DISTURBED AREAS THAT ARE LOCATED ON 2:1 OR GREATER SLOPES.
  - PARCEL LINES PROVIDED BY MORGAN COUNTY AND ARE SUBJECT TO CHANGE PENDING FINAL ALTA.
  - FINAL BASIN SIZE AND LOCATION WILL BE DESIGNED PENDING FINAL HYDROLOGY STUDY.
  - CULVERTS AND LOW WATER CROSSING LOCATIONS AND SIZES WILL BE DETERMINED PENDING FINAL HYDROLOGY STUDY.

**SETBACK TABLE**

LOCATION	DISTANCE
ROW	35'
FRONT	30'
REAR	20'
SIDE	25'



PE STAMP:

KEY PLAN: 1" = 9,000'

**REVISIONS:**

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

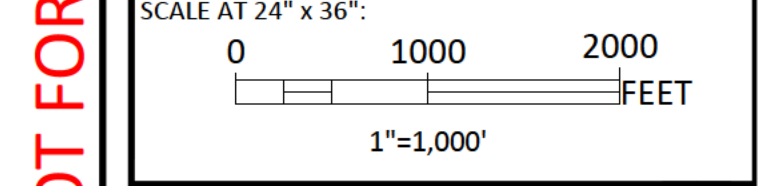
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ROADRUNNER ENERGY FARM

**PROJECT LOCATION:**  
MORGAN COUNTY, COLORADO

**SHEET TITLE & DESCRIPTION:**  
OVERALL PLAN

**DRAFT**

PROJ NUM:	
DES:	
DWN:	MM
CHK:	DG
APV:	
DATE:	7/8/2024



SHEET NO: C-1-1-001 REV: 0

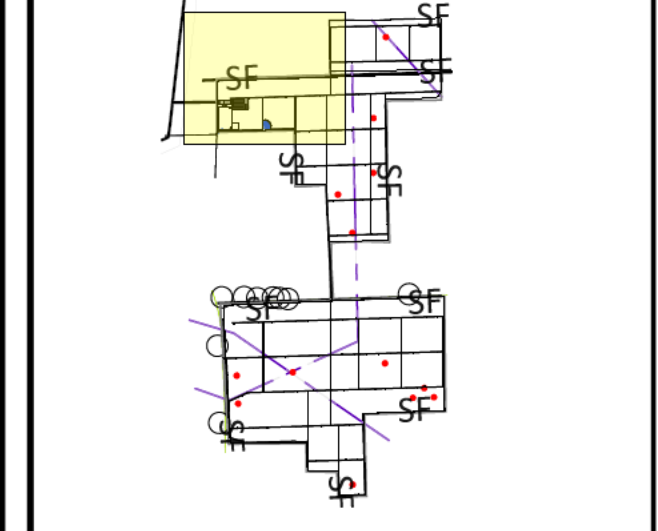
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PE STAMP:



KEY PLAN: 1" = 9,000'



REVISIONS:

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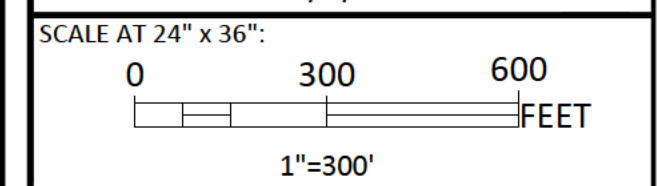
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**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

SHEET TITLE & DESCRIPTION:  
**PROPOSED CONDITIONS:  
EROSION & SEDIMENT CONTROL 1**

**DRAFT**

PROJ NUM:	
DES:	
DWN:	MM
CHK:	DG
APV:	
DATE:	7/8/2024



SHEET NO:	C-1-2-001	REV:	0
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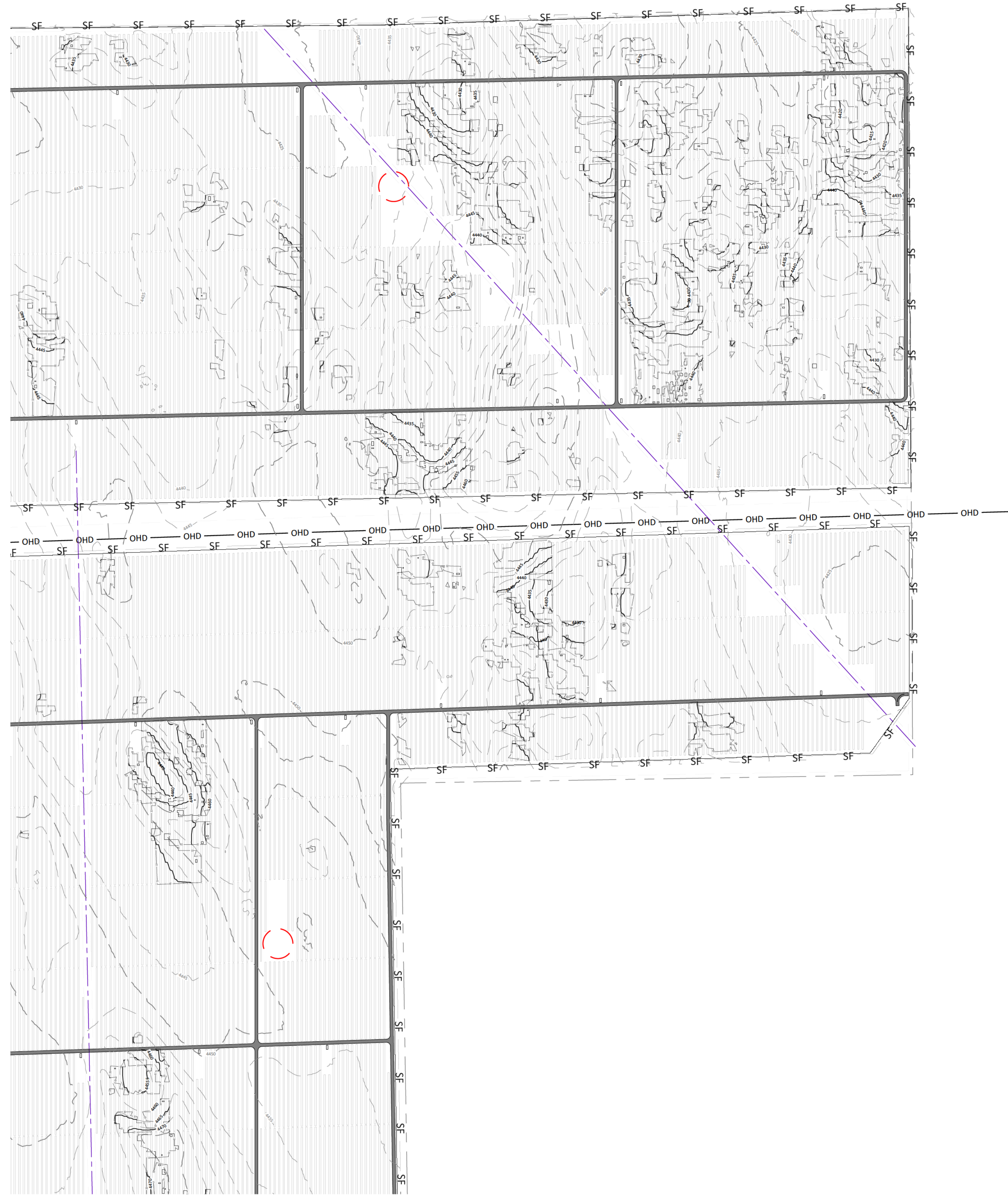
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--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
--- 112 ---	(P) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(P) MINOR CONTOUR (2' INTERVAL)

LEGEND	
— OHD —	OVERHEAD LINE
— (P) —	ARRAY AREA
— (E) —	WETLAND
— (P) —	ROAD
— (E) —	PUBLIC ROAD
— (E) —	PIPELINE
— (P) —	FENCE
—	PROPERTYLINE
—	OFFSET/EASEMENT
—	OFFSET/EASEMENT
— (P) —	SUBSTATION 1
— (P) —	SUBSTATION 2
— (P) —	BESS
— (P) —	GRADING BOUNDARY
— (P) —	POTENTIAL BASIN/BERM AREA
— SF —	SILT FENCE



**NOT FOR CONSTRUCTION**



CONTOUR LEGEND	
--- 110 ---	(E) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
---	(P) MAJOR CONTOUR (10' INTERVAL)
---	(P) MINOR CONTOUR (2' INTERVAL)

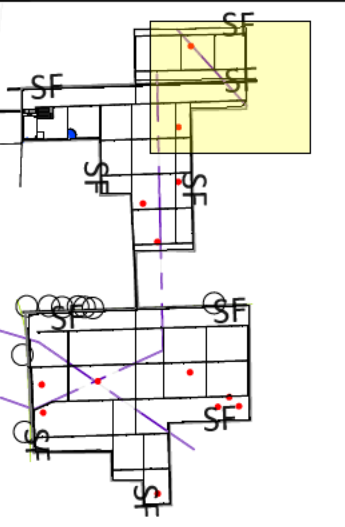
  

LEGEND	
— OHD —	OVERHEAD LINE
— (P) —	ARRAY AREA
	(E) WETLAND
— (P) —	ROAD
— (E) —	PUBLIC ROAD
— (E) —	PIPELINE
— (P) —	FENCE
—	PROPERTYLINE
—	OFFSET/EASEMENT
— (P) —	OFFSET/EASEMENT 1
— (P) —	OFFSET/EASEMENT 2
— (P) —	BESS
— (P) —	GRADING BOUNDARY
— (P) —	POTENTIAL BASIN/BERM AREA
— SF —	SILT FENCE



PE STAMP:

KEY PLAN: 1" = 9,000'



REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:

**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:

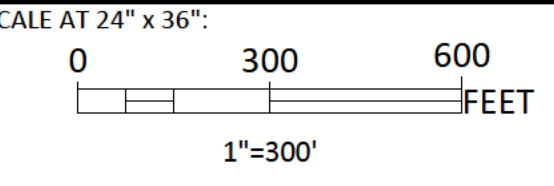
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SHEET TITLE & DESCRIPTION:

**PROPOSED CONDITIONS:  
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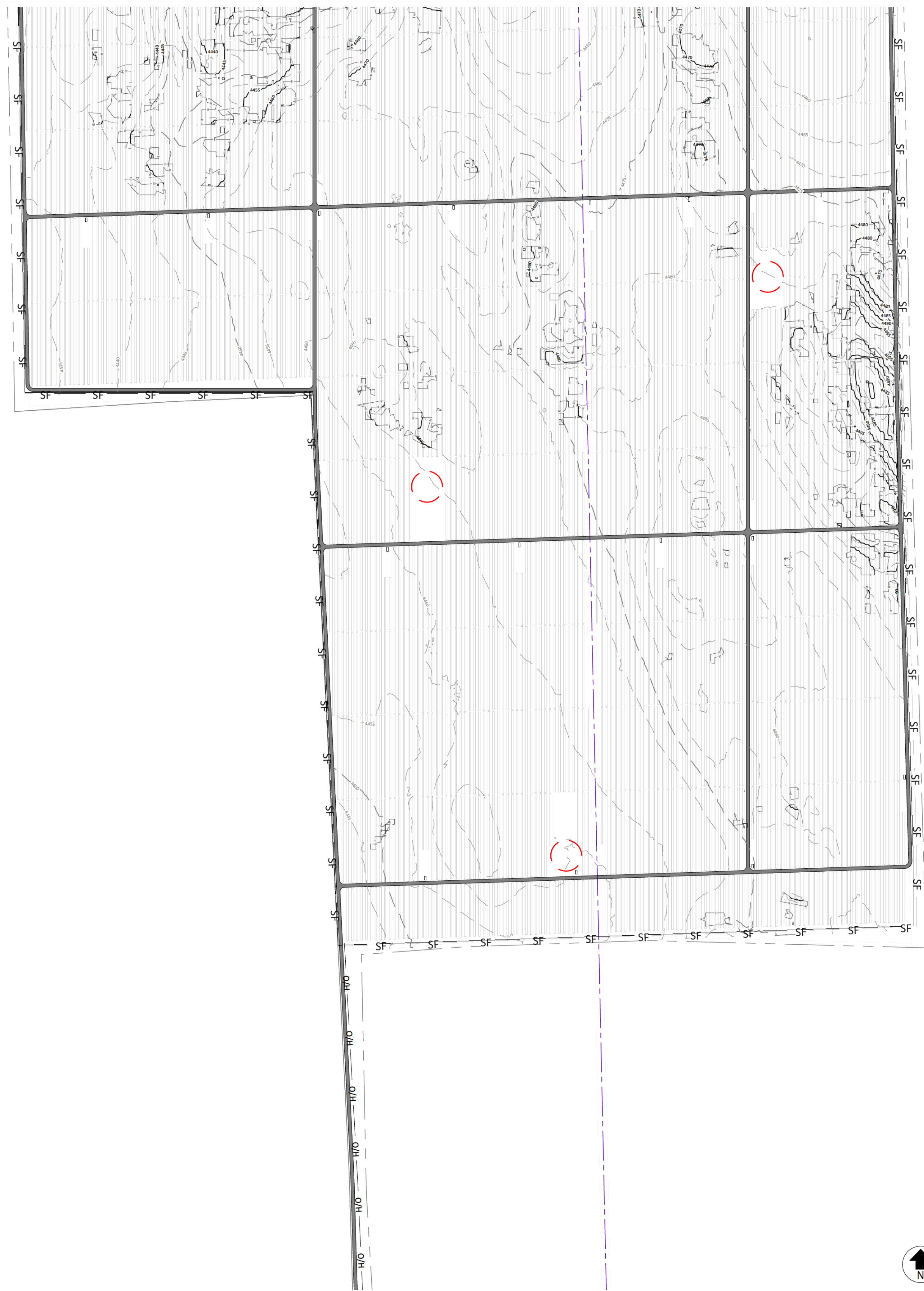
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APV:	
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SHEET NO:	C-1-2-002	REV:	0
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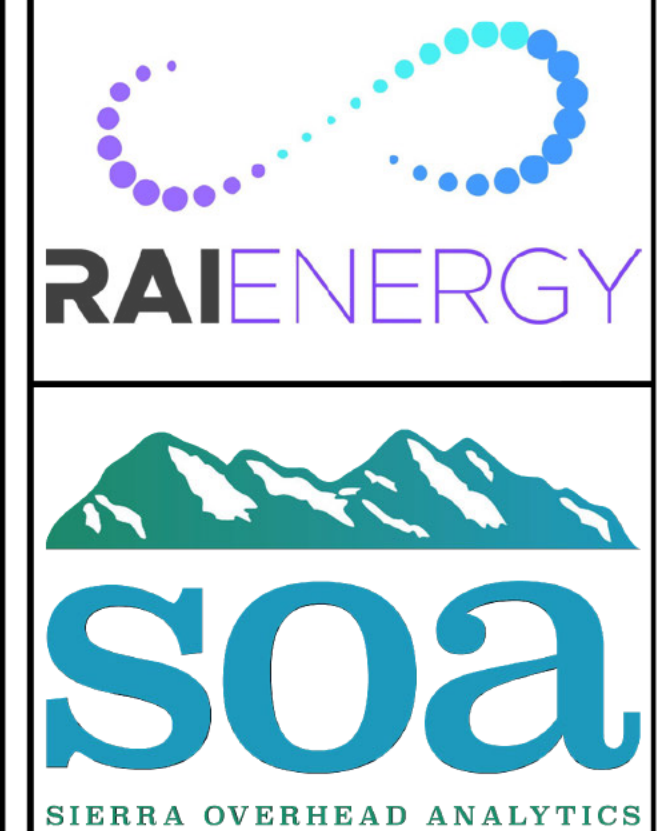
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--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
--- 112 ---	(P) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(P) MINOR CONTOUR (2' INTERVAL)

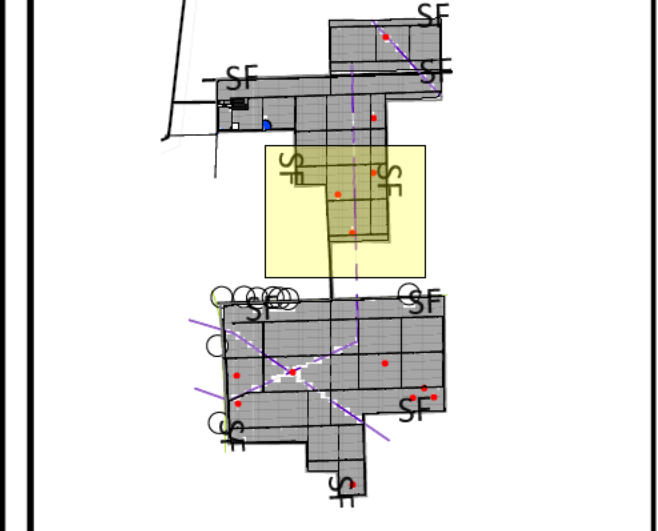
LEGEND	
— OHD —	OVERHEAD LINE
— (P) —	(P) ARRAY AREA
(E)	(E) WETLAND
— (P) —	(P) ROAD
— (E) —	(E) PUBLIC ROAD
— (E) —	(E) PIPELINE
— (P) —	(P) FENCE
—	PROPERTYLINE
—	OFFSET/EASEMENT
— (P) —	(P) SUBSTATION 1
— (P) —	(P) SUBSTATION 2
— (P) —	(P) BESS
— (P) —	(P) GRADING BOUNDARY
— (P) —	(P) POTENTIAL BASIN/BERM AREA
— SF —	(P) SILT FENCE



PE STAMP:



KEY PLAN: 1" = 9,000'



REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:  
**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

SHEET TITLE & DESCRIPTION:  
**PROPOSED CONDITIONS: EROSION & SEDIMENT CONTROL 3**

**DRAFT**

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DWN:	MM
CHK:	DG
APV:	
DATE:	7/8/2024
SCALE AT 24" x 36":	
1"=300'	

SHEET NO: **C-1-2-003** REV: **0**

**NOT FOR CONSTRUCTION**



CONTOUR LEGEND	
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--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
--- 112 ---	(P) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(P) MINOR CONTOUR (2' INTERVAL)

LEGEND	
— OHD —	OVERHEAD LINE
— (P) —	ARRAY AREA
— (E) —	WETLAND
— (P) —	ROAD
— (E) —	PUBLIC ROAD
— (E) —	PIPELINE
— (P) —	FENCE
—	PROPERTYLINE
—	OFFSET/EASEMENT
— (P) —	OFFSET/EASEMENT
— (P) —	SUBSTATION 1
— (P) —	SUBSTATION 2
— (P) —	BESS
— (P) —	GRADING BOUNDARY
— (P) —	POTENTIAL BASIN/BERM AREA
— SF —	SILT FENCE



PE STAMP:



KEY PLAN: 1" = 9,000'

REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:  
**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

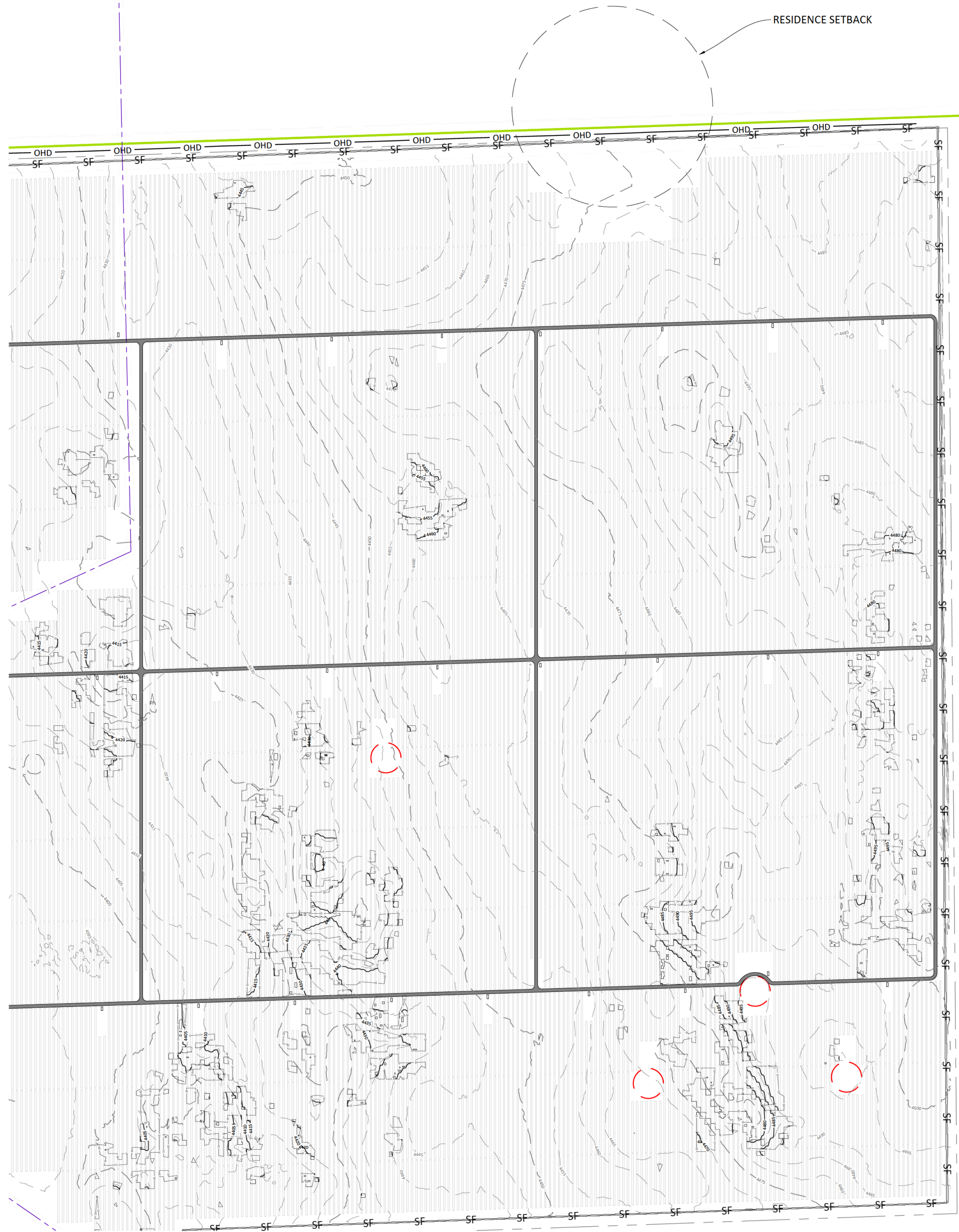
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EROSION & SEDIMENT CONTROL 4**

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CHK:	DG
APV:	
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SHEET NO: **C-1-2-004** REV: **0**

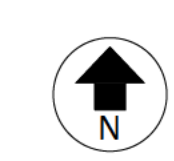
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CONTOUR LEGEND	
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--- 112 ---	(E) MINOR CONTOUR (2' INTERVAL)
---	(P) MAJOR CONTOUR (10' INTERVAL)
---	(P) MINOR CONTOUR (2' INTERVAL)

LEGEND	
— OHD —	OVERHEAD LINE
---	(P) ARRAY AREA
	(E) WETLAND
—	(P) ROAD
—	(E) PUBLIC ROAD
---	(E) PIPELINE
---	(P) FENCE
---	PROPERTYLINE
---	OFFSET/EASEMENT
---	OFFSET/EASEMENT
---	(P) SUBSTATION 1
---	(P) SUBSTATION 2
---	(P) BESS
---	(P) GRADING BOUNDARY
---	(P) POTENTIAL BASIN/BERM AREA
---	(P) SILT FENCE



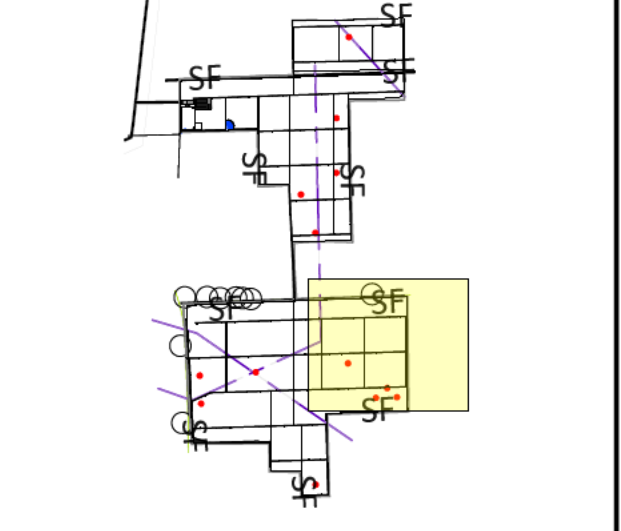
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PE STAMP:



KEY PLAN: 1" = 9,000'



REVISIONS:

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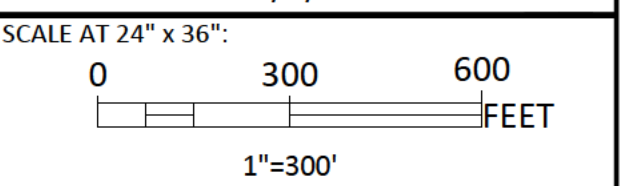
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**MORGAN COUNTY, COLORADO**

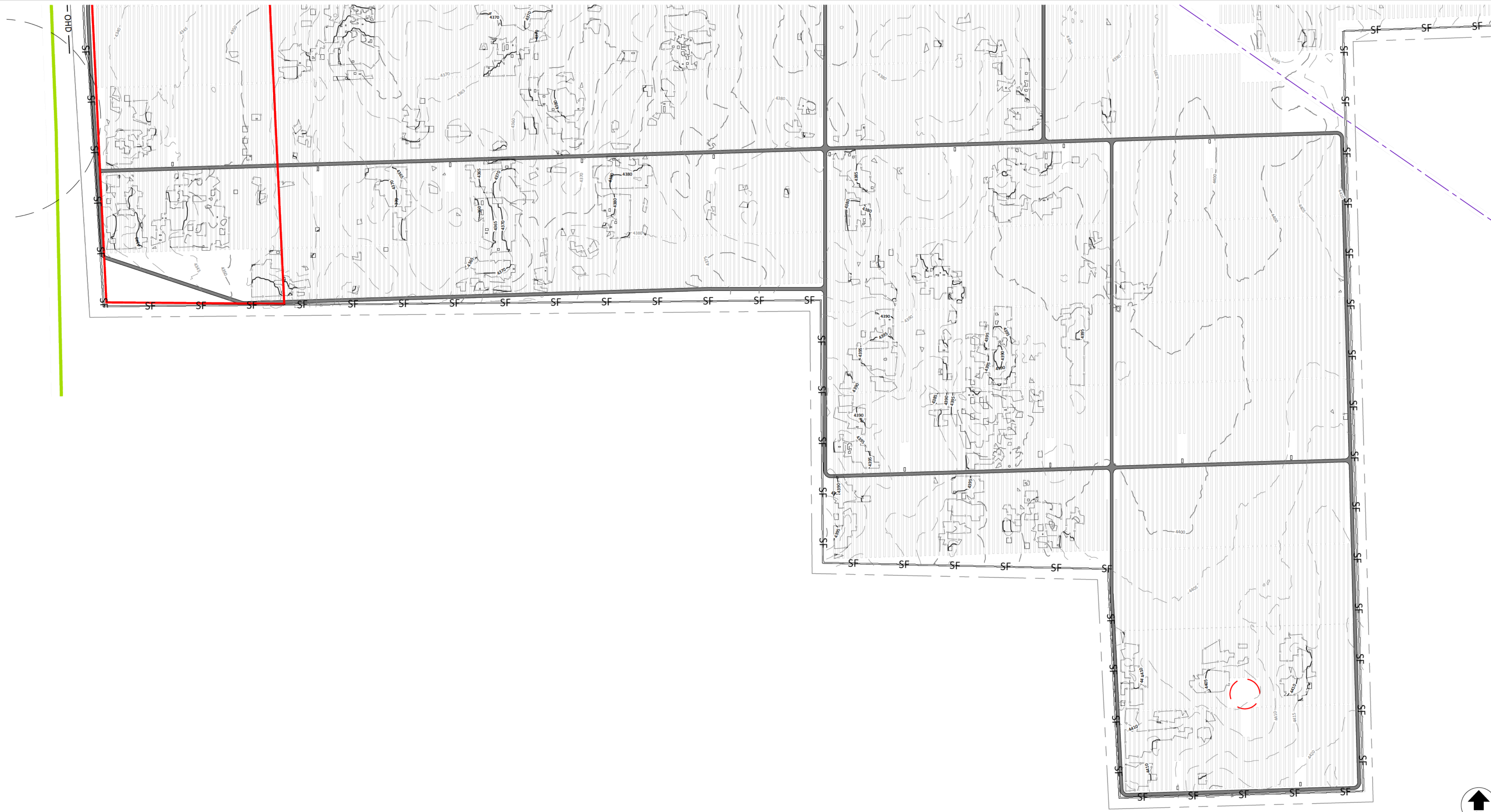
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EROSION & SEDIMENT CONTROL 5**

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APV:	
DATE:	7/8/2024



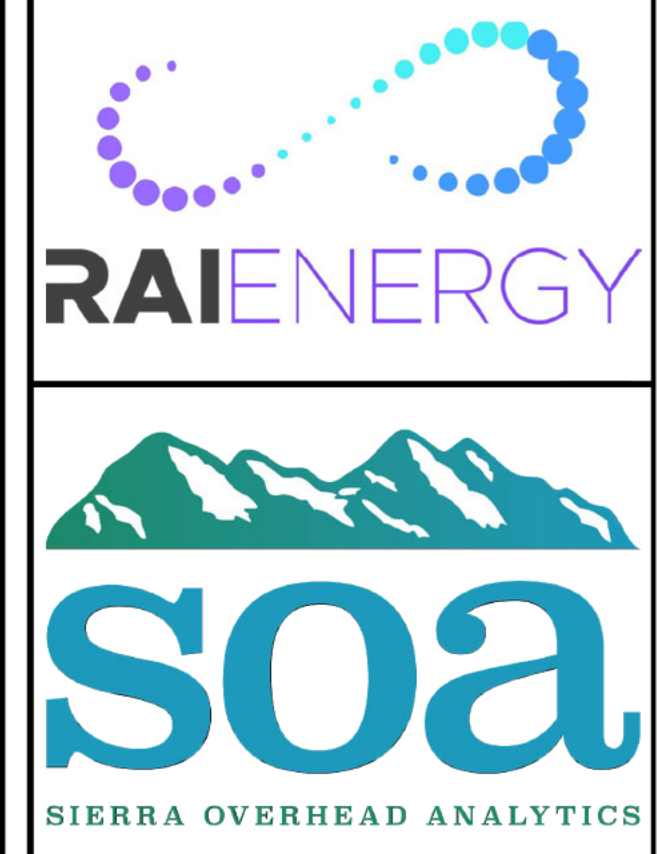
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--- 112 ---	(P) MAJOR CONTOUR (10' INTERVAL)
--- 112 ---	(P) MINOR CONTOUR (2' INTERVAL)

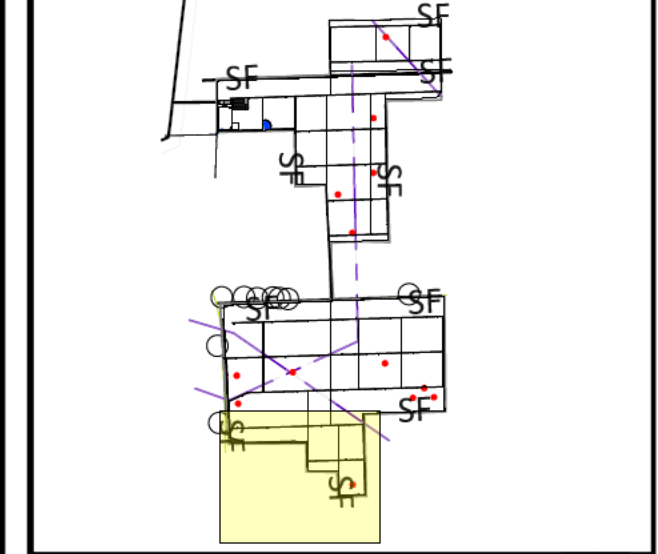
LEGEND	
— OHD —	OVERHEAD LINE
(P) ARRAY AREA	(P) ARRAY AREA
(E) WETLAND	(E) WETLAND
(P) ROAD	(P) ROAD
(E) PUBLIC ROAD	(E) PUBLIC ROAD
(E) PIPELINE	(E) PIPELINE
(P) FENCE	(P) FENCE
PROPERTYLINE	PROPERTYLINE
OFFSET/EASEMENT	OFFSET/EASEMENT
OFFSET/EASEMENT	OFFSET/EASEMENT
(P) SUBSTATION 1	(P) SUBSTATION 1
(P) SUBSTATION 2	(P) SUBSTATION 2
(P) BESS	(P) BESS
(P) GRADING BOUNDARY	(P) GRADING BOUNDARY
(P) POTENTIAL BASIN/BERM AREA	(P) POTENTIAL BASIN/BERM AREA
SF	(P) SILT FENCE



PE STAMP:



KEY PLAN: 1" = 9,000'



REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:

**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:

**MORGAN COUNTY, COLORADO**

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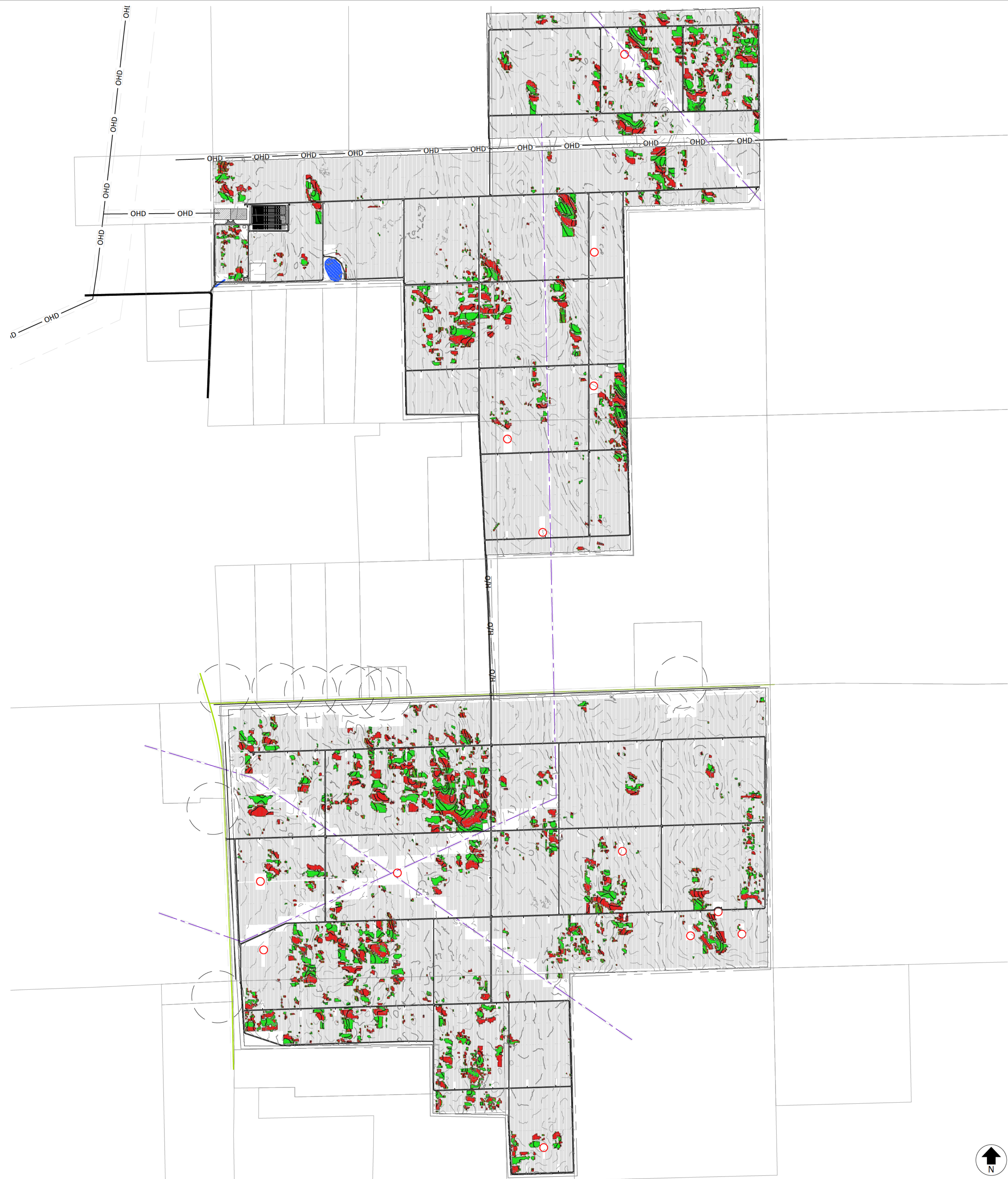
**PROPOSED CONDITIONS:  
EROSION & SEDIMENT CONTROL 6**

**DRAFT**

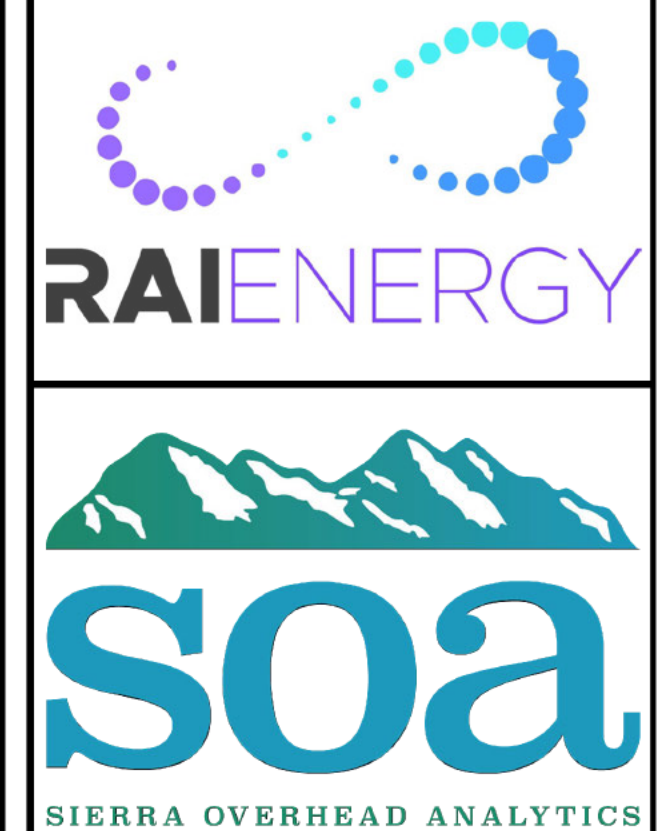
PROJ NUM:	
DES:	
DWN:	MM
CHK:	DG
APV:	
DATE:	7/8/2024
SCALE AT 24" x 36":	

SHEET NO:	C-1-2-006	REV:	0
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**NOT FOR CONSTRUCTION**



CUT FILL SUMMARY		
CUT (CU. YD)	FILL (CU. YD)	NET (CU. YD)
158,000	145,000	13,000 (CUT)



PE STAMP:

KEY PLAN: 1" = 9,000'

REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

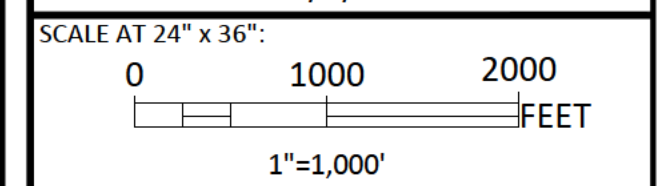
PROJECT TITLE:  
**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

SHEET TITLE & DESCRIPTION:  
**CUT & FILL OVERVIEW**

**DRAFT**

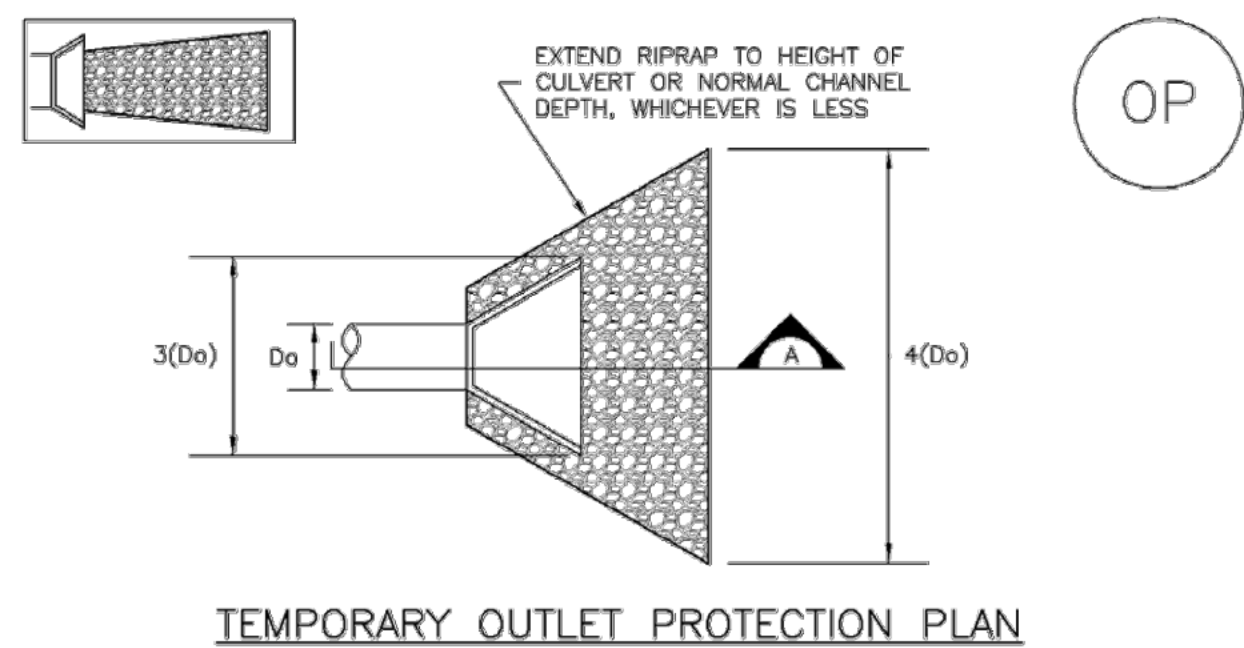
PROJ NUM:  
DES:  
DWN: MM  
CHK: DG  
APV:  
DATE: 7/8/2024



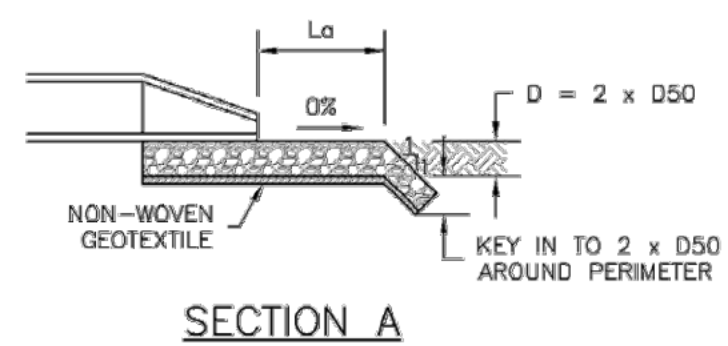
SHEET NO: **C-1-3-001** REV: **0**

**NOT FOR CONSTRUCTION**

**EC-8 Temporary Outlet Protection (TOP)**



TEMPORARY OUTLET PROTECTION PLAN



SECTION A

TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE

PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5	5	4
12	5	10	4
18	10	16	6
24	20	23	9
	30	26	12
	40	28	16
	50	30	15
	60	30	15

OP-1. TEMPORARY OUTLET PROTECTION

TOP-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

**EC-5 Compost Blanket and Filter Berm (CB)**

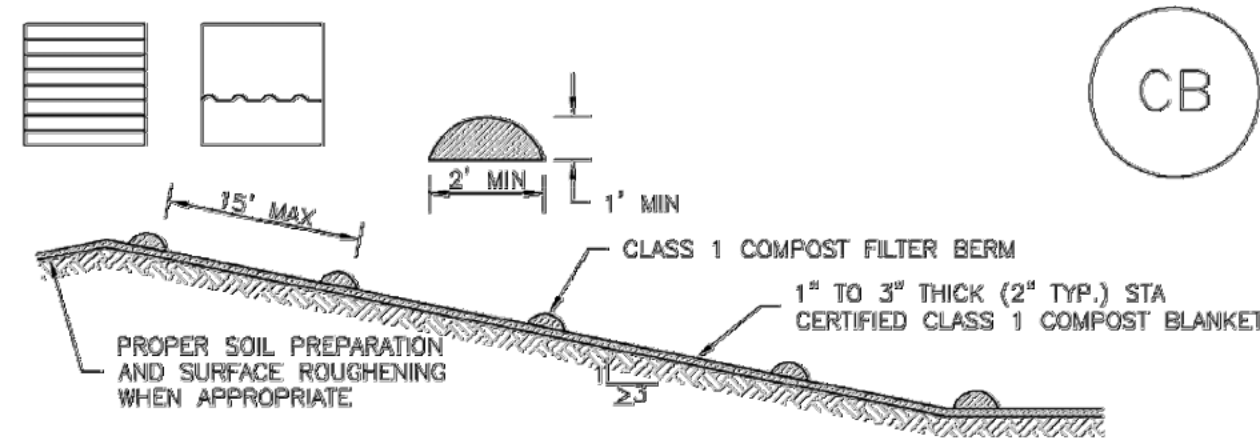


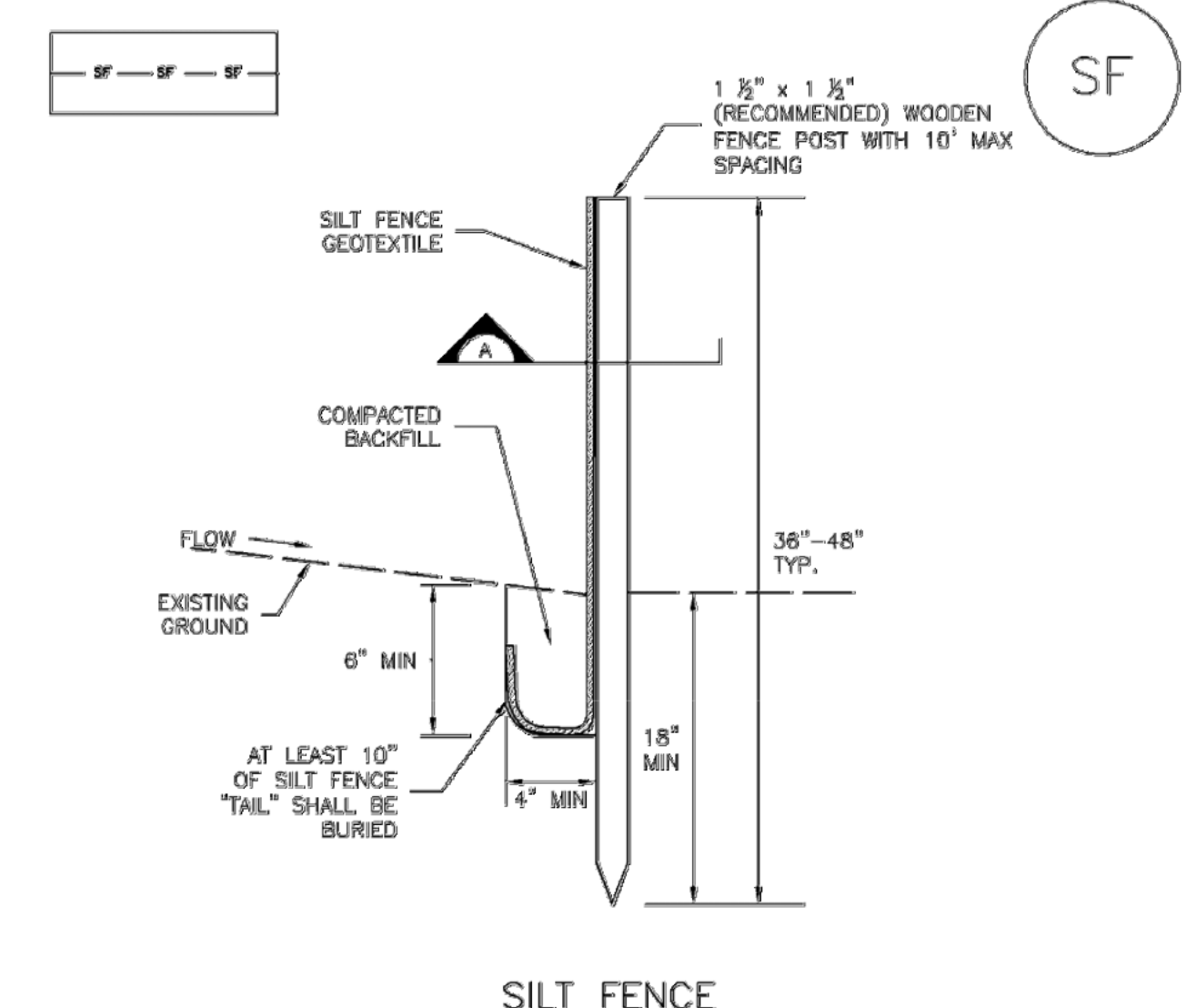
TABLE CB-1. CLASS 1 COMPOST

PARAMETERS	CHARACTERISTIC
MINIMUM STABILITY INDICATOR	STABLE TO VERY STABLE
SOLUBLE SALTS	MAXIMUM 5 mmhos/cm
PH	6.0 - 8.0
AG INDEX	> 10
MATURITY INDICATOR EXPRESSED AS PERCENTAGE OF GERMINATION/VIGOR	80+/80+
MATURITY INDICATOR EXPRESSED AS AMMONIA N/ NITRATE N RATIO	< 4
MATURITY INDEX AS CARBON TO NITROGEN RATIO	20:1
TESTED FOR CLOPYRALID	YES/NEGATIVE RESULT
MOISTURE CONTENT	30-60%
ORGANIC MATTER CONTENT	25-45% OF DRY WEIGHT
PARTICLE SIZE DISTRIBUTION	3" (75mm) 100% PASSING
PRIMARY, SECONDARY NUTRIENTS; TRACE ELEMENTS	MUST BE REPORTED
TESTING AND TEST REPORT SUBMITTAL REQUIREMENTS	STA + CLOPYRALID
ORGANIC MATTER PER CUBIC YARD	MUST REPORT
CHEMICAL CONTAMINANTS	COMPLY WITH US EPA CLASS A STANDARD, 40 CFR 503.1 TABLES 1 & 3 LEVELS
MINIMUM MANUFACTURING/PRODUCTION REQUIREMENT	FULLY PERMITTED UNDER COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
RISK FACTOR RELATING TO PLANT GERMINATION AND HEALTH	LOW

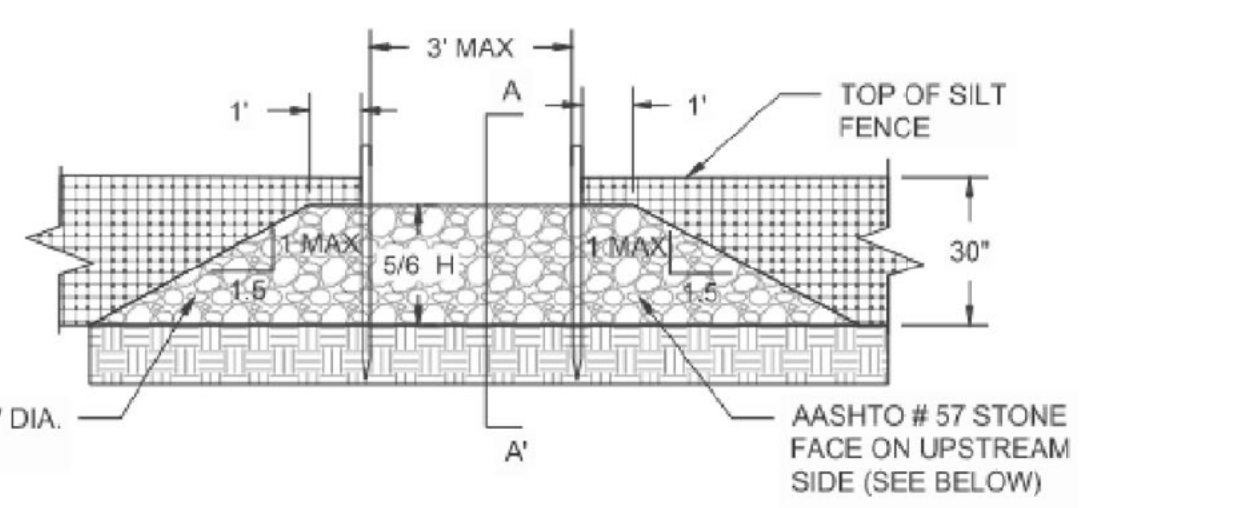
CB-1. COMPOST BLANKET AND COMPOST FILTER BERM

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

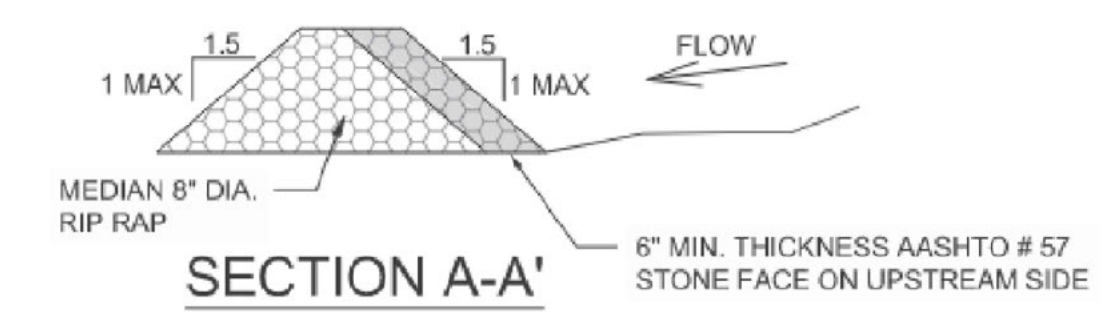
**SC-1 Silt Fence (SF)**



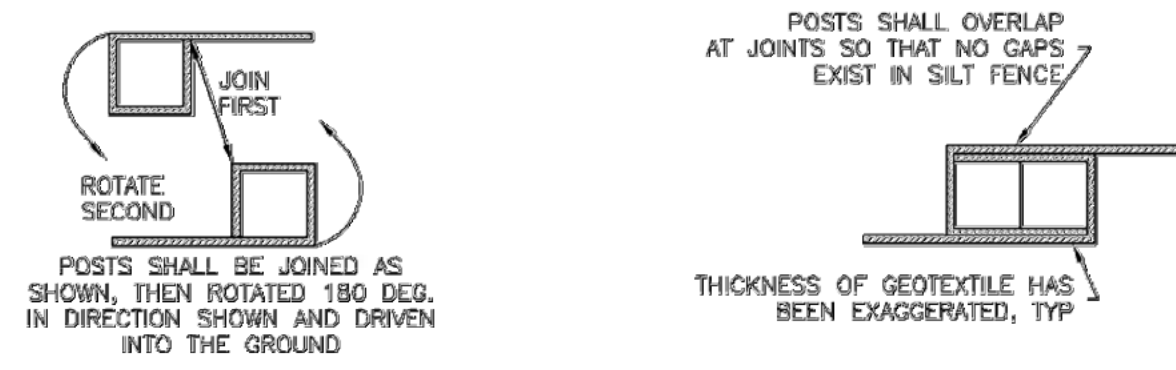
SILT FENCE



ELEVATION - UP-SLOPE FACE



SECTION A-A'



SECTION A

SF-1. SILT FENCE

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

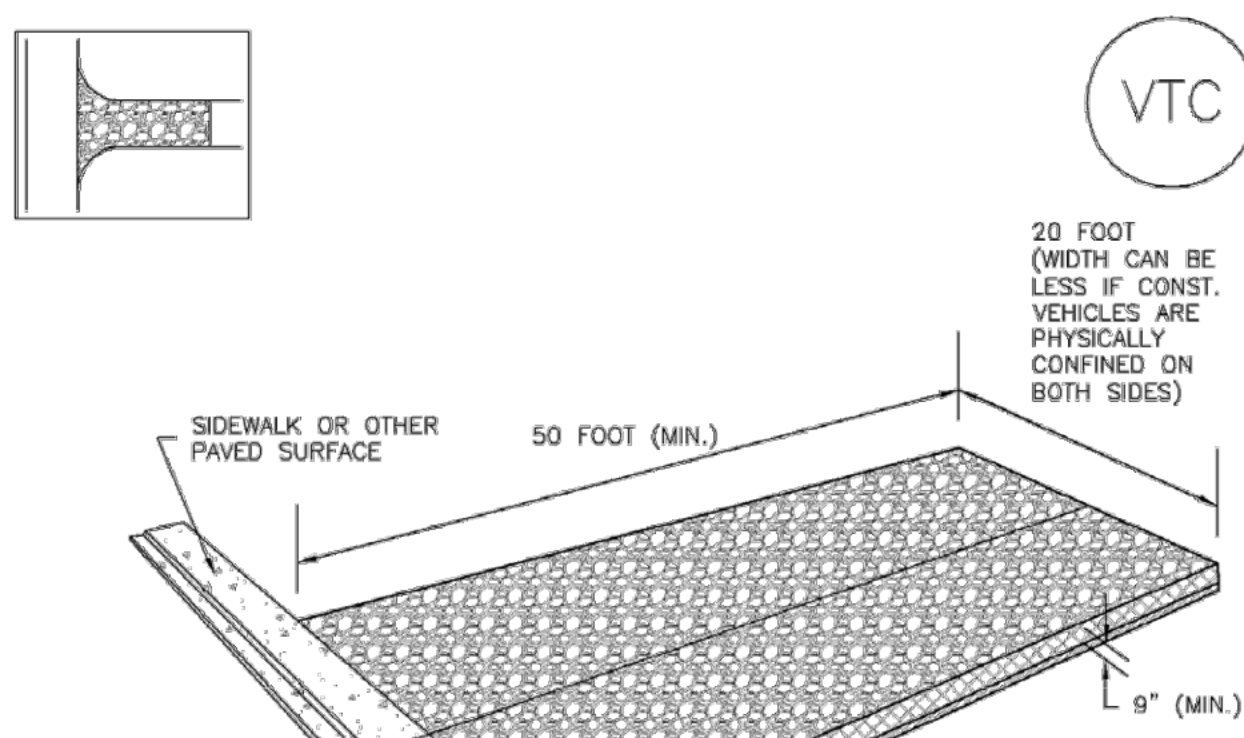
TEMPORARY OUTLET PROTECTION NOT TO SCALE

COMPOST BLANKET AND FILTER BERM NOT TO SCALE

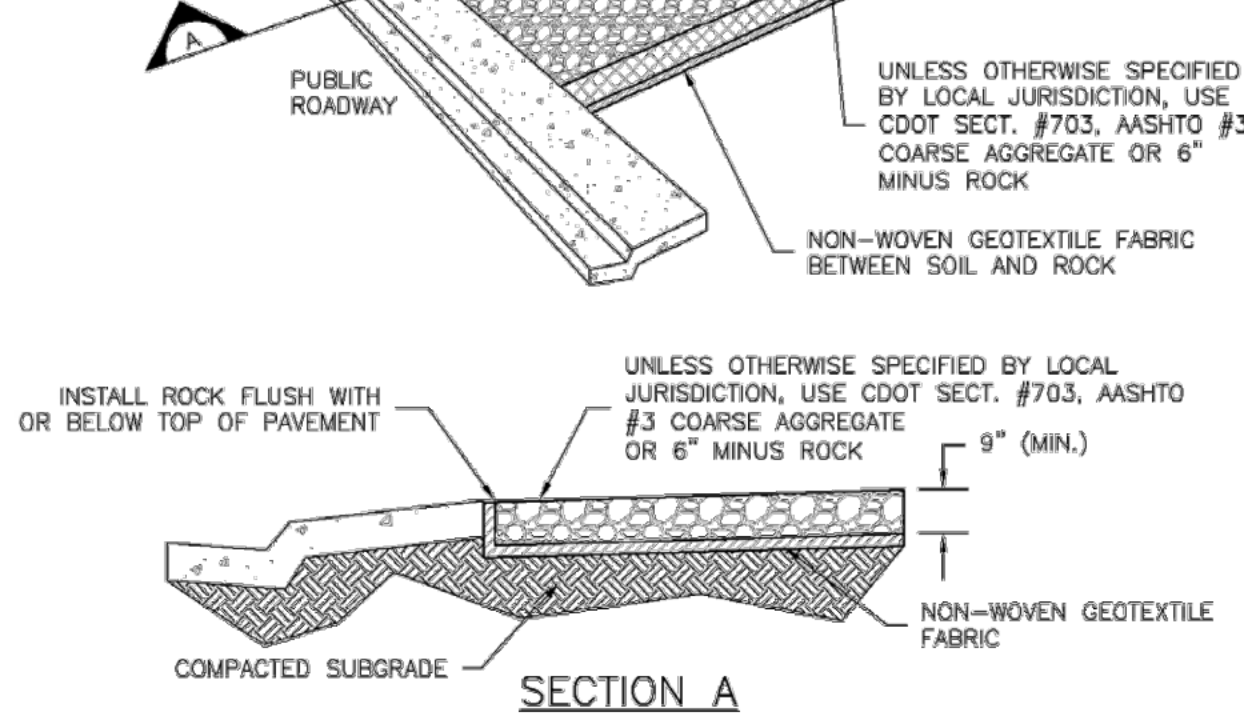
ROCK FILTER DAM NOT TO SCALE

SILT FENCE DETAIL NOT TO SCALE

**SM-4 Vehicle Tracking Control (VTC)**



VTC

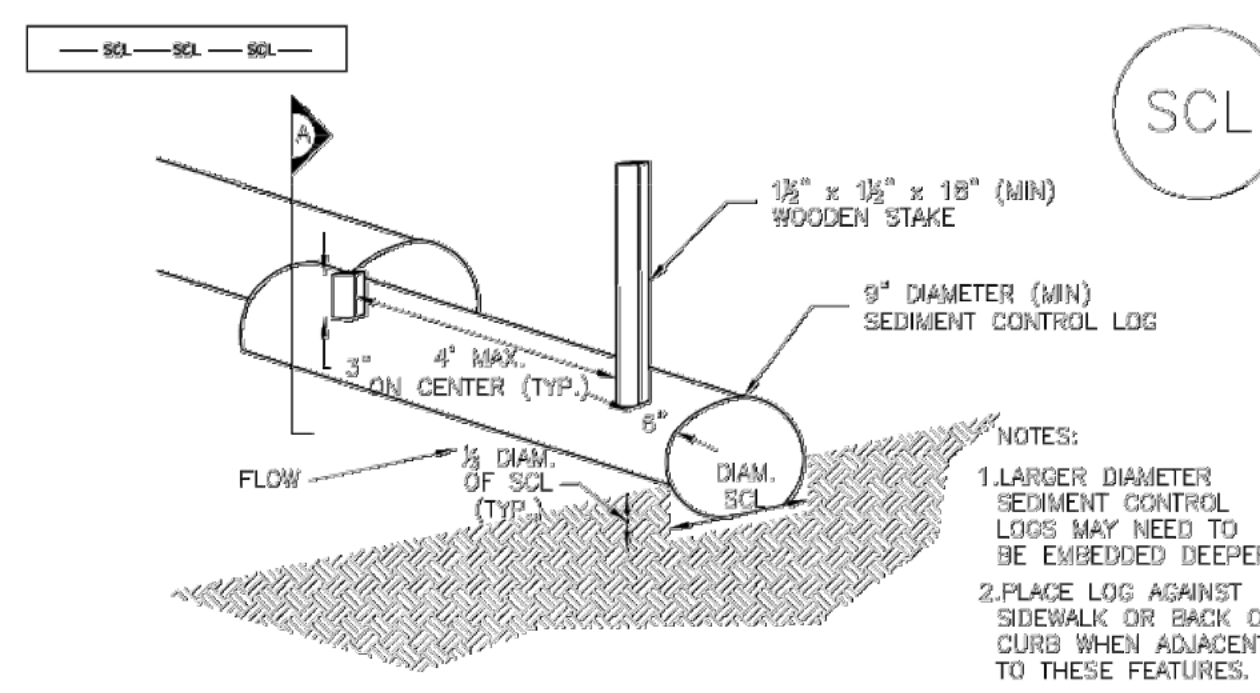


SECTION A

VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

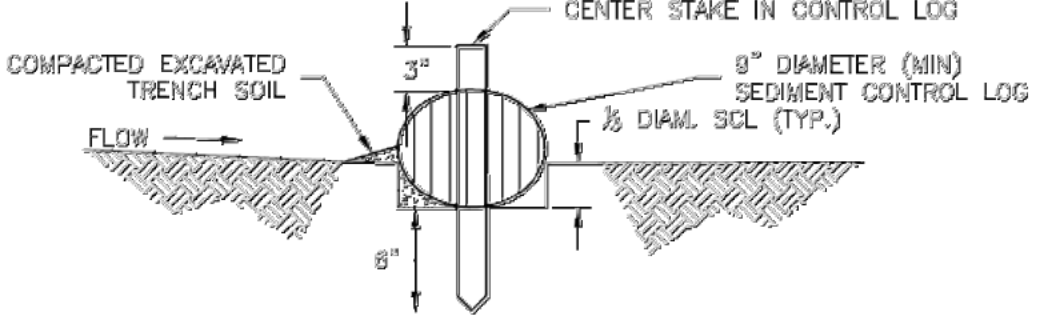
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 VTC-3

**SC-2 Sediment Control Log (SCL)**



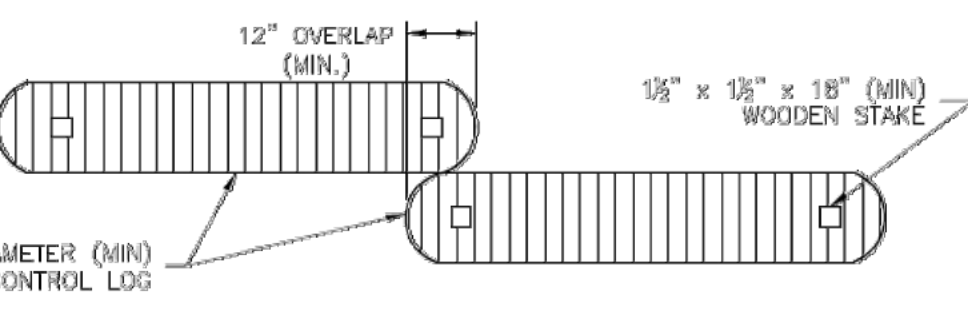
SCL

TRENCHED SEDIMENT CONTROL LOG



SECTION A

TRENCHED SEDIMENT CONTROL LOG

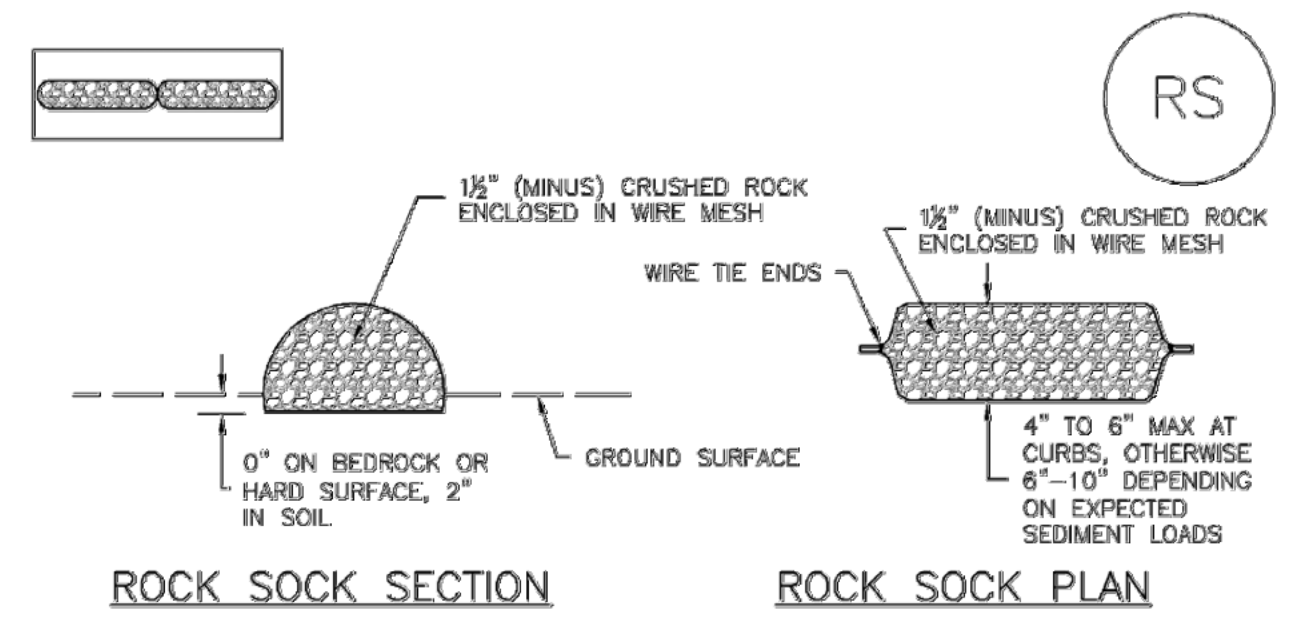


LOG JOINTS

SCL-1. TRENCHED SEDIMENT CONTROL LOG

November 2015 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SCL-3

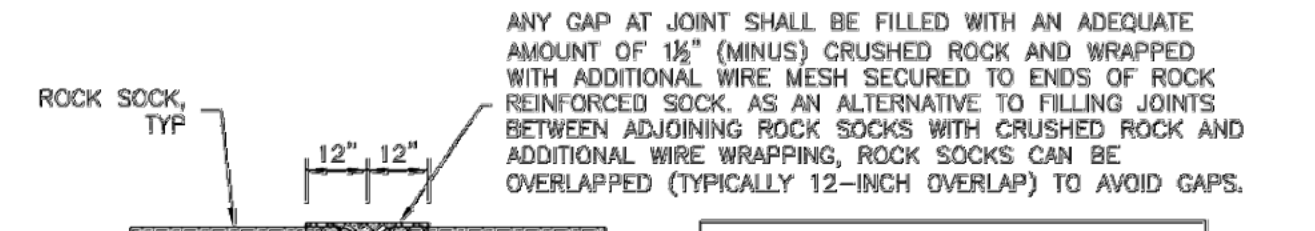
**SC-5 Rock Sock (RS)**



RS

ROCK SOCK SECTION

ROCK SOCK PLAN



ROCK SOCK JOINTING

GRADATION TABLE

NO. 4	NO. 10
2"	100
1 1/2"	90 - 100
1"	20 - 65
3/4"	0 - 15
5/8"	0 - 5

- ROCK SOCK INSTALLATION NOTES
- SEE PLAN VIEW FOR: -LOCATION(S) OF ROCK SOCKS.
  - CRUSHED ROCK SHALL BE 1 1/2" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (1 1/2" MINUS).
  - WIRE MESH SHALL BE FABRICATED OF 10 GAUGE POULTRY MESH, OR EQUIVALENT, WITH A MAXIMUM OPENING OF 1/2", RECOMMENDED MINIMUM ROLL WIDTH OF 48"
  - WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.
  - SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE MESH FOR THE ROCK ENCLOSURE.

RS-1. ROCK SOCK PERIMETER CONTROL

RS-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

VEHICLE TRACKING CONTROL NOT TO SCALE

SEDIMENT CONTROL LOG NOT TO SCALE

TYPICAL MATERIAL STOCKPILE NOT TO SCALE

ROCK SOCK NOT TO SCALE



PE STAMP:

KEY PLAN: 1" = 9,000'

REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:  
**ROADRUNNER ENERGY FARM**

PROJECT LOCATION:  
**MORGAN COUNTY, COLORADO**

SHEET TITLE & DESCRIPTION:  
**DETAILS**

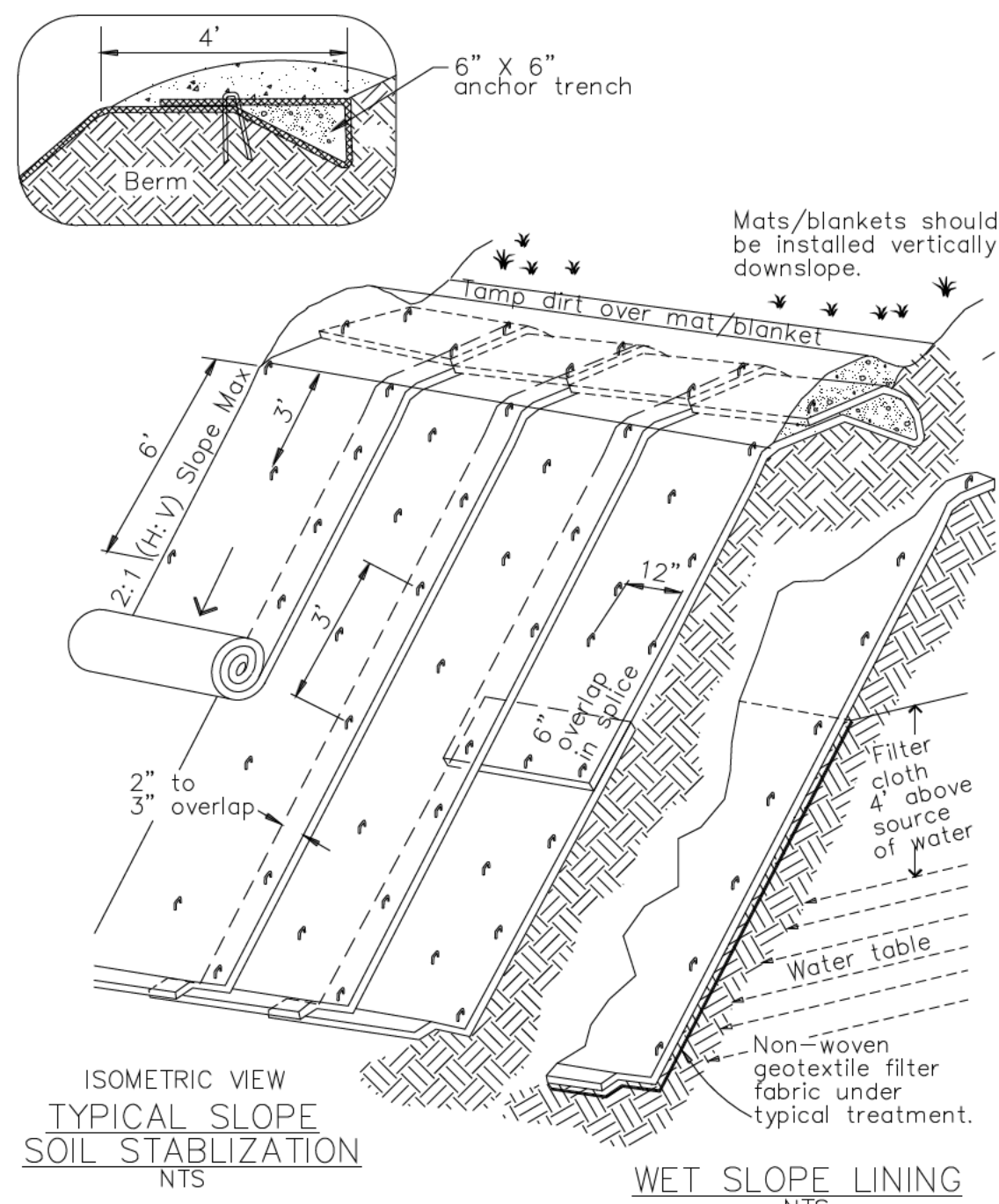
**DRAFT**

PROJ NUM:  
DES:  
DWN: MM  
CHK: DG  
APV:  
DATE: 7/8/2024  
SCALE AT 24" x 36":

SHEET NO: **C-1-4-001** REV: **0**

NOT FOR CONSTRUCTION

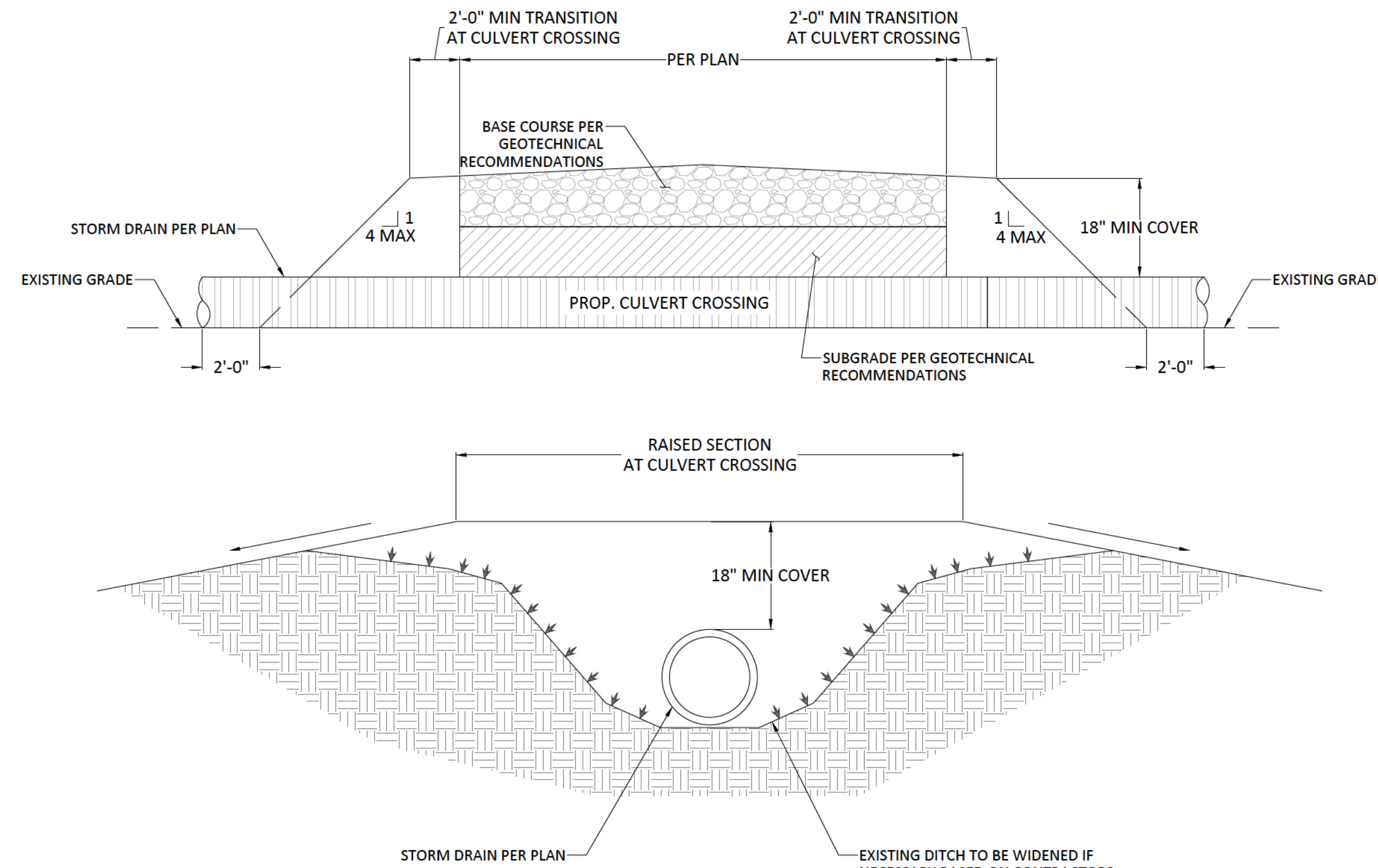




- NOTES:
- Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
  - Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
  - Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

**1** EROSION CONTROL MATTING, TYP.  
SCALE: NTS



- NOTES:
- PROPOSED CULVERT INVERTS TO MATCH EXISTING FLOW LINE. FOR CULVERTS PROPOSED IN EXISTING DITCHES. THE INTENT IS TO SET THE PIPE AT THE EXISTING DITCH INVERT TO ENSURE STORMWATER RUNOFF MAINTAINS ITS EXISTING DRAINAGE PATTERN.
  - CONTRACTOR SHALL VERIFY EXISTING GRADES PRIOR TO CONSTRUCTION AND SHALL REMOVE UNSUITABLE MATERIAL AND PREPARE THE PIPE BED AS NEEDED.

EROSION CONTROL MATTING NOT TO SCALE CULVERT CROSSING, TYP. NOT TO SCALE



PE STAMP:

KEY PLAN: 1" = 9,000'

REVISIONS:

NO.	DATE	DESCRIPTION
0	7/8/2024	FOR SUP SUBMITTAL

PROJECT TITLE:

ROADRUNNER ENERGY FARM

PROJECT LOCATION:

MORGAN COUNTY, COLORADO

SHEET TITLE & DESCRIPTION:

DETAILS

DRAFT

PROJ NUM:

DES:

DWN: MM

CHK: DG

APV:

DATE: 7/8/2024

SCALE AT 24" x 36":

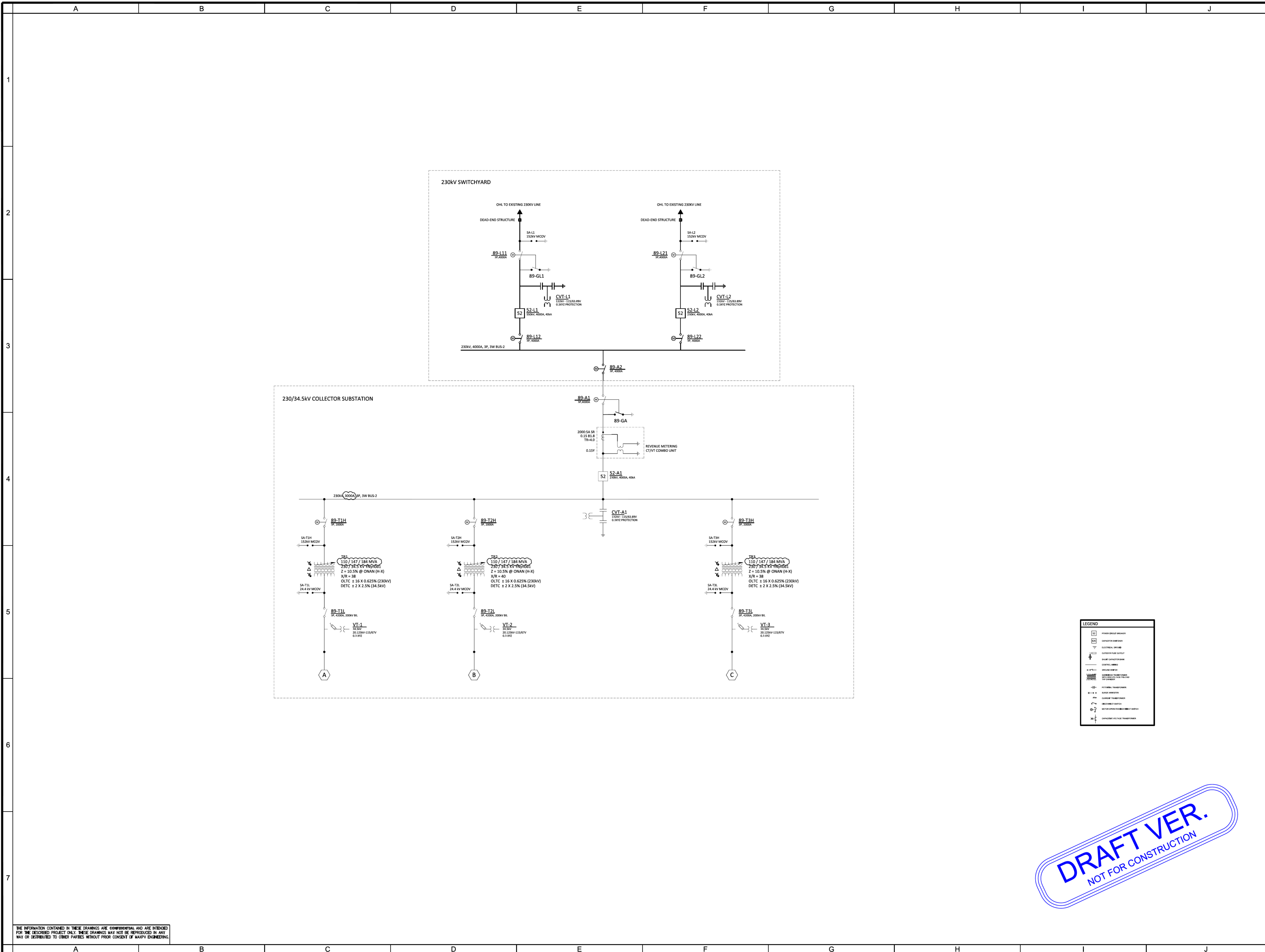
SHEET NO:

C-1-4-002

REV:

0

NOT FOR CONSTRUCTION



**NOTES:**  
 1. THIS DRAWING IS A CUSTOMER-PROVIDED TERABASE DESIGN. EQUIPMENT RATINGS AND NAMES HAVE BEEN ADDED OR ADJUSTED.

**KEYED NOTES:**  
 (L) NONE.



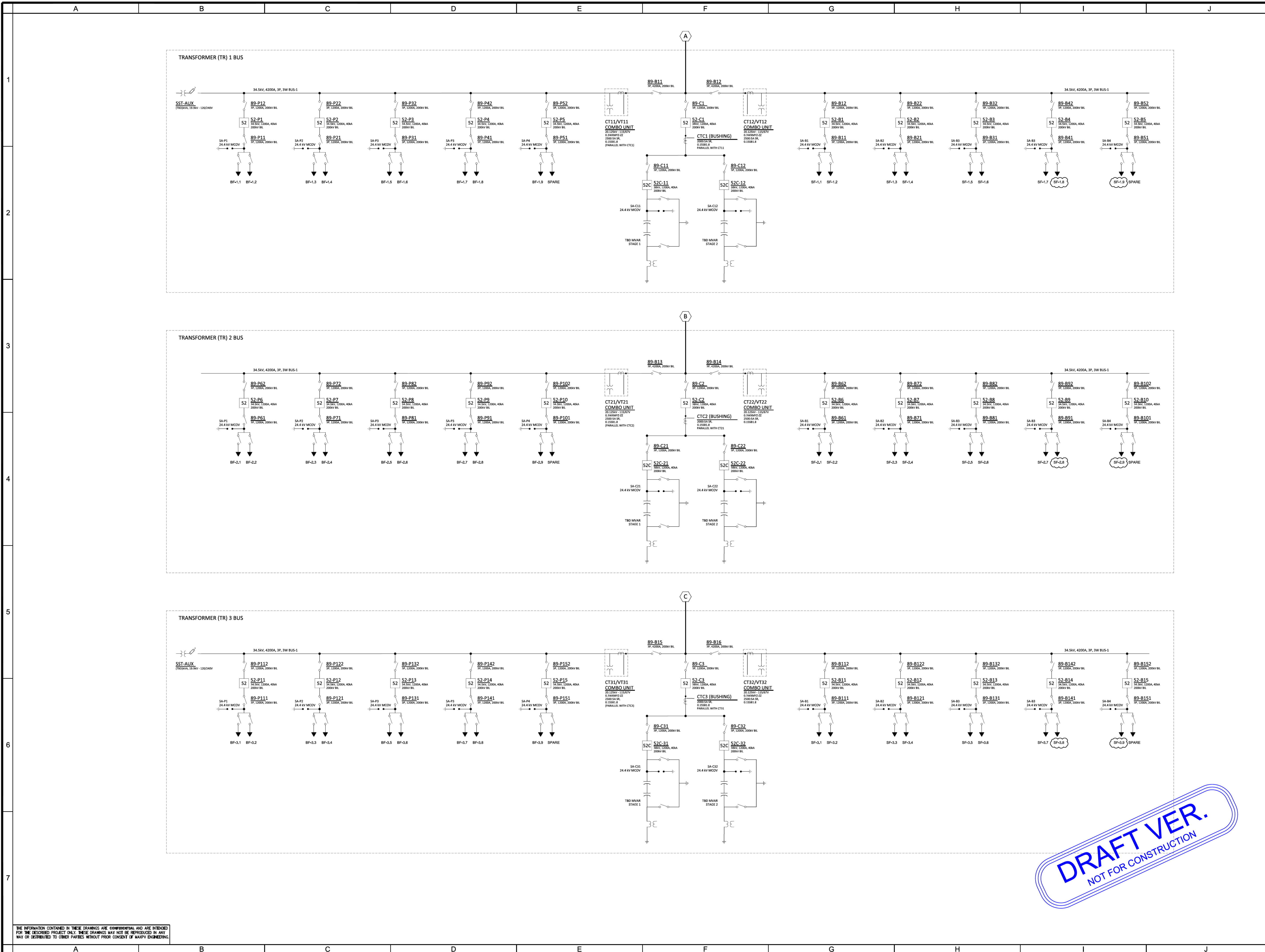
REV. NO.	DATE	DESCRIPTION	BY	CHK	APP
B	04-08-24	SOLAR QUANTITY CHANGE	LB	LB	--
A	04-04-24	PRELIMINARY ENGINEERING	LB	LB	--

OWNER: RAI ENERGY  
 PROJECT SITE: ROADRUNNER ENERGY CENTER  
 DRAWING: SINGLE LINE DIAGRAM  
 230KV SWITCHYARD AND SUBSTATION  
 DRAWING NO. **E001**

THIS PRINT IS NOT TO BE USED FOR CONSTRUCTION UNLESS NOTED AND SIGNED OK FOR CONSTRUCTION ABOVE LAST REVISION.

**DRAFT VER.**  
 NOT FOR CONSTRUCTION

THE INFORMATION CONTAINED IN THESE DRAWINGS ARE CONFIDENTIAL AND ARE INTENDED FOR THE DESCRIBED PROJECT ONLY. THESE DRAWINGS MAY NOT BE REPRODUCED IN ANY WAY OR DISTRIBUTED TO OTHER PARTIES WITHOUT PRIOR CONSENT OF MAXPV ENGINEERING.



**NOTES:**  
 1. THIS DRAWING IS A CUSTOMER-PROVIDED TERABASE DESIGN. EQUIPMENT RATINGS AND NAMES HAVE BEEN ADDED OR ADJUSTED.

**KEYED NOTES:**  
 (1) NONE.

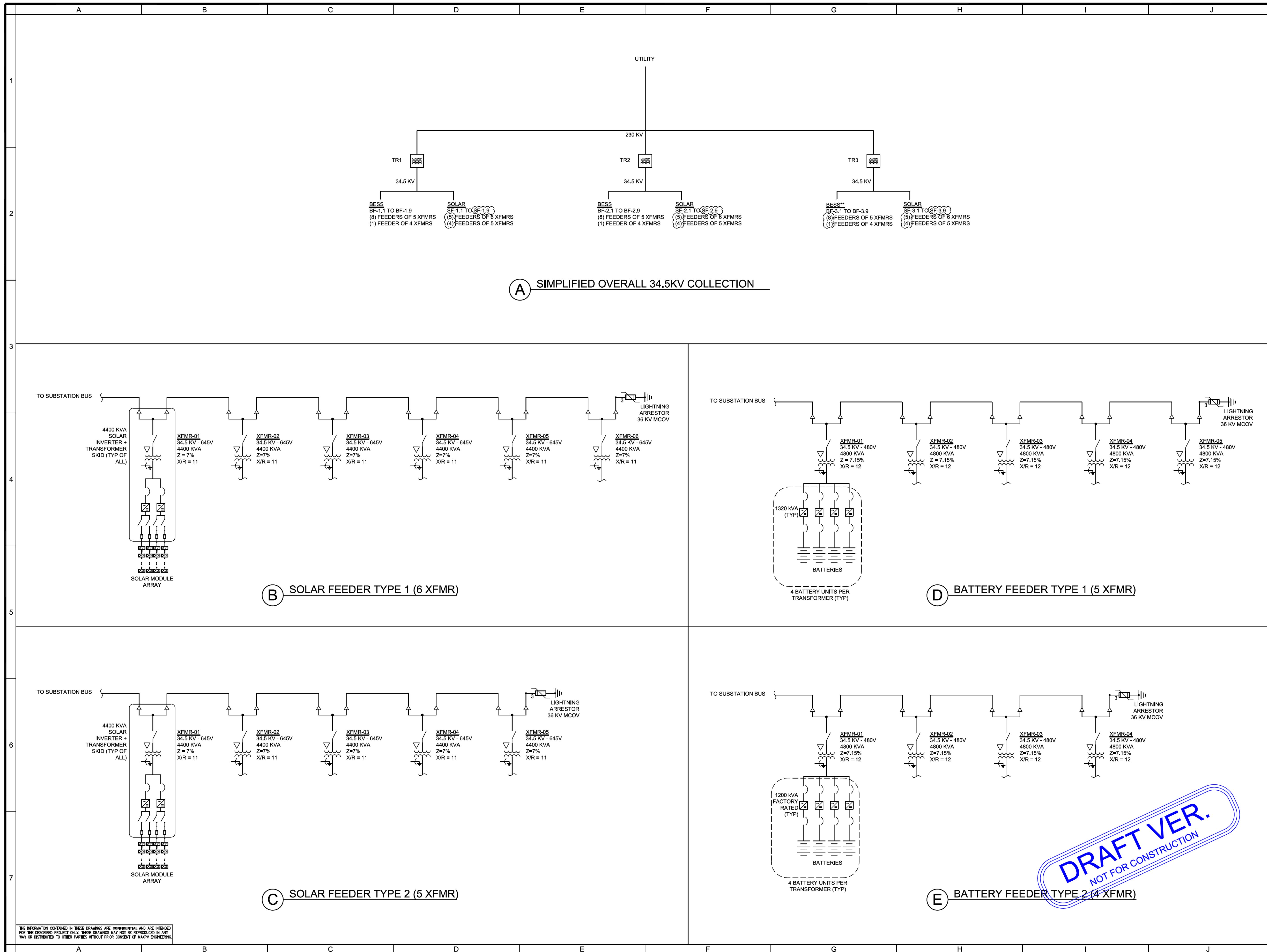


REV. NO.	DATE	DESCRIPTION	BY	CHK.	APP.
B	04-08-24	SOLAR QUANTITY CHANGE	LB	LB	-
A	04-04-24	PRELIMINARY ENGINEERING	LB	LB	-

OWNER: RAI ENERGY  
 PROJECT SITE: ROADRUNNER ENERGY CENTER  
 DRAWING: SINGLE LINE DIAGRAM  
 34.5 kV BUS DISTRIBUTION  
 DRAWING NO. **E002**  
 THIS PRINT IS NOT TO BE USED FOR CONSTRUCTION UNLESS NOTED AND SIGNED OK FOR CONSTRUCTION ABOVE LAST REVISION.

**DRAFT VER.**  
 NOT FOR CONSTRUCTION

THE INFORMATION CONTAINED IN THESE DRAWINGS ARE CONFIDENTIAL AND ARE INTENDED FOR THE DESCRIBED PROJECT ONLY. THESE DRAWINGS MAY NOT BE REPRODUCED IN ANY WAY OR DISTRIBUTED TO OTHER PARTIES WITHOUT PRIOR CONSENT OF MAXPV ENGINEERING.



**NOTES:**  
1. NONE.

**KEYED NOTES:**  
(L) NONE.



REV. NO.	DATE	DESCRIPTION	BY	CHK.	APR.
B	04-08-24	SOLAR QUANTITY CHANGE	LB	LB	-
A	04-04-24	PRELIMINARY ENGINEERING	LB	LB	-

OWNER: RAI ENERGY

PROJECT SITE: ROADRUNNER ENERGY CENTER

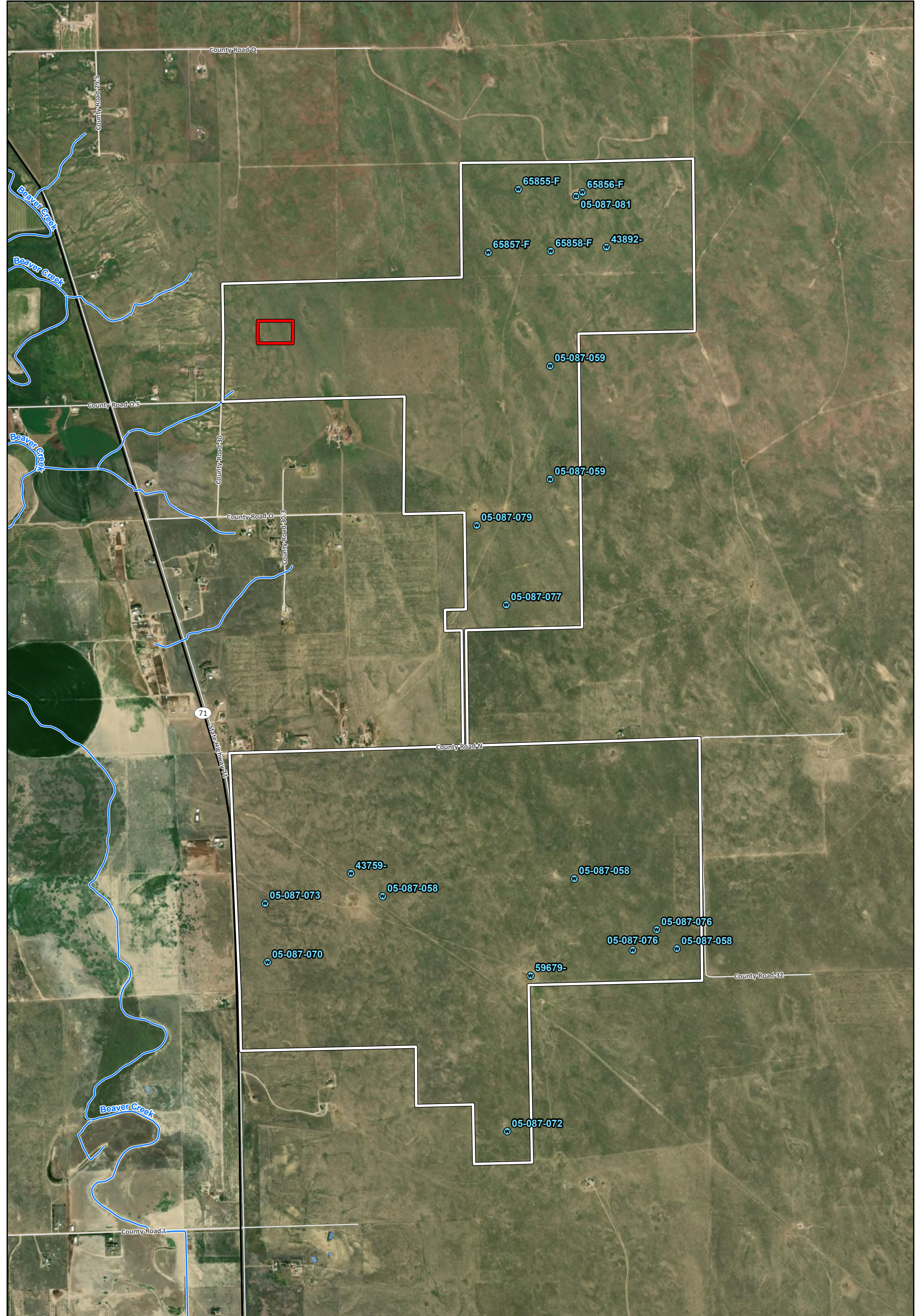
DRAWING: SINGLE LINE DIAGRAM  
34.5 KV FEEDERS

DRAWING NO. **E003**

THIS PRINT IS NOT TO BE USED FOR CONSTRUCTION UNLESS NOTED AND SIGNED OK FOR CONSTRUCTION ABOVE LAST REVISION.

**DRAFT VER.**  
NOT FOR CONSTRUCTION

THE INFORMATION CONTAINED IN THESE DRAWINGS ARE CONFIDENTIAL AND ARE INTENDED FOR THE DESCRIBED PROJECT ONLY. THESE DRAWINGS MAY NOT BE REPRODUCED IN ANY WAY OR DISTRIBUTED TO OTHER PARTIES WITHOUT PRIOR CONSENT OF MAXPV ENGINEERING.



Data Source(s): Westwood (2024); ESRI WMS World Imagery Basemap (Accessed 2024); U.S. Census Bureau (2023); OpenStreetMap (2023); NHD (2024); DNR (2023).

### Legend

0 2,000 Feet

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

- BESS Area
- Project Area
- NHD Waterbody
- NHD Flowline
- Major Road
- Road
- W Water Well

## Roadrunner Energy Farm

Morgan County, Colorado

### Water Wells Map

EXHIBIT 9 OF 9



**Appendix B: SUP Application Form**



## MORGAN COUNTY PLANNING AND ZONING DEPARTMENT

February 29, 2024

Kristina Jansen  
Roadrunner Energy Farm, LLC  
1875 S. Bascom Avenue  
Campbell, CA 95008

Dear Kristina:

This letter serves as documentation that the Morgan County Special Use Permit (“SUP”) process commenced with the pre-application conference held with Roadrunner Energy Farm, LLC (“Applicant”), Morgan County Planning Department Planning Administrator, and Westwood Professional Services in attendance for the Roadrunner Energy Farm on February 29, 2024, as required under Morgan County Zoning Regulations § 2-385(A). This pertains to both the solar and battery storage SUP applications, which have been initiated concurrently by the Applicant.

Sincerely,

  
Nicole Hay  
Morgan County Planning Administrator



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

EMAIL: [permits\\_licensing@co.morgan.us](mailto:permits_licensing@co.morgan.us)

PERMIT # \_\_\_\_\_ - \_\_\_\_\_

Date Received	___/___/___	Received By	_____
App Fee \$	_____	Ck/CC #:	_____
		Paid	___/___/___
Minor Amend Fee: \$	_____	CK/CC #:	_____
		Paid	___/___/___
Recording Fee \$	_____	Ck/CC #:	_____
		Paid	___/___/___
PC Date:	___/___/___	BOCC Date:	___/___/___
100 Year Floodplain?	<u>Y/N</u>	Taxes Current?	<u>Y/N</u>

**SPECIAL USE PERMIT APPLICATION**

*(Also to be used as application for Amendments to Existing Special Use Permits)*

Landowner **MUST** Sign Application and Right to Farm Policy

**APPLICANT**

**LANDOWNER**

Name Roadrunner Energy Farm, LLC  
 Address 1875 S. Bascom Avenue  
Campbell, CA 95008  
 Phone (                      )  
 Email                                     

Name See Addendum A  
 Address \_\_\_\_\_  
 \_\_\_\_\_  
 Phone (     ) \_\_\_\_\_  
 Email \_\_\_\_\_

**BRIEF DESCRIPTION OF APPLICATION**

Roadrunner Energy Farm, LLC is proposing an up to 500 MW BESS facility southeast of Brush, Colorado. The Roadrunner Energy Farm BESS will consist of a substation/switchyard (permitted with associated solar facility), laydown yard (permitted with associated solar facility), inverters, and battery containers.

**PROPERTY LEGAL DESCRIPTION**

Address (if available):

See Addendum B

S:\_\_\_ T:\_\_\_ R:\_\_\_                      \_\_\_ 1/2 \_\_\_ 1/4 \_\_\_ 1/4

Property Size 2,886 (sq. ft. or acres)

Parcel #: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Zone District: \_\_\_\_\_

Subdivision: \_\_\_\_\_

Lot #(s): \_\_\_\_\_

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

**SEE REQUIRED ATTACHMENT LIST ON BACK OF THIS PAGE.**

**INCOMPLETE APPLICATIONS WILL NOT BE ACCEPTED OR PROCESSED.**



**SPECIAL USE PERMIT REQUIRED ATTACHMENT LIST**

**Fee:**

**Non-Refundable Application Fee**

*\*Additional fees and charges may be required pursuant to Section 2-160 of Morgan County Zoning Regulations*

**Project Narrative:**

**Narrative– Including the following:**

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

**Environmental Impacts:**

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

- |   |  |   |   |
|---|--|---|---|
| <input checked="" type="checkbox"/> Air Quality | <input checked="" type="checkbox"/> Dust     | <input checked="" type="checkbox"/> Existing Vegetation | <input checked="" type="checkbox"/> Land Forms      |
| <input checked="" type="checkbox"/> Noise       | <input checked="" type="checkbox"/> Odor     | <input checked="" type="checkbox"/> Storm Water Runoff  | <input checked="" type="checkbox"/> Water Resources |
| <input checked="" type="checkbox"/> Wetlands    | <input checked="" type="checkbox"/> Wildlife | <input checked="" type="checkbox"/> Visual Amenities    | <input type="checkbox"/> Other _____                |

- Map & Plans:**  **Special Use Map** meeting the requirements of Sec. 2-420 and any specific map requirements for the proposed use including but not limited to: *Campgrounds, Livestock Confinement, Kennels, Outdoor Shooting Ranges, Home Occupations, Oil and Gas, Mobile Home Parks, Wireless Service Facilities, Solar, Wind and BESS. Sample Map attached to application for reference*
- Drainage/Run-Off Control Plan** may be required if the Planning Administrator determines that the use or building meets one of the following criteria:
- (1) The accessory use or building may have a drainage impact on adjacent properties;
  - (2) The accessory use or building may have a drainage impact on adjacent right of ways;
  - (3) The accessory structure is 5000 square feet or larger.
- Decommissioning Plan** [Wind, Solar, BESS]
- Geotechnical Report** [Wind, Solar]
- Maintenance Statement** [Wind, Solar, BESS]
- Water and/or Wind Erosion Control Plan** [Wind, Solar]
- Fire Mitigation Plan** [BESS]
- Specification Sheet** [BESS]
- Emergency Operation Plan** [BESS]

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

- Utilities/Access:**  **Water tap (Engineering Report from Quality Water or proof of access to a well)**
- Sewer (Septic Permit, Will Serve Letter from NCHD or proof of other public system)**
- Electric (Electric bill or letter of commitment from electricity provider)**
- Driveway Permit from CDOT or Morgan County Road & Bridge (If required by staff)**
- Ditch Company- Proof of contact if there is a ditch on or next to subject property**
- Architecture Control Approval (if applicable)**
- Utility Interconnection or Crossing Certification** [Wind, Solar]
- Road Agreement** [Wind, Solar]
- Electrical Diagram** [BESS]

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

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

**Miscellaneous:**  **Right to Farm Policy** signed by Landowner(attached)  
 **Liability Insurance for Solar, Wind and/or BESS projects**

\_\_\_\_# **Paper Application sets**

  1   **Digital Copy of Application** (One sided only)

**Posted Public Notice Verification:**

Notarized affidavit with photographs from a distance & close-up

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

**Additional Information required by staff:**

---

# APPLICANT & LANDOWNER'S STATEMENT

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

 4/16/2024  
Applicant Signature Date

 4/11/2024  
Landowner Signature Date

\_\_\_\_\_  
Applicant Signature Date

\_\_\_\_\_  
Landowner Signature Date



**MORGAN COUNTY, PLANNING, ZONING & BUILDING DEPT.**

231 Ensign, P.O. Box 596  
Fort Morgan, Colorado 80701  
PHONE (970) 542-3526 FAX (970) 542-3509

**MORGAN COUNTY RIGHT TO FARM POLICY / NOTICE**

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

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

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

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

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

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

**RECEIPT AND STATEMENT OF UNDERSTANDING**

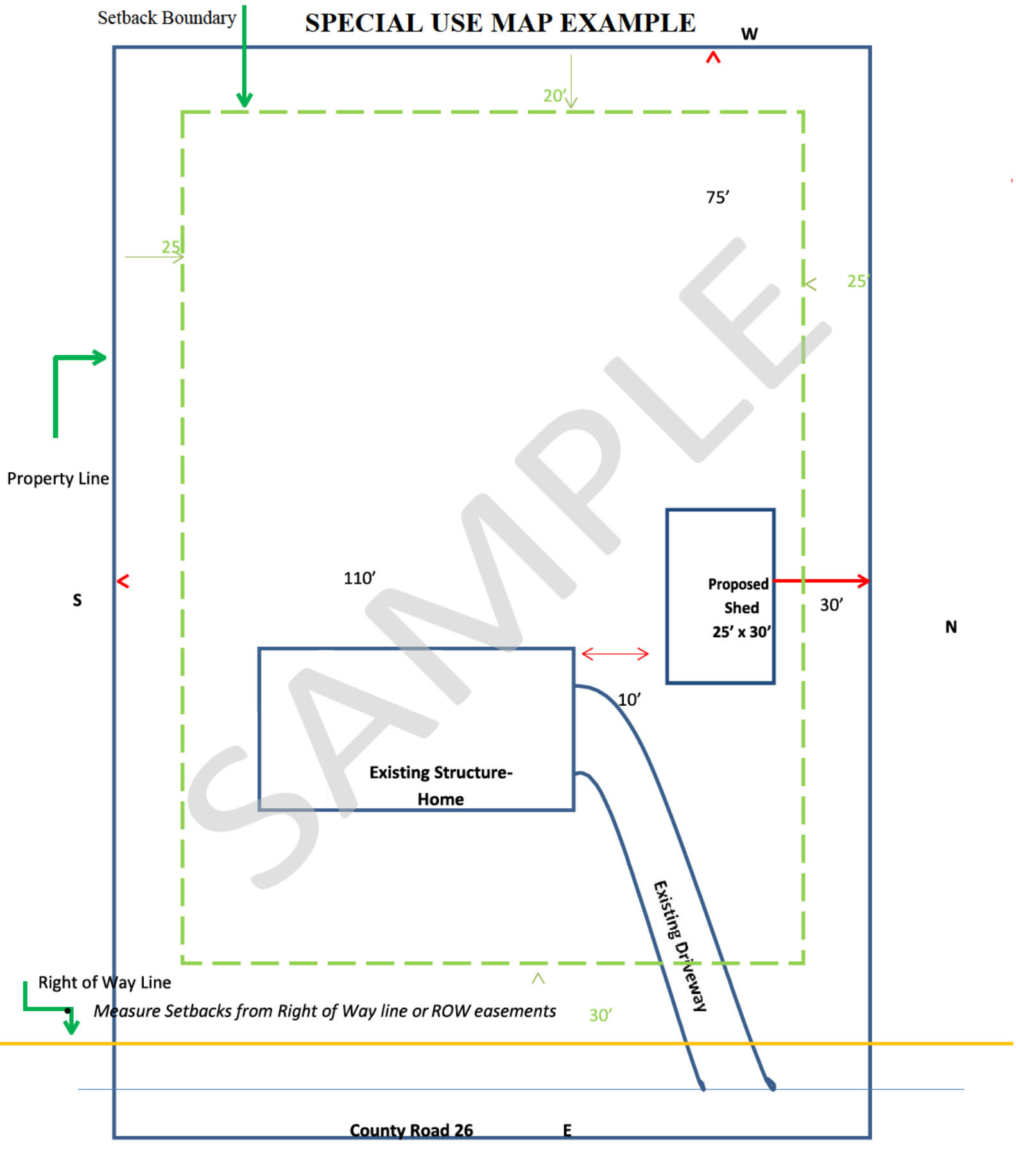
I hereby certify that I have received, read, and understood the Morgan County Statement of Policy and Notice regarding Right to Farm.

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

*Bonnie Frazier* 4/11/2024  
Signature Date  
Bonnie Frazier 4/11/2024  
Printed Name  
30475 Rd.0 Brush Co, 80723  
Address

**To Be Signed by Landowner**

# SPECIAL USE MAP EXAMPLE



**Appendix C: Landowner List**

OFFSET LANDOWNER 1/4 MILE	PARCEL ID	ADDRESS
---------------------------	-----------	---------

**SOLAR LEASES**

James Lee and Ruth Ann Odle	1233-080-00-001 1233-090-00-001 1233-070-00-002	16218 Hwy 71, Brush CO 80723
State of Colorado	1233-160-00-900	Denver CO
Booth Land & Livestock LLC	1233-210-00-001 1233-200-00-002 1233-290-00-001 1233-330-00-001	P O Box 72, Lucerne CO 80646
Justin P Curtis & Jill C Westhoff-Curtis	1287-050-00-001 1287-040-00-002 1287-060-00-003	11626 Hwy 71, Brush CO 80723
Timothy & Crystal Ludgate	1287-050-00-004	31437 County Road K, Brush CO 80723
Keidi E. & Luke R Hannan	1287-060-000-005	11652 Hwy 71, Brush CO 80723
Llewellyn W Bass	1289-010-00-001	11107 Hwy 71, Brush CO 80723
Weitzel Land LLC	1289-010-00-002 1231-360-00-001	28271 County Road L, Brush CO 80723
Jerry L & Barbara E Bass	1289-010-00-007	11943 Hwy 71, Brush CO 80723
Mathew & Julie Padilla	1231-360-00-002	4 Pine Court, Brush CO 80723
John W & Kathy Lee	1231-250-00-007	12702 E Via De Palmas, Chandler AZ 85249



**GEN-TIE**

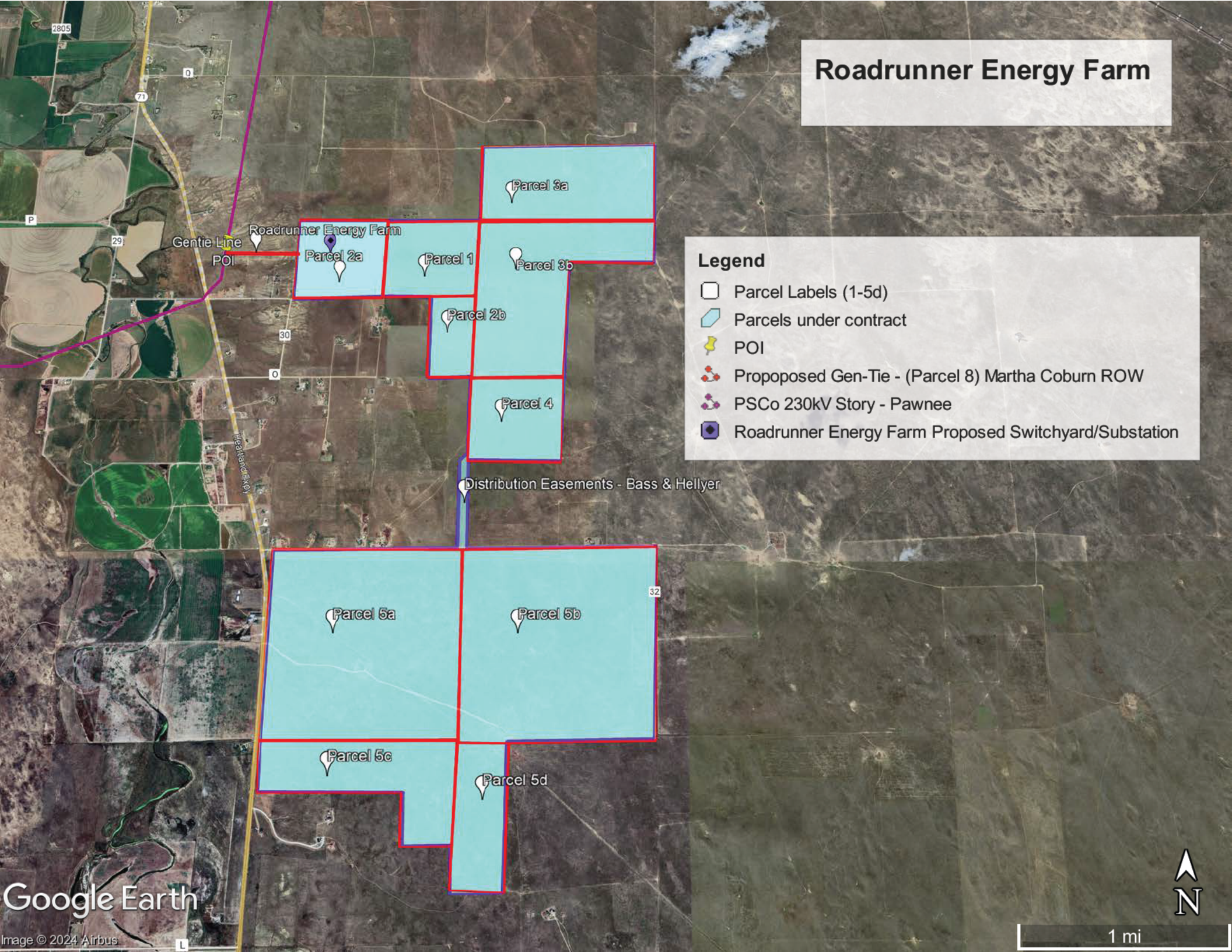
Martha Colburn	1231-130-00-009 1231-130-00-007	14998 Hwy 71, Brush CO 80723
Timothy J & Lana J Stutzman	1233-180-00-002	19798 County Road 23, Fort Morgan CO 80701
Kathryn A Baughman trust	1233-180-00-001	4855 West Cougar Rock Trail, Prescott AZ 86305

---

# Roadrunner Energy Farm

## Legend

- Parcel Labels (1-5d)
- Parcels under contract
- POI
- Proposed Gen-Tie - (Parcel 8) Martha Coburn ROW
- PSCo 230kV Story - Pawnee
- Roadrunner Energy Farm Proposed Switchyard/Substation



**Roadrunner Energy Farm  
Site Control Table for PSCO LGIA**

Parcel APN	Option Parcel	Leased Parcel Acreage	Owner	Optionee	Legal Description	Effective Date
1233-190-00-008	1	160	GoldSpur Genetics, LLC (Assigned from Cody Frazier)	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect 19: NE/4	10/28/2022
1233-190-00-009	2a	165.52	Bonnie Frazier	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect 19: NW/4	10/28/2022
1233-190-00-010 (partial)	2b	80			T3N, R55W, 6th PM, Sect 19: E/2/SE/4	
1233-170-00-001	3a	320	Bruce B. Bass Family LLLP	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect 17: S/2	10/28/2022
1233-200-00-001	3b	400			T3N, R55W, 6th PM, Sect 20: W/2, N/2NE/4	
1233-290-00-002	4	160	Mary Ellen Hellyer	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect. 29: NW/4	10/28/2022
1233-320-00-001	5a	640	Michael L. Dixon Family LLLP	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect. 31: ALL (correction Lots)	10/28/2022
1233-310-00-001	5b	657.76			T3N, R55W, 6th PM, Sect. 32: ALL	
1287-060-00-001	5c	204.98			T2N, R55W, 6th PM, Sect. 6: N/2N/2,SE/4NE/4	
1287-050-00-002	5d	119.71			T2N, R55W, 6th PM, Sect 5 W/2NW/4, NW/4SW/4	
<b>Roadrunner Total Acres:</b>		<b><u>2907.97</u></b>				
Distribution ROW			Owner	Optionee	Legal Description	Effective Date
1233-300-00-009	6	100' wide strip	Bruce B. Bass Family LLLP	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect. 30, the East 100' of the E/2E/2SE/4	12/19/2022
1233-300-00-010	7	5 acre corner	Mary-Ellen Hellyer	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R55W, 6th PM, Sect 30: 5 acres in the NE/4, more particularly described as the SE/4SE/4SE/4SE/4NE/4	12/19/2022
Gen-tie R-O-W			Owner	Optionee	Legal Description	Effective Date
1231-240-00-001	8	200' wide strip	Martha Colburn	Roadrunner Energy Farm LLC (assigned from Story Solar, LLC)	T3N, R56W, 6th PM, Sect24: South 200' of N/2NE/4	1/31/2023



EXHIBIT F

Notice of Solar Energy Lease and Easement Agreement

*Prepared by and after recording return to:*

Mr. Daniel E. Rustowicz  
Chief Executive Officer  
RedWind Renewables, LLC  
9853 Frederick Place  
Eden Prairie, MN 55347

NOTICE OF SOLAR ENERGY LEASE AND EASEMENT AGREEMENT

THIS NOTICE OF SOLAR ENERGY LEASE AND EASEMENT AGREEMENT (this "Notice"), is made, dated and effective as of October 28, 2022 (the "Effective Date"), between, **BONNIE FRAZIER**, ("Owner"), and **STORY SOLAR, LLC**, a Minnesota limited liability company ("Grantee"), with regards to the following:

1. Solar Agreement. Owner and Grantee did enter into that certain Solar Energy Lease and Easement Agreement of even date herewith (the "Agreement"), which affects the real property located in Morgan County, State of Colorado, as more particularly described in Exhibit A-1 attached hereto, and shown on the leased property plan attached hereto as Exhibit A-2 (the "Property"). Capitalized terms used and not defined herein have the meaning given the same in the Agreement.

2. Grant of Rights and Easements. The Agreement grants Grantee an exclusive leasehold interest in the Property, and grants (or shall grant) to Grantee the easements specified; such leasehold and easement rights include, without limitation, (a) the exclusive right to access, relocate and maintain Project Facilities located on the Property; (b) the exclusive right to use the Property for converting solar energy into electrical energy and collecting and transmitting the electrical energy so converted; (c) an exclusive easement to capture, use and convert the unobstructed solar resources over and across the Property; (e) an easement and right to prevent measurable diminishment in output due to obstruction of the sunlight across the Property; (f) the right to subjacent and lateral support for the Project Facilities; (g) the right to undertake any other activities necessary to accomplish the purposes of the Agreement. The Agreement also prohibits Owner from engaging in any activity on the Property that might cause a decrease in the output or efficiency of any of the Project Facilities. Grantee shall have the right to remove any obstructions to the light that materially and adversely affect its operations if this covenant is violated. Owner further agrees to undertake reasonable efforts to prevent, or failing that, to minimize, the introduction of continuous dust onto the Project Facilities.

3. Term. The Agreement shall be for an initial Development Term of up to **five (5) years**, a subsequent Construction Term of up to **twelve (12) months**, a subsequent Construction Extension Term of up to **twelve (12) months**, a subsequent Operations Term of **thirty five (35) years**, and two subsequent Extended Operations Terms of **five (5) years each**. The easements granted pursuant to the Agreement are for a term coterminous with the Agreement.

4. Rights of Mortgagees. Pursuant to the Agreement, any Mortgagee of Grantee or Grantee's assignees has certain rights regarding notice and right to cure any default of Grantee under the Agreement, and the right to take possession of the Property, and to acquire the leasehold estate by foreclosure, as well as other rights as set forth in the Agreement.

5. Assignment. Grantee's rights and obligations under the Agreement shall be assignable without Owner's prior written consent provided that such assignment is in furtherance of the provisions of the development of the Solar Energy Project contemplated by the Agreement.

6. Non-Interference and Setbacks. To the extent permitted by law, Owner has waived any and all setbacks and setback requirements, whether imposed by applicable law or by any person or entity, including any setback requirements described in the zoning ordinance of the County or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, such Sublessee or such Affiliate. Owner has agreed not to engage in any activity that might cause a decrease in the output or efficiency of any Project Facilities without the prior written consent of Grantee.

7. Subordination. The Agreement provides that from and after its effective date, any right, title or interest created by Owner in favor of or granted to any third party shall be subject to (i) the Agreement and all of Grantee's rights, title and interests created thereby, (ii) any lien of any lender of Grantee's then in existence on the leasehold estate created by the Agreement, and (iii) Grantee's right to create a lien in favor of any lender of Grantee's.

8. Agreement Controls. This Notice does not supersede, modify, amend or otherwise change the terms, conditions or covenants of the Agreement, and Owner and Grantee executed and are recording this Notice solely for the purpose of providing constructive notice of the Agreement and Grantee's rights thereunder. The terms, conditions and covenants of the Agreement are incorporated in this Notice by reference as though fully set forth herein.

9. No Ownership; Lien Waiver. Except as provided in this Solar Lease and Easement Agreement, Owner shall have no ownership, lien, security or other interest in any Project Facilities installed on the Property, and Grantee may remove any or all Project Facilities at any time. Owner hereby expressly waives any and all liens upon the personal property of Grantee now or subsequently located upon the Property, including but not limited to the Project Facilities, whether Owner's lien arises by statute (including Colorado Revised Statutes, Title 4, Article 9 - Uniform Commercial Code - Secured Transactions), or otherwise.

10. Counterparts. This Notice may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have executed this Notice to be effective as of the date first written above.

[signatures appear on following pages]

OWNER:

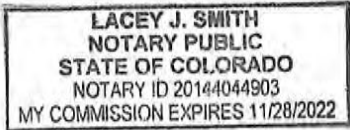
BONNIE FRAZIER

By: Bonnie Frazier

STATE OF COLORADO )

COUNTY OF Morgan ) ss.: )

On the 20<sup>th</sup> day of October in the year 2022, before me, the undersigned, a notary public in and for said State, personally appeared Bonnie Frazier personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.



Lacey J. Smith  
Notary Public

GRANTEE:

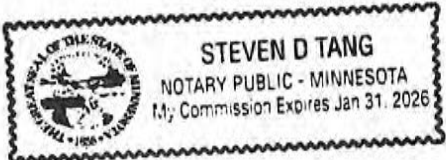
STORY SOLAR, LLC  
a Minnesota limited liability company

By: \_\_\_\_\_  
Daniel E. Rustowicz

STATE OF MINNESOTA )

COUNTY OF Hennepin ) ss.: )

On the 5<sup>th</sup> day of November in the year 2022, before me, the undersigned, a notary public in and for said State, personally appeared Daniel Rustowicz personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.



Steven D Tang  
Notary Public

Ehibit A-1 to

NOTICE OF SOLAR ENERGY LEASE AND EASEMENT AGREEMENT

Legal Description of the Property

The following described land located in Morgan County, State of Colorado, containing 245.20 acres, more or less:

TOWNSHIP 3 NORTH-RANGE 55 WEST, 6<sup>th</sup> PM

Section 19: NW/4 (Correction Line)

Section 19: ~~NE~~E/2SW/4



**ADDENDUM TO SOLAR ENERGY LEASE AND EASEMENT AGREEMENT**

**THIS ADDENDUM TO SOLAR ENERGY LEASE AND EASEMENT AGREEMENT (“Addendum”)** is made and entered into effective as of May 25, 2023 (“**Effective Date**”) by and between Story Solar, LLC, a Minnesota limited liability company (“**Grantee**”), and Bonnie Frazier, a Colorado resident (“**Owner**”) (Grantee and Owner are collectively, the “**Parties**”).

**RECITALS**

A. Owner and Grantee entered into that certain Solar Energy Lease and Easement Agreement dated October 28<sup>th</sup>, 2022 (the “**Lease**”).

B. Pursuant to the Lease, Grantee agreed to lease from Owner approximately 245.52 acres of land (the “**Site**”) located in Morgan County, State of Colorado, set forth in Exhibit A-1 to the Lease (the “**Property**”).

C. The Parties wish to amend the Lease, including the description of the Property set forth in Exhibits A-1 and A-2, as further set forth herein.

**NOW, THEREFORE**, in consideration of the premises and mutual covenants and conditions contained herein, and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

**1. Amendment to Property.** The Parties acknowledge and agree that for all purposes, the Property shall comprise approximately 240.00 acres of the Site, as more fully described in Exhibits A-1 and A-2, as amended and attached to this Addendum.

**2. Ratification.** Except as hereinabove stated, all other terms, covenants and conditions of the Lease shall remain as stated therein and the Lease shall remain in full force and effect.

**3. Counterparts.** This Addendum may be executed in counterparts, each of which when executed and delivered shall be deemed an original, but both of which together shall constitute one and the same instrument.


[SIGNATURES ON FOLLOWING PAGES]



IN WITNESS WHEREOF, the parties have entered into this Addendum effective as of the date and year first above-written.

**GRANTEE:**  
Story Solar, LLC,  
a Minnesota limited liability company

By:  
**RAI Energy International, Inc., its sole member**

By:   
Name: Mohammed S. Alrai  
Its: Chief Executive Officer

*A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.*

State of California  
County of Orange )

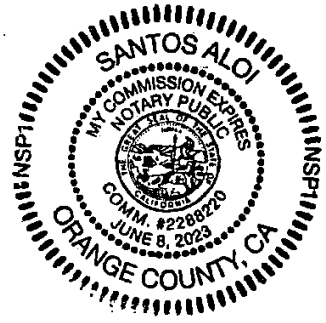
On May 30<sup>th</sup>, 2023 before me, Santos Aloï Notary Public  
(insert name and title of the officer)

personally appeared Mohammed S Alrai, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature  (Seal)



**OWNER:**  
Bonnie Frazier,  
a Colorado resident

By: Bonnie Frazier

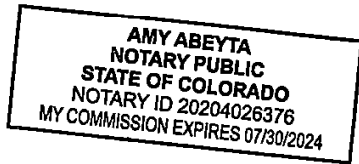
Print Name: Bonnie Frazier

Its: \_\_\_\_\_

STATE OF COLORADO )  
COUNTY OF Morgan ) SS.:  
)

On the 31 day of May in the year 2023, before me, the undersigned, a notary public in and for said State, personally appeared Bonnie Frazier personally known to me of proved to me on the basis of satisfactory evidence to the the individual(s) whose names(s) is (are) subscribed to the within instrument and acknowledged to me that he/shc/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Amy Abeysa  
Notary Public



**EXHIBIT A-1**

**Description of Property**

*[Pursuant to the terms of the Agreement, the legal description of the Property contained on this Exhibit A-1 shall, upon request by Grantee, be replaced with a more detailed legal description approved by Grantee and its Title Company or surveyor]*

The following described land located in Morgan County, State of Colorado, containing approximately 240.00 acres, more or less:

TOWNSHIP 3 NORTH-RANGE 55 WEST, 6<sup>th</sup> PM

Section 19: NW/4 (Correction Line)

Section 19: E/2SE/4

**EXHIBIT A-2**

**Lease Plan**

TOWNSHIP 3 NORTH-RANGE 55 WEST, 6<sup>th</sup> PM

Section 19: NW/4 (Correction line)

Section 19: E/2SE/4

## ASSIGNMENT AND ASSUMPTION AGREEMENT

THIS ASSIGNMENT AND ASSUMPTION AGREEMENT (“**Assignment**”) is entered into as of February 23, 2024 (the “**Effective Date**”) by and between **Cody W. Frazier**, a Colorado resident (“**Assignor**”), and **Gold Spur Genetics, LLC**, a [Colorado] limited liability company (“**Assignee**”, together with Assignor, the “**Parties**” and each, a “**Party**”), and Roadrunner Energy Farm, LLC, a Delaware limited liability company (“**Roadrunner**”), solely for purposes of consenting to this Assignment and for no other purpose. Terms capitalized herein and not defined shall have their respective meaning in the Lease (defined below)

### RECITALS

WHEREAS, Assignor and Story Solar, LLC, a Minnesota limited liability company (“**Story**”) are parties to that certain **Solar Energy Lease and Easement Agreement**, dated October 28, 2022, as amended by that certain First Addendum to Solar Energy Lease and Easement Agreement, dated December 8, 2022, (the “**Lease**”), under which Story contracted to lease from Assignor certain property located in Morgan County, Colorado, a true and correct copy of which is attached hereto as **Exhibit A** and made a part hereof;

WHEREAS, Story assigned the Lease to Roadrunner, pursuant to that certain Assignment and Assumption Agreement, dated as of June 16, 2023;

WHEREAS, Assignor transferred the Property to Assignee pursuant to that certain Quitclaim Deed, dated February 23, 2024;

WHEREAS, Assignor desired to assign to Assignee all of Assignor’s right, title and interest in, to and under the Lease, to Assignee, and Assignee desires to assume all of Assignor’s rights duties and obligations under the Lease, subject to the terms and conditions of this Assignment;

WHEREAS, in connection with the transfer of the Property and assignment of the Lease. Assignor has requested the consent of Roadrunner to this Assignment, and Roadrunner has consented to such transfer of the Property and Assignment, as evidenced by its signature below.

NOW, THEREFORE, in consideration of the foregoing and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Assignment. As of the Effective Date, Assignor hereby assigns, conveys, grants, and transfers to Assignee, all of Assignor’s right, title, and interest in and to the Lease.
2. Assumption.
  - (a) As of the Effective Date, Assignee hereby accepts from Assignor, all of Assignor’s right, title, and interest in and to the Lease.
  - (b) As of the Effective Date, the Assignee hereby accepts and assumes from Assignor the terms, covenants, conditions, duties and obligations required to be performed and

fulfilled by Assignor under the Lease, whether arising before or after the Effective Date.

3. Miscellaneous.

- (a) Further Assurances. The Parties agree to: (i) furnish upon request to each other such further information; (ii) execute and deliver to each other such other documents; and (iii) do such other acts and things, all as the other party may reasonably request for the purpose of carrying out the intent of this Assignment and the documents referred to in this Assignment.
- (b) Successors and Assigns. This Assignment shall be binding upon and inure to the benefit of each of the Parties and their respective successors and permitted assigns.
- (c) Counterparts. This Assignment may be executed in any number of counterparts and each such counterpart shall be deemed an original, but all of which, when taken together, shall constitute one agreement. Signatures transmitted by facsimile or by .pdf file delivered via electronic mail shall be binding; provided, however, that any Party transmitting its signature by facsimile or such electronic mail shall promptly send an original signature to the other Party.
- (d) Governing Law. The rights and obligations of the Parties and the interpretation and performance of this Assignment shall be governed by the laws of the State of Colorado, excluding its conflicts of laws rules. Venue shall be in the Federal District Court located in Denver, Colorado.

[SIGNATURES ON FOLLOWING PAGE]

ASSIGNOR

Cody W. Frazier

Cody W. Frazier

ASSIGNEE

Gold Spur Genetics, LLC

By: Bonnie Frazier

Name: Bonnie Frazier

Title: owner

Consented to this Assignment and Transfer of Property this 23<sup>rd</sup> day of February 2024:

Roadrunner Energy Farm, LLC

By: RAI Energy International, Inc.,  
a Delaware corporation, its sole member

By: Mohammed S. Alrai  
Mohammed S. Alrai (Jun 28, 2024 10:40 PDT)

Mohammed S. Alrai, Chief Executive Officer

**EXHIBIT A**

**LEASE**

*[attached hereto on the following page]*








# Assignment and Assumption\_C\_Frazier\_Partially Signed

Final Audit Report

2024-06-28

Created:	2024-06-28
By:	Kristina Jansen [REDACTED]
Status:	Signed
Transaction ID:	CBJCHBCAABAAE9JU4iolUpXoYvh_WkgWpGTMhadgDgnS

## "Assignment and Assumption\_C\_Frazier\_Partially Signed" History

-  Document created by Kristina Jansen ([REDACTED])  
2024-06-28 - 5:39:40 PM GMT
-  Document emailed to Mohammed S. Alrai ([REDACTED]) for signature  
2024-06-28 - 5:39:47 PM GMT
-  Email viewed by Mohammed S. Alrai ([REDACTED])  
2024-06-28 - 5:40:18 PM GMT
-  Document e-signed by Mohammed S. Alrai ([REDACTED])  
Signature Date: 2024-06-28 - 5:40:46 PM GMT - Time Source: server
-  Agreement completed.  
2024-06-28 - 5:40:46 PM GMT

**Appendix D: Morgan County Zoning Regulations Checklist**

Information Required per Morgan County Zoning Regulations	Location in this Application
<b>2-395 Review Criteria</b>	
<p>The following criteria will be used by the Planning Commission and the Board when reviewing an application for a special use permit:</p>	
(A) The use and its location as proposed are in conformance with the Morgan County Comprehensive Plan;	Section 2.8
(B) All the application documents are complete and present a clear picture of how uses are to be arranged on the site or within Morgan County;	Appendix B
(C) The site plan conforms to the district design standards of these Regulations;	Section 4.1, Appendix A
(D) All on and off-site impacts have been satisfactorily mitigated either through agreement, public improvements, site plan requirements or other mitigation measures;	Section 2.4
(E) The special use proposed has been made compatible with the surrounding uses and adequately buffered as determined by the County;	Section 2.3
(F) The special use poses only the minimum amount of risk to the public health, safety and welfare as set by either federal, state or county regulation, whichever is the strictest;	Section 3.0
(G) The special use proposed is not planned to be developed on a non-conforming parcel;	Section 2.0
(H) The applicant has adequately documented a public need for the project, all pertinent technical information, adequate financial resources to implement it, and has paid all fees and review costs levied by the County for application processing and review; and	Section 1.0
(I) For any special use requiring a supply of water that the applicant has demonstrated a source of water which is adequate for the proposed use in terms of quantity and reliability and in the case of human consumption, quantity, quality, and reliability.	Section 6.1

**Appendix E: Desktop Threatened & Endangered Species  
Review**



December 28, 2023

Brandon Marette  
 Colorado Parks and Wildlife  
 6060 Broadway  
 Denver, Colorado 80216

**Re: Roadrunner Energy Farm Project, CPW Request for Comment, Morgan County, Colorado**

Dear Brandon,

RAI Energy, LLC (RAI) is proposing the development of the Roadrunner Energy Farm Project (Project). The Project is located on approximately 2,900 acres of land within Morgan County, south of US Highway 34 and east of State Highway 71 (Exhibit 1). Land use within the Project is 90.2% grassland/herbaceous plant communities and 9.6% shrub/scrub, with developed areas covering less than 1% of the Project (Exhibit 2). Based on the National Wetland Inventory and National Hydrologic Dataset, two wetlands and one flowline are located within the Project Area (Exhibit 3). As part of the planning and design process for this Project, Westwood respectfully requests Colorado Parks and Wildlife (CPW) comment. Please find below a summary of protected species identified in Westwood’s desktop review of the Project.

During initial planning stages of this Project, Westwood reviewed the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) and natural heritage data via the Colorado Conservation Data Explorer (CODEX). A list of IPaC and CODEX results for species with regulatory concern or that are considered State Special Concern (SC), is below in Table 1.

**Table 1. Regulated or SC Species identified by IPaC and CODEX with Potential to Occur Near or Within the Project Areas**

Species (Common Name)	Species (Scientific Name)	Protection Status	Source
Gray Wolf	<i>Canis lupus</i>	FE/SE	IPaC
Tricolored Bat	<i>Perimyotis subflavus</i>	PE	IPaC
Piping Plover	<i>Charadrius melodus</i>	FT/ST	IPaC
Whooping Crane	<i>Grus americana</i>	FE/SE	IPaC
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	FE	IPaC
Monarch Butterfly	<i>Danaus plexippus</i>	FC	IPaC
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	FT	IPaC
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	FT	IPaC
Golden Eagle	<i>Aquila chrysaetos</i>	BGEPA	CODEX
Greater Prairie-chicken	<i>Tympanuchus cupido</i>	--	CODEX
Burrowing Owl	<i>Athene cunicularia</i>	ST	CODEX
Ferruginous Hawk	<i>Buteo regalis</i>	SC	CODEX
Mountain Plover	<i>Charadrius montanus</i>	SC	CODEX
Long-billed Curlew	<i>Numenius americanus</i>	SC	CODEX
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	SC	CODEX

FE=Federally Endangered; FT=Federally Threatened; PE = Proposed Endangered; FC=Federal Candidate Species; BGEPA= Bald and Golden Eagle Protection Act; SE=State Endangered; ST=State Threatened; SC=State Special Concern

While no High Priority Habitat (HPH) is mapped within the Project Area, winter concentration and severe winter concentration ranges for Mule Deer lie approximately 280 feet to the west.

IPaC results note that gray wolves only need consideration for Projects implementing a predator management program, which this Project will not have. Additionally, IPaC results note that Piping Plovers and pallid sturgeons only need consideration for Projects implementing water-related activities in the N. Platte, S. Platte, and Laramie River Basins, which this Project will not have. Westwood understands that no further consideration at a federal level of these species is necessary for this Project.

Westwood welcomes any additional comments, recommendations, or input from CPW on this Project.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES, INC.

Ethan Muller

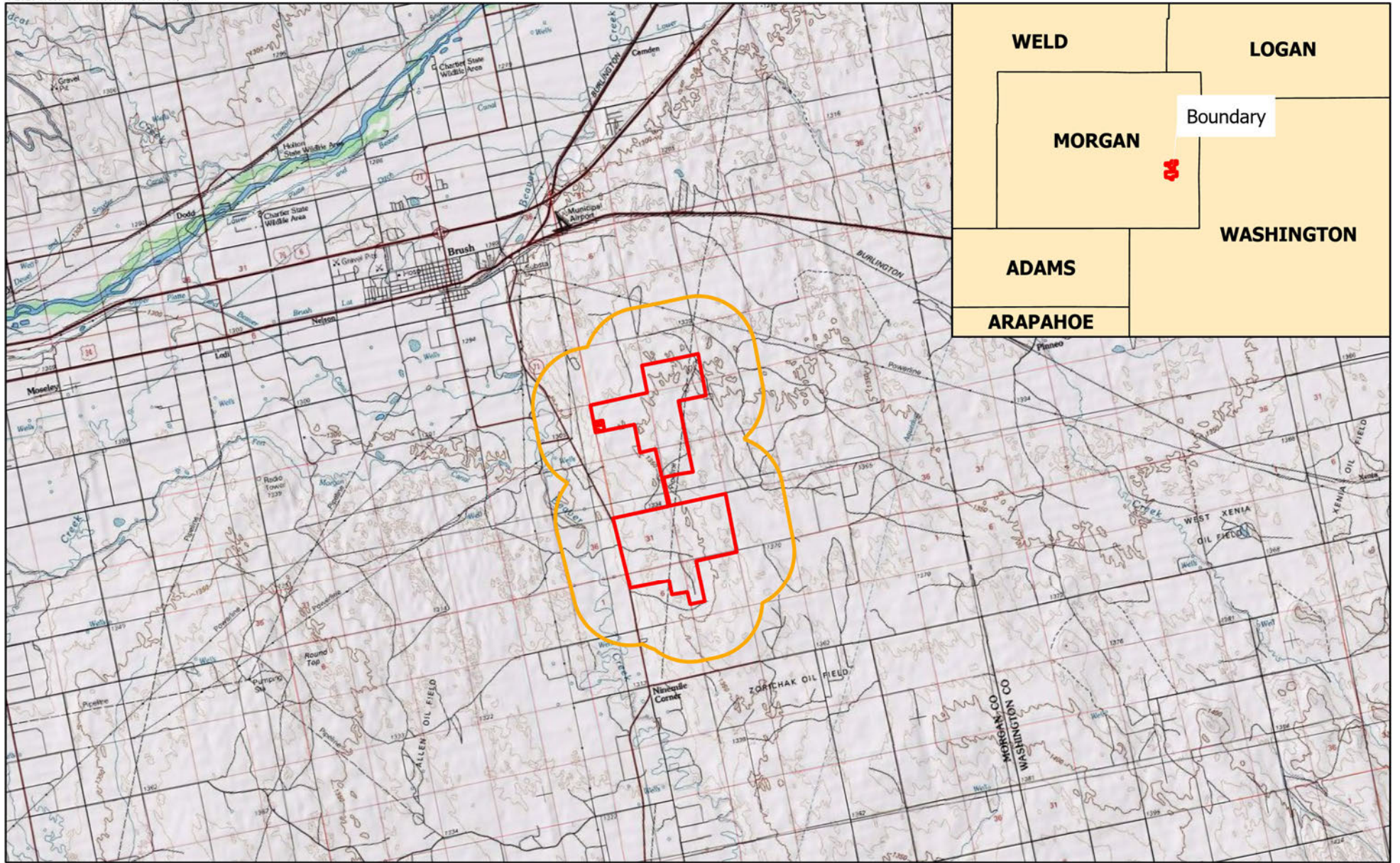
A handwritten signature in black ink, appearing to read 'Ethan Muller', with a long horizontal flourish extending to the right.

Wildlife Biologist

# **Exhibits**

**Roadrunner Energy Farm Project**  
Morgan County, Colorado

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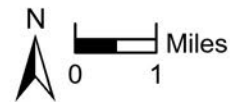


Data Source(s): Westwood (2023); .

-  Project Area
-  One Mile Buffer
-  Roads

# Roadrunner Energy Farm Project

Morgan County, Colorado



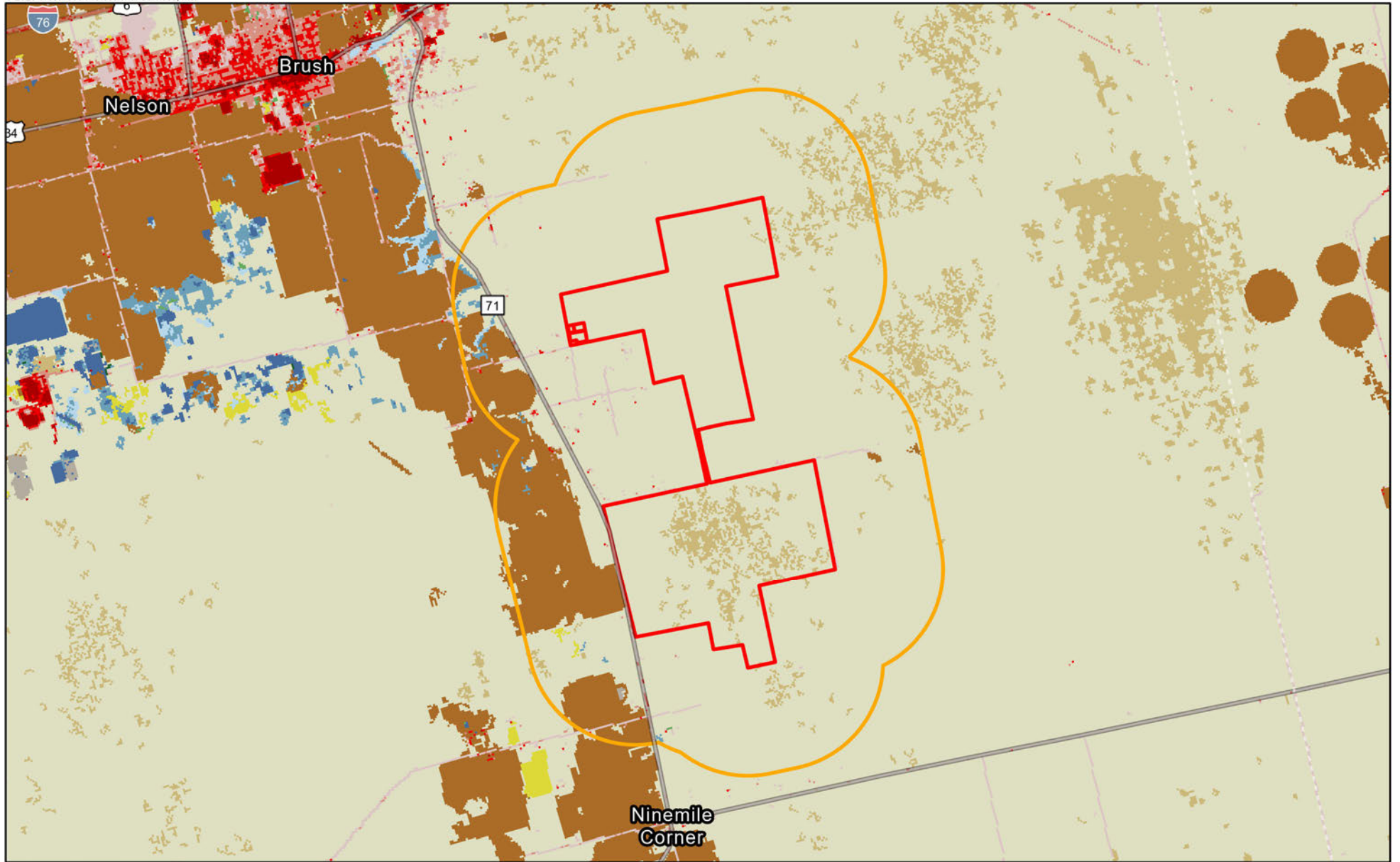
## Project Location

### Westwood

Toll Free (888) 937-5150 westwoodps.com  
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Data Source(s): Westwood (2023).

# Roadrunner Energy Farm Project

Morgan County, Colorado

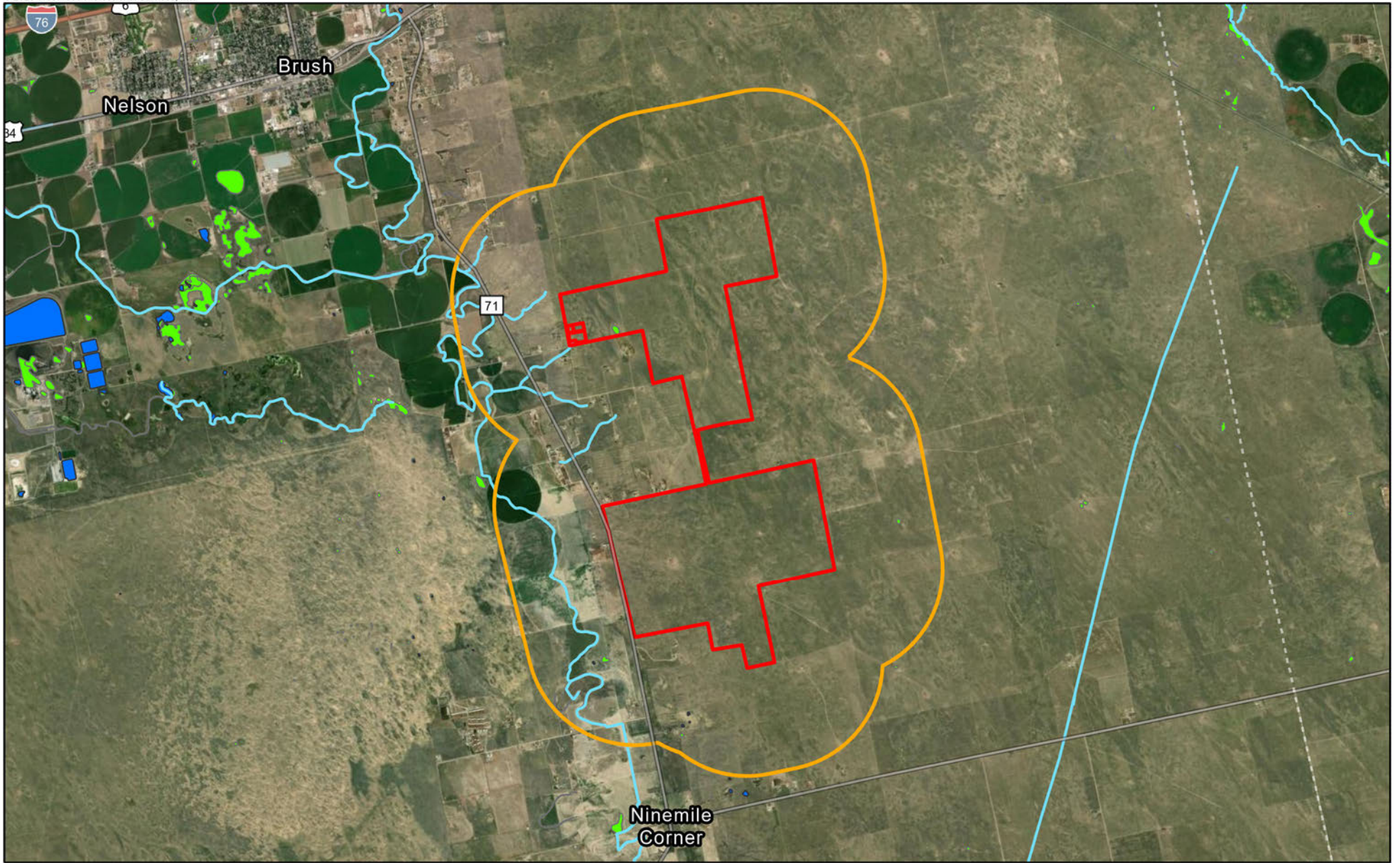
## NLCD Land Cover






**Westwood**

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Data Source(s): Westwood (2023); .

-  Project Area
-  One Mile Buffer
-  NWI Wetlands
-  NHD Flowlines
-  NHD Waterbodies



# Roadrunner Energy Farm Project

Morgan County, Colorado

## Water Resources

**Westwood**

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

# Westwood

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Date: January 17, 2024

**Re: Roadrunner Energy Farm Project, Threatened and Endangered  
Species Desktop Summary, Morgan County, Colorado**

**Confidential Information – Not to be shared publicly**

File: R0046541.00

To: Kristina Jansen, RAI Energy

## Introduction

RAI Energy (RAI) is proposing the Roadrunner Energy Farm Project (Project) located on approximately 2,920 acres of land (Project Area) in Morgan County, Colorado (**Exhibit 1**). The Project Area lies south of US Highway 34 and east of State Highway 71. The purpose of this memorandum is to provide a desktop-level risk assessment for species protected under the federal Endangered Species Act (ESA), Colorado Endangered Species Statute and Rules, or the Bald and Golden Eagle Protection Act (BGEPA), collectively “T&E species,” that may occur within the Project Area.

## Background

The Project Area is within the High Plains ecoregion. The region is characterized by smooth to slightly irregular plains dominated by grama-buffalo grass. In Colorado, gas and oil fields are present throughout the region (EPA 2006). According to the National Land Cover Database (NLCD) (MRLC 2019), landcover within the Project Area is predominantly herbaceous with lesser areas of shrub/scrub and developed land (**Exhibit 2**). The Project Area falls within the Outlet Beaver Creek and Round Top-Beaver Creek watersheds. Based on the National Wetland Inventory (NWI) and National Hydrography Dataset (NHD), desktop review indicates the presence of two wetlands and one unnamed flowline mapped within the Project Area (USFWS 2022a, USGS 2022a) (**Exhibit 3**). No federal, state, or local public lands are present in the Project Area (USGS 2022b).

Federally listed threatened or endangered species are afforded protection under the Endangered Species Act of 1973 (as amended), which is administered by the U.S. Fish and Wildlife Service (USFWS). The Endangered Species Act (ESA) authorizes the listing of species and prohibits the taking, possession, sale, and transport of listed species. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm can include significant habitat modification or degradation when it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. A permit is required to take a species when the taking is incidental to an otherwise lawful activity.

The Colorado’s Revised Statutes (Article 2 – Nongame and Endangered Species Conservation Sections 33-2-101 through 33-2-108) provide protection of species listed as threatened or endangered at the state level and prohibits the taking, importing, possessing, transporting, or sale

of any of the plant or animal species designated by state law endangered or threatened without the issuance of a permit. Additionally, CPW provides best management practices (BMPs) for solar energy development including buffer recommendations to minimize impacts for various species (CPW 2020, 2021).

### Methods

Westwood conducted a desktop review of publicly available environmental data, including aerial imagery, land cover, wetlands, waterways, and T&E species data resources. T&E species that may occur within the Project Area or surrounding region were reviewed using the following data resources:

- USFWS Information for Planning and Consultation (IPaC) (**Appendix A**)
- Colorado Natural Heritage Program (CNHP) and CPW Colorado’s Conservation Data Explorer (CODEX) (**Appendix B**)

Westwood investigated the probability of occurrence (i.e., zero, low, moderate, or high) in the Project Area for species of wildlife and plant that are federally, or state listed as endangered or threatened. Westwood’s best professional judgement definitions of zero, low, moderate, and high probabilities can be described as follows:

- A **zero** probability of occurrence was assigned when the species had no chance of occurring in the project area at any time.
- A **low** probability of occurrence was assigned when the species had not been documented in the region from any known source and suitable habitat is absent or largely very limited or of low quality.
- A **moderate** probability of occurrence was assigned to species that have been documented in the region and relatively suitable habitat is present within the Project Area.
- A **high** probability was assigned when the species has been documented in the region and/or highly suitable habitat is available.

Please note that occurrence ratings are based on available desktop resources; field-based studies can provide higher degrees of confidence for the presence/probable absence of species.

### Results

The results from the IPaC inquiry identified eight species listed as federally threatened, endangered, candidate, or proposed endangered that may occur within the Project Area (**Appendix A**). The species and their listing status are named in **Table 1**. Please note that candidate and proposed threatened and endangered species are not currently afforded protections under the ESA. Also, although not identified by the IPaC, the Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) are federally protected under the Bald and Golden Eagle Protection Act (BGEPA) (USFWS n.d.a) and were reviewed for potential occurrence within or near the Project Area.

**Table 1: Federally protected species identified in the IPaC with the potential to occur within the Project Area**

Common Name ( <i>Scientific Name</i> )	Name Status <sup>1</sup> (Federal/State)
<b>Mammals</b>	
Gray Wolf ( <i>Canis lupus</i> )	FE/SE
Tricolored Bat ( <i>Perimyotis subflavus</i> )	PE/--

<b>Birds</b>	
Piping Plover ( <i>Charadrius melodus</i> )	FT/ST
Whooping Crane ( <i>Grus americana</i> )	FE/SE
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	BGEPA/SC
Golden Eagle ( <i>Aquila chrysaetos</i> )	BGEPA/--
<b>Fish</b>	
Pallid Sturgeon ( <i>Scaphirhynchus albus</i> )	FE/--
<b>Insects</b>	
Monarch Butterfly ( <i>Danaus plexippus</i> )	C/--
<b>Plants</b>	
Ute Ladies'-tresses ( <i>Spiranthes diluvialis</i> )	FT/--
Western Prairie Fringed Orchid ( <i>Platanthera praeclara</i> )	FT/--

FE= Federally Endangered; FT= Federally Threatened; PE = Proposed Endangered; FC= Federal Candidate Species; BGEPA= Bald and Golden Eagle Protection Act; SE= State Endangered; ST= State Threatened; SC= State Special Concern

The results from the CODEX inquiry identified six species listed as state threatened or state special concern that may occur within the Project Area (**Appendix B**). The species and their listing status are named in **Table 2**. Please note that state special concern species are not currently afforded protections but may have disturbance buffers or mitigation requested by CPW.

**Table 2: Federally protected species identified in the CODEX with the potential to occur within the Project Area**

Common Name ( <i>Scientific Name</i> )	Name Status <sup>1</sup> (Federal/State)
<b>Mammals</b>	
Black-tailed Prairie Dog ( <i>Cynomys ludovicianus</i> )	--/SC
<b>Birds</b>	
Golden Eagle ( <i>Aquila chrysaetos</i> )	BGEPA/--
Burrowing Owl ( <i>Athene cunicularia</i> )	--/ST
Ferruginous Hawk ( <i>Buteo regalis</i> )	--/SC
Mountain Plover ( <i>Charadrius montanus</i> )	--/SC
Long-billed Curlew ( <i>Numenius americanus</i> )	--/SC
Greater Prairie-chicken ( <i>Tympanuchus cupido</i> )	--/--

BGEPA= Bald and Golden Eagle Protection Act; ST= State Threatened; SC= State Special Concern

Westwood additionally reviewed High Priority Habitat (HPH) mapping compiled by CPW. No areas of HPH were mapped within the Project Area, however, mule deer winter and severe winter concentration areas are mapped immediately adjacent to the west of the Project Area.

A summary of the identified species, their conservation status, habitat preferences, probability to occur within the Project Area, and potential to be affected by Project construction and operation as determined by desktop review are provided in **Table 3** below.

**Table 3: Special status species identified as potentially occurring within the Project Area or surrounding region.**

Species	Status <sup>1</sup> Federal/ State	Habitat	Probability of occurrence within Project Area	Potential to be affected
<b>MAMMALS</b>				
<b>Gray Wolf</b> <i>Canis lupus</i>	FE/SE	The gray wolf is a habitat generalist that will utilize a wide variety of landscapes, including conifer, hardwood and mixed forests, mountains, and grasslands (CPW n.d.a, CPW n.d.b).	<b>Low;</b> a small population of gray wolves have been established in the mountainous northwestern part of the state. The low number of individuals present in Colorado suggests a low probability of occurrence.	<b>Low;</b> due to the low probability of occurrence, impacts to gray wolves are not anticipated.  In addition, gray wolves only need federal consideration for Projects implementing a predator management program.
<b>Tricolored Bat</b> <i>Perimyotis subflavus</i>	PE/--	Roosts among leaf clusters of live or recently dead deciduous hardwood trees. Typically forages along riparian corridors and forested edges (USFWS n.d.b).	<b>Low;</b> based on aerial imagery, suitable roosting and foraging habitat appears limited to absent within the Project Area.	<b>Low;</b> due to the low probability of occurrence, impacts to tricolored bats are not anticipated.
<b>Black-tailed Prairie Dog</b> <i>Cynomys ludovicianus</i>	--/SC	Form colonies (towns) in grassland areas east of the Colorado foothills (CPW n.d.c).	<b>High;</b> a review of aerial imagery shows potential prairie dog burrows to be present within the Project Area.	<b>High;</b> dependent on burrow locations and site design, impacts may occur.  Although prairie dogs have no statutory protections, they are a keystone species and removal from the ecosystem may impact other protected species like Golden Eagles, Burrowing Owls, Ferruginous Hawks, and Mountain Plovers.
<b>BIRDS</b>				

Species	Status <sup>1</sup> Federal/ State	Habitat	Probability of occurrence within Project Area	Potential to be affected
<b>Piping Plover</b> <i>Charadrius melodus</i>	FT/ST	Nests on sand and gravel shorelines with sparse vegetation. Typically forages on sandy mudflats, ephemeral pools, and seasonally emergent seagrass beds (CPW n.d.d, USFWS n.d.c).	<b>Low;</b> suitable nesting and foraging habitat appears absent within the Project Area.	<b>Low;</b> due to the low probability of occurrence, impacts to Piping Plovers are not anticipated.  In addition, the Piping Plover does not need to be considered federally for projects that do not include water impacts in the N. Platte, S. Platte, or Laramie River basins.
<b>Whooping Crane</b> <i>Grus americana</i>	FE/SE	Overwinter at the Aransas National Wildlife Refuge in Texas and breed in Canada. Stopover habitat during migration includes agricultural fields and herbaceous wetland complexes (CPW n.d.e, USFWS n.d.d).	<b>Low;</b> Whooping Cranes have not been documented in Colorado since 2010 (CPW n.d.e) and suitable habitat appears absent within the Project Area.	<b>Low;</b> due to the low probability of occurrence, impacts to Whooping Cranes are not anticipated.
<b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i>	BGEPA/S C	Typically nests in mature trees adjacent to bodies of water, but sometimes nest at greater distances from water if closer nesting locations are occupied (Buehler 2022).	<b>Moderate;</b> although suitable trees and waterbodies appear limited to absent within the Project Area and immediate surroundings., migrating individuals may pass through the Project Area.	<b>Low;</b> because suitable nesting habitat appears absent within the Project Area, impacts to Bald Eagles are not anticipated.
<b>Golden Eagle</b> <i>Aquila chrysaetos</i>	BGEPA/--	Typically nest within rock ledges of cliffs, large trees, steep hillsides, or on the ground. Foraging habitat includes mountains, foothills, plains, open country, and agricultural habitats (National Audubon Society n.d., Page and Seibert 1973).	<b>High;</b> although suitable nesting habitat appears limited, the Project Area presents potentially suitable foraging habitat.	<b>Low;</b> impacts to Golden Eagles are not anticipated unless nests are found to be present.

Species	Status <sup>1</sup> Federal/ State	Habitat	Probability of occurrence within Project Area	Potential to be affected
<b>Burrowing Owl</b> <i>Athene cunicularia</i>	--/ST	Can be found in Colorado spring through fall in dry, open areas with short grasses with existing burrows from species such as prairie dogs, ground squirrels, or badgers (CPW n.d.f).	<b>High</b> ; aerial imagery suggests the potential presence of burrows within the Project Area.	<b>High</b> ; if present onsite, CPW recommends a 0.25-mile buffer from active nests.
<b>Ferruginous Hawk</b> <i>Buteo regalis</i>	--/SC	Typically nest in flat, rolling or rugged terrain in open areas, including shortgrass prairie, canyons, and areas with isolated trees or small groves in grasslands, shrublands or riparian areas (CPW n.d.g).	<b>Moderate</b> ; potentially suitable nesting and foraging habitat appears to be present within the Project Area.	<b>Moderate</b> ; if nests are present, CPW recommends a 0.5-mile buffer during the nesting season.
<b>Mountain Plover</b> <i>Charadrius montanus</i>	--/SC	Typically nest on hilltops or in dry swales in shortgrass prairies with areas of sparse vegetation and are strongly associated with prairie dogs (CPW n.d.h).	<b>High</b> ; potentially suitable nesting habitat appears to be present within the Project Area.	<b>High</b> ; if prairie dog colonies are disturbed there is a chance Mountain Plovers may be impacted.
<b>Long-billed Curlew</b> <i>Numenius americanus</i>	--/SC	Utilize ponds, reservoirs, playas, and wet meadows in grasslands (CPW n.d.i).	<b>Low</b> ; based on NWI and NHD mapping, potentially suitable water resources appear absent within the Project Area.	<b>Low</b> ; Due to the low probability of occurrence, impacts to Long-billed Curlews are not anticipated.
<b>Greater Prairie-chicken</b> <i>Tympanuchus cupido</i>	--/--	Utilize mid-grass sandsage grasslands on sandhills and sometimes corn fields (CPW n.d.j).	<b>Moderate</b> ; potentially suitable habitat appears to be present within the Project Area. Additionally, there is a documented sighting within one mile of the Project Area and known leks within 5 miles.	<b>Moderate</b> ; if leks are present, Project-related construction activities may impact breeding individuals. CPW recommends lek buffers of 2.2-miles (seasonal) and 0.6-mile (permanent).
<b>Fish</b>				



Species	Status <sup>1</sup> Federal/ State	Habitat	Probability of occurrence within Project Area	Potential to be affected
<b>Pallid Sturgeon</b> <i>Scaphirhynchus albus</i>	FE/--	Inhabit large, deep turbid rivers typically with a strong current and firm sand or gravel substrates (USFWS n.d.e).	<b>None;</b> based on NHD mapping, no suitable watercourses are present within the Project Area.	<b>None;</b> no suitable watercourses are present within the Project Area.  In addition, the pallid sturgeon does not need to be considered federally for projects that do not include water impacts in the N. Platte, S. Platte, or Laramie River basins.
<b>INSECTS</b>				
<b>Monarch Butterfly</b> <i>Danaus plexippus</i>	C/--	Monarch butterflies lay their eggs on milkweed species ( <i>Asclepias</i> sp.), which can be found in a variety of habitats, including wetlands, roadside ditches, and grasslands. Adults forage on a variety of flowering plants (USFWS n.d.f).	<b>High;</b> suitable herbaceous appears to be present within the Project Area.	<b>High;</b> if host plants are eliminated during site development the potential for impacts is considered to be high.  Please note that the monarch butterfly is a candidate for listing species and is not afforded any state or federal protections.
<b>Plants</b>				
<b>Ute Ladies'-tresses</b> <i>Spiranthes diluvialis</i>	FT/--	This species grows at the base of the eastern slope of the Rocky Mountains in north central and central Colorado where its preferred habitat includes riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams (USFWS n.d.g).	<b>Low;</b> suitable habitat appears absent within the Project Area. Additionally, this species typically occurs closer to the foothills in Colorado (USFWS n.d.g).	<b>Low;</b> suitable habitat appears absent within the Project Area.

Species	Status <sup>1</sup> Federal/ State	Habitat	Probability of occurrence within Project Area	Potential to be affected
<b>Western Prairie Fringed Orchid</b> <i>Platanthera praeclara</i>	FT/--	This species grows in moist tallgrass prairies and sedge meadows (USFWS n.d.h).	<b>Low;</b> suitable habitat appears absent within the Project Area. Additionally, this species is not currently known to occur within Colorado (USFWS n.d.h).	<b>Low;</b> suitable habitat appears absent within the Project Area.

<sup>1</sup>FE = Federally endangered; FT= Federally threatened; PE = Proposed federally endangered; C = Federal candidate for listing; BGEPA=Bald and Golden Eagle Protection Act; SE = State endangered; ST = State threatened; SC = State Species of Special Concern

## **Conclusion**

Desktop review of the Project Area and surrounding region identified sixteen species listed as federally or state endangered, threatened, proposed, candidate, special concern, or protected under the BGEPA as potentially occurring within the Project Area. Of these, Westwood identified seven as having a moderate or higher probability of occurrence and/ or potential to be affected.

In order to refine species risks, Westwood recommends completion of a site-specific field review; this may aid in determining the need for targeted survey efforts, refining areas of risk, and/or downgrading species-specific risks. Without completion of a habitat assessment, Westwood provides the following suggestions:

- CPW recommends buffering raptor nests by up to 0.5-mile, depending upon the species. Although limited nesting substrate appears present within the Project Area, woody vegetation surrounding the Project may provide suitable nesting habitat. Therefore, springtime stick nest surveys should be considered.
- CPW recommends implementing a 0.6-mile permanent and 2.2-mile seasonal lek avoidance buffer. Due to species records within one mile of the Project and potentially suitable habitat onsite, Westwood recommends targeted lek surveys.
- Aerial imagery suggests the potential presence of prairie dog colonies; the preferred habitat for the state-threatened Burrowing Owl. Westwood recommends completion of targeted Burrowing Owl surveys if prairie dog colonies and an associated 0.25- mile buffer cannot be avoided from March 15 – October 31.
- Although suitable habitat is not readily apparent based on the desktop review, avoidance of any delineated wetlands will further reduce risk of adverse impacts to rare plants.
- Based on the mapped mule deer winter and severe winter concentration areas immediately adjacent to the Project Area, movement of big game near the Project Area is likely. In order to minimize impacts to any movement corridors and minimize risk of wildlife/vehicle collisions, Westwood recommends that study design incorporates strategic fencing techniques and adequate spacing between arrays to ensure safe passage of wildlife.

Field studies may help refine the presence or absence of suitable habitat and therefore the probability of impacts to the species discussed above. Additionally, Westwood has submitted a letter to CPW requesting their comment on the species above and nearby HPH identified in this review. Their response may contain further recommendations.

Please contact the Westwood Project Manager at [REDACTED] if you have any questions.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES, INC.

## Literature Cited

- Buehler, D. A. 2022. Bald Eagle (*Haliaeetus leucocephalus*), version 2.0. In Birds of the World (P. G. Rodewald and S. G. Mlodinow, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://birdsoftheworld.org/bow/species/baleag/2.0/introduction>
- Colorado Natural Heritage Program (CNHP). 2023. Colorado Conservation Data Explorer (CODEX). <https://cnhp.colostate.edu/maps/codex/>
- Colorado Parks and Wildlife (CPW). 2021. Colorado Parks and Wildlife Best Management Practices for Solar Energy Development. [https://cpw.state.co.us/Documents/Commission/2021/June/Item.18-Colorado Parks and Wildlife Solar Energy BMPs May 2021.pdf](https://cpw.state.co.us/Documents/Commission/2021/June/Item.18-Colorado%20Parks%20and%20Wildlife%20Solar%20Energy%20BMPs%20May%202021.pdf)
- Colorado Parks and Wildlife (CPW). 2020. Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors. <https://cpw.state.co.us/Documents/WildlifeSpecies/LivingWithWildlife/Raptor-Buffer-Guidelines.pdf>
- Colorado Parks and Wildlife (CPW). No Date -A. Gray and Mexican Wolves <https://cpw.state.co.us/learn/Pages/SOC-Wolves.aspx>
- Colorado Parks and Wildlife (CPW). No Date -B. Wolf Management. <https://cpw.state.co.us/learn/Pages/CON-Wolf-Management.aspx>
- Colorado Parks and Wildlife (CPW). No Date -C. Prairie Dogs. <https://cpw.state.co.us/conservation/Pages/CON-Prairie-Dogs.aspx>
- Colorado Parks and Wildlife (CPW). No Date -D. Piping Plover. <https://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>
- Colorado Parks and Wildlife (CPW). No Date -E. Whooping Crane. <https://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>
- Colorado Parks and Wildlife (CPW). No Date -F. Burrowing Owl. <https://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>
- Colorado Parks and Wildlife (CPW). No Date -G. Ferruginous Hawk. <https://cpw.state.co.us/Documents/WildlifeSpecies/Grasslands/appendixE.pdf>
- Colorado Parks and Wildlife (CPW). No Date -H. Mountain Plover. <https://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>
- Colorado Parks and Wildlife (CPW). No Date -I. Long-billed Curlew. [https://cpw.state.co.us/Documents/LandWater/WetlandsProgram/PrioritySpecies/Factsheet-and-Habitat-Scorecard LongBilledCurlew.pdf](https://cpw.state.co.us/Documents/LandWater/WetlandsProgram/PrioritySpecies/Factsheet-and-Habitat-Scorecard%20LongBilledCurlew.pdf)
- Colorado Parks and Wildlife (CPW). No Date -J. Greater Prairie-chicken. <https://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>

Multi-Resource Land Consortium (MRLC). 2019. USGS National Land Cover Database (NLCD).  
<https://www.usgs.gov/centers/eros/science/national-land-cover-database>

National Audubon Society. No Date. Golden Eagle (*Aquila chrysaetos*).  
<https://www.audubon.org/field-guide/bird/golden-eagle>

Page, J. L., and D. J. Seibert. 1973. Inventory of golden eagle nests in Elko County, Nevada. Cal-  
Neva Wildlife 1973.

U.S. Department of the Interior (USDOI). 1973. Endangered Species Act of 1973, as Amended  
through the 108<sup>th</sup> Congress.  
<https://www.fws.gov/sites/default/files/documents/endangered-species-act-accessible.pdf>. U.S. Fish and Wildlife Service. Washington, D.C. 20240.

U.S. Environmental Protection Agency (EPA). 2006. Level III and IV Ecoregions of Colorado.  
<https://www.epa.gov/eco-research/ecoregion-download-files-state-region-8#pane-05>

U.S. Fish and Wildlife Service. No Date –A. Bald and Golden Eagle Protection Act (BGEPA).  
<https://www.fws.gov/law/bald-and-golden-eagle-protection-act>

U.S. Fish and Wildlife Service (USFWS). No Date -B. Tricolored Bat (*Perimyotis subflavus*).  
<https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus>

U.S. Fish and Wildlife Service (USFWS). No Date -C. Piping Plover (*Charadrius melodus*).  
<https://www.fws.gov/species/piping-plover-charadrius-melodus>

U.S. Fish and Wildlife Service (USFWS). No Date -D. Whooping Crane (*Grus americana*).  
<https://www.fws.gov/species/whooping-crane-grus-americana>

U.S. Fish and Wildlife Service (USFWS). No Date –E. Pallid Sturgeon (*Scaphirhynchus albus*).  
<https://www.fws.gov/species/pallid-sturgeon-scapirhynchus-albus>

U.S. Fish and Wildlife Service (USFWS). No Date –F. Monarch (*Danaus plexippus*).  
<https://www.fws.gov/species/monarch-danaus-plexippus>

U.S. Fish and Wildlife Service (USFWS). No Date –G. Ute Ladies-tresses (*Spiranthes diluvialis*).  
<https://ecos.fws.gov/ecp/species/2159>

U.S. Fish and Wildlife Service (USFWS). No Date –H. Western Prairie Fringed Orchid  
(*Platanthera praeclara*). <https://www.fws.gov/species/western-prairie-fringed-orchid-platanthera-praeclara>

U.S. Fish and Wildlife Service (USFWS). 2023. Information for Planning and Consultation  
(IPaC) for Roadrunner Energy Farm Project.

U.S. Fish and Wildlife Service (USFWS). National Wetlands Inventory (NWI). 2022.  
<https://www.fws.gov/program/national-wetlands-inventory/wetlands-data>

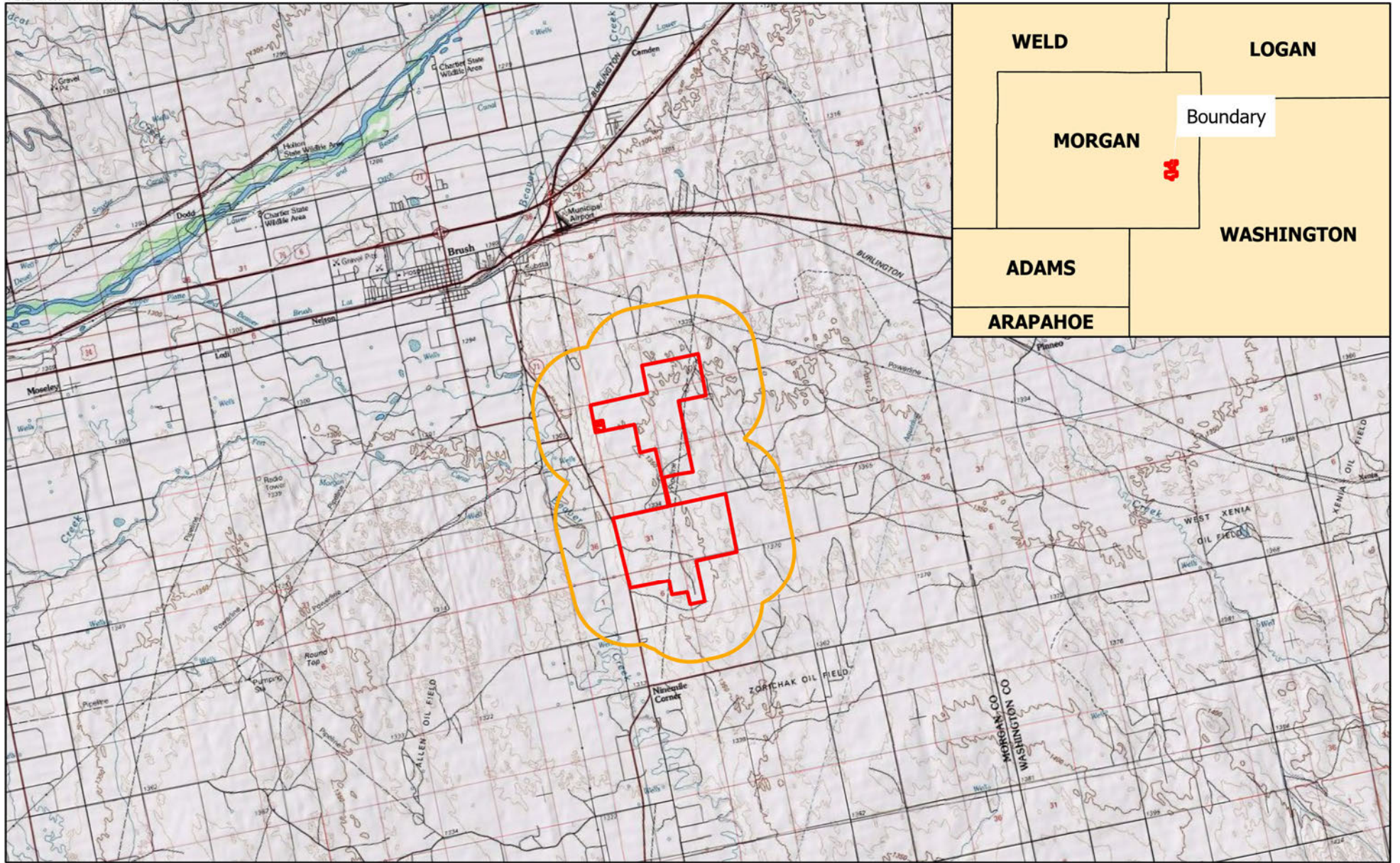
USGS National Hydrography Dataset (NHD). 2022a. High-Resolution – Colorado.

USGS Gap Analysis Project (GAP). 2022b. Protected Areas Database of the United States (PAD-US) 2.1: U.S. Geological Survey data release. <https://doi.org/10.5066/P92QM3NT>.

# **Exhibits**

**Roadrunner Energy Farm Project**  
Morgan County, Colorado

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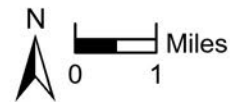


Data Source(s): Westwood (2023); .

-  Project Area
-  One Mile Buffer
-  Roads

# Roadrunner Energy Farm Project

Morgan County, Colorado



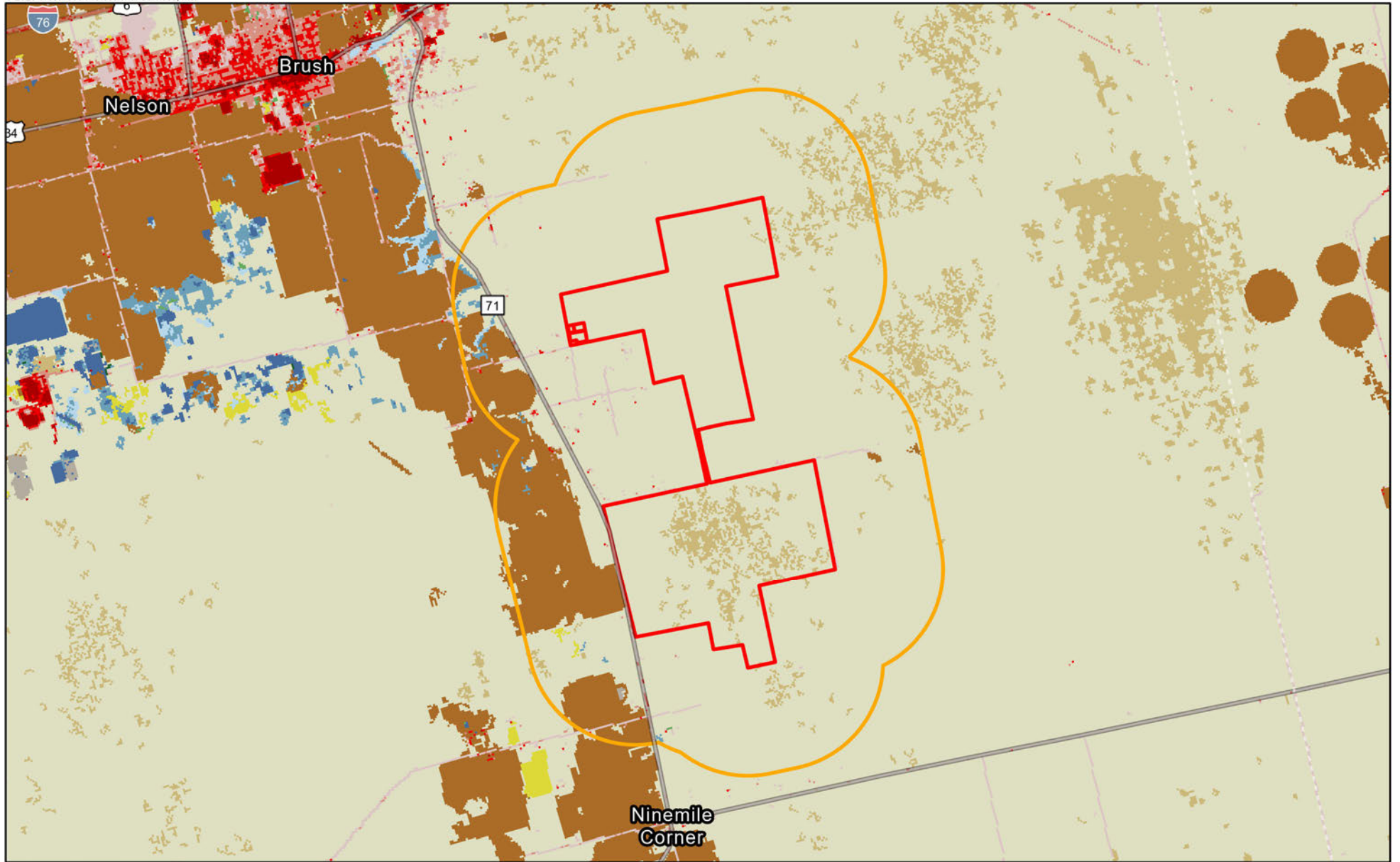
## Project Location

### Westwood

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.



© 2023 Westwood Professional Services, Inc.



Data Source(s): Westwood (2023).

# Roadrunner Energy Farm Project

Morgan County, Colorado

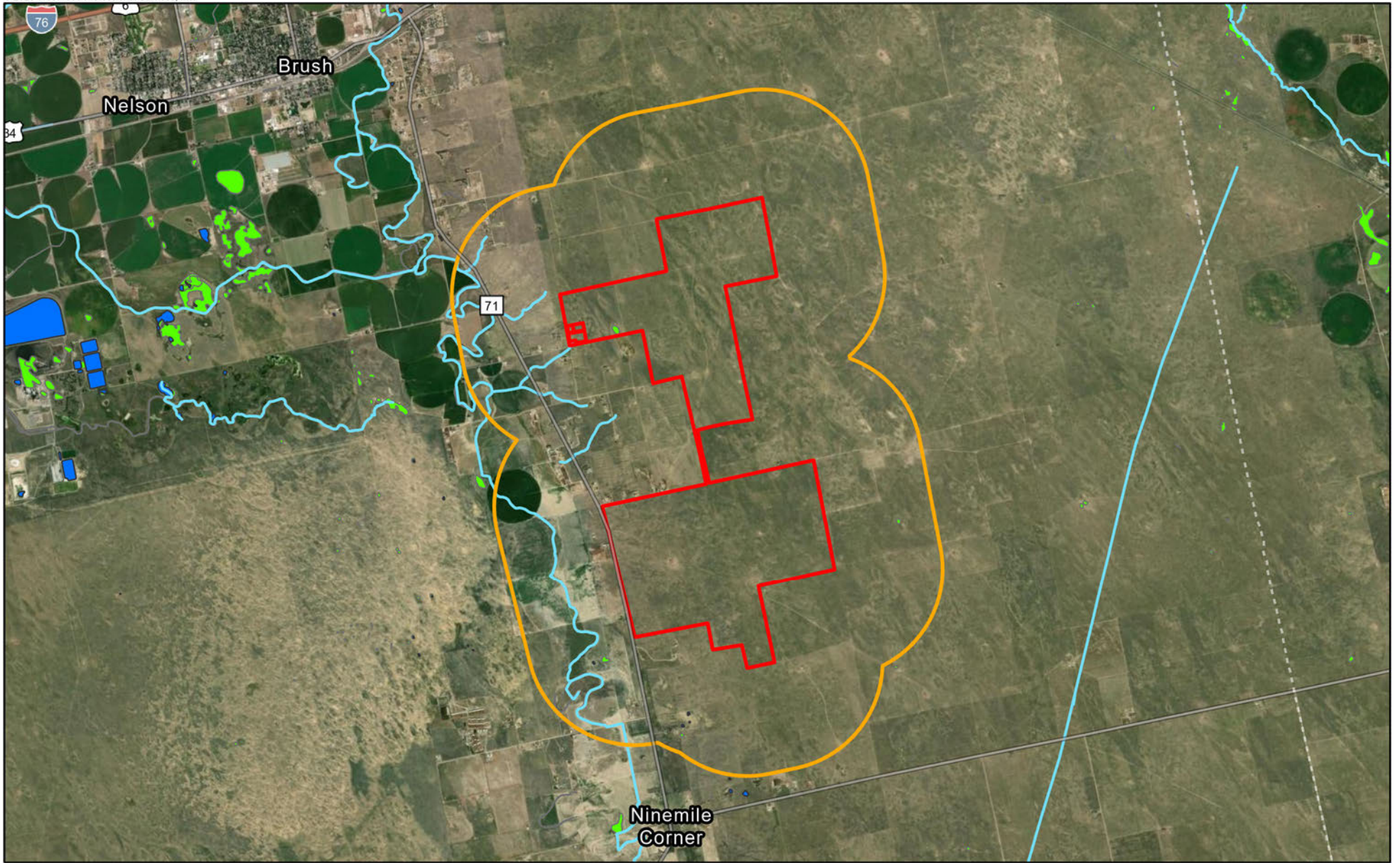
## NLCD Land Cover






**Westwood**

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

© 2023 Westwood Professional Services, Inc.



Data Source(s): Westwood (2023); .

-  Project Area
-  One Mile Buffer
-  NWI Wetlands
-  NHD Flowlines
-  NHD Waterbodies



# Roadrunner Energy Farm Project

Morgan County, Colorado

## Water Resources

**Westwood**

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.

**Appendix A**  
**USFWS IPaC Report**  
**Roadrunner Energy Farm Project**  
Morgan County, Colorado



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Colorado Ecological Services Field Office  
Denver Federal Center  
P.O. Box 25486  
Denver, CO 80225-0486  
Phone: (303) 236-4773 Fax: (303) 236-4005

In Reply Refer To:  
Project Code: 2024-0028465  
Project Name: Roadrunner Energy Farm

December 19, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

## To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: <https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

**Migratory Birds:** In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see [Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service \(fws.gov\)](#).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

---

Attachment(s):

- Official Species List

## **OFFICIAL SPECIES LIST**

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Colorado Ecological Services Field Office**

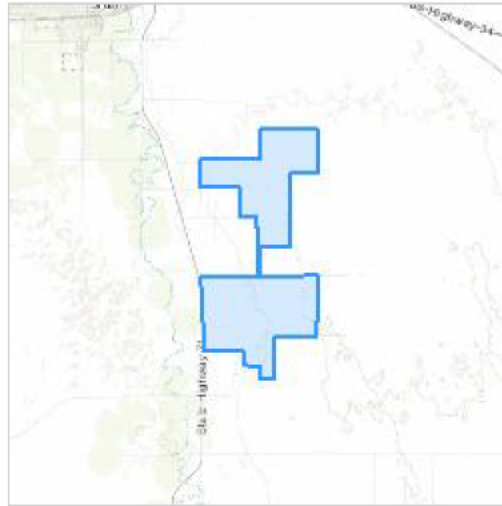
Denver Federal Center  
P.O. Box 25486  
Denver, CO 80225-0486



## PROJECT SUMMARY

Project Code: 2024-0028465  
Project Name: Roadrunner Energy Farm  
Project Type: Power Gen - Solar  
Project Description: Proposed solar project.  
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@40.195859,-103.56640858618516,14z>



Counties: Morgan County, Colorado

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## ENDANGERED SPECIES ACT SPECIES

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

NAME	STATUS
<p>Gray Wolf <i>Canis lupus</i></p> <p>Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico.</p> <p>There is <b>final</b> critical habitat for this species.</p> <p>This species only needs to be considered under the following conditions:</p> <ul style="list-style-type: none"> <li>▪ Lone, dispersing gray wolves may be present throughout the state of Colorado. If your activity includes a predator management program, please consider this species in your environmental review.</li> </ul> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/4488">https://ecos.fws.gov/ecp/species/4488</a></p>	Endangered
<p>Tricolored Bat <i>Perimyotis subflavus</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/10515">https://ecos.fws.gov/ecp/species/10515</a></p>	Proposed Endangered

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**BIRDS**

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> <li>Project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins which may affect listed species in Nebraska.</li> </ul> Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a>	Threatened
Whooping Crane <i>Grus americana</i> Population: Wherever found, except where listed as an experimental population There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Endangered

**FISHES**

NAME	STATUS
Pallid Sturgeon <i>Scaphirhynchus albus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> <li>Project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins which may affect listed species in Nebraska.</li> </ul> Species profile: <a href="https://ecos.fws.gov/ecp/species/7162">https://ecos.fws.gov/ecp/species/7162</a>	Endangered

**INSECTS**

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a>	Candidate

**FLOWERING PLANTS**

NAME	STATUS
Ute Ladies'-tresses <i>Spiranthes diluvialis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/2159">https://ecos.fws.gov/ecp/species/2159</a>	Threatened
Western Prairie Fringed Orchid <i>Platanthera praeclara</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/1669">https://ecos.fws.gov/ecp/species/1669</a>	Threatened

**CRITICAL HABITATS**

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

## **IPAC USER CONTACT INFORMATION**

Agency: Westwood

Name: Ethan Muller

Address: 10170 Church Ranch Way, Suite 201

City: Westminster

State: CO

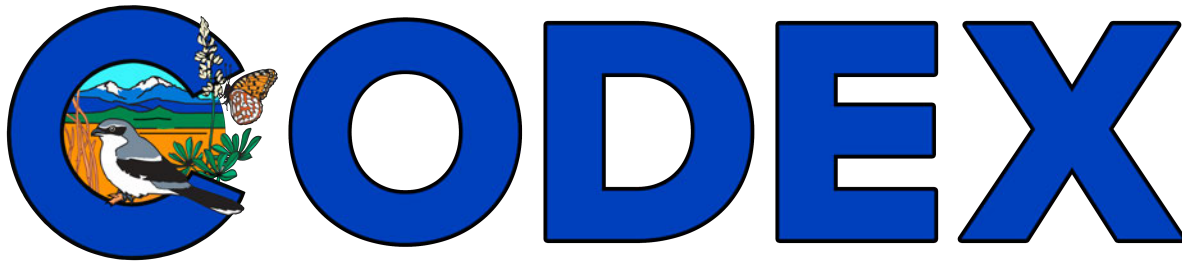
Zip: 80021

Email

Phone:



**Appendix B**  
**Colorado Parks and Wildlife CODEX**  
**Roadrunner Energy Farm Project**  
Morgan County, Colorado



## Colorado's Conservation Data Explorer

### Project Review Report

#### Project Description

Proposed solar project.

#### Project Information

Report Generation Date: 12/19/2023 01:26:53 PM

Project Title: Roadrunner Energy Farm

User Project Number(s):

System Generated ID: CODEX-3145

Project Type: Energy

Project Size: 2,919.41 (acres)

Latitude/Longitude: 40.182682 / -103.556476

County(s): MORGAN

Watershed(s) HUC 8: Beaver

Township/Range and/or Section(s): 003N055W - 17 - 6P, 003N055W - 18 - 6P, 003N055W - 20 - 6P, 003N055W - 19 - 6P, 003N056W - 24 - 6P, 003N055W - 29 - 6P, 003N055W - 30 - 6P, 003N055W - 32 - 6P, 003N055W - 31 - 6P, 003N056W - 36 - 6P, 002N055W - 05 - 6P, 002N055W - 06 - 6P

#### Contact Information

Organization: Westwood Professional Services

Contact Name: Ethan Muller

Contact Phone: [REDACTED]

Contact Email: [REDACTED]

Contact Address: 10170 Church Ranch Way Suite 201, Westminster, CO 80021

Submitted On Behalf Of: CONSULTING

Prepared By:

## Project Report:

The information contained herein represents the results of a search of Colorado's Conservation Data Explorer (CODEX) and can be used as notice to anticipate possible impacts or identify areas of interest. This tool queries multiple conservation datasets and includes a synthesis of Colorado Natural Heritage Program (CNHP) and Colorado Parks and Wildlife (CPW) data for sensitive animal and plant species and natural communities. Care should be taken in interpreting these data.

Please note that the absence of data for a particular area, species, or habitat does not necessarily mean that these natural heritage resources do not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence. CODEX information should not replace field studies necessary for more localized planning efforts, especially if impacts to wildlife habitat are possible. Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CODEX data is constantly updated and revised. Please contact CNHP, CPW and our partners for assistance with interpretation of this report or to obtain more information.

## Disclaimer:

1. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. **This review does not constitute environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the review of site-specific projects by CNHP and CPW and our partners.**
2. This Project Report is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
3. The Conservation Data Explorer (CODEX) data is constantly changing and being updated and is not intended to be the final word on the potential distribution of special status species. Colorado is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. CODEX data contains information about species occurrences that have actually been reported to CNHP, CPW and our partners. Not all of Colorado has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.

## Location Accuracy Disclaimer:

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

## Contact for CODEX Support:

### Colorado Natural Heritage Program (CNHP)

CNHP  
Colorado State University  
1475 Campus Delivery  
Fort Collins, CO 80523-1475

Tel: [REDACTED]

Email: [REDACTED]

CNHP Website: [cnhp.colostate.edu](http://cnhp.colostate.edu)

### Colorado Parks and Wildlife

For support regarding project review of land use impacts to wildlife, please contact the regional office in which your project resides and visit <https://cpw.state.co.us/conservation/Pages/CON-Energy-Land.aspx>

CPW Website : [cpw.state.co.us](http://cpw.state.co.us)

#### Northeast Region

**Denver Office**  
6060 Broadway  
Denver, CO 80216  
Tel: [REDACTED]

#### Southeast Region

**Colorado Springs Office**  
4255 Sinton Road  
Colorado Springs, CO 80907  
Tel: [REDACTED]

#### Northwest Region

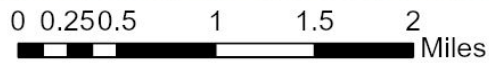
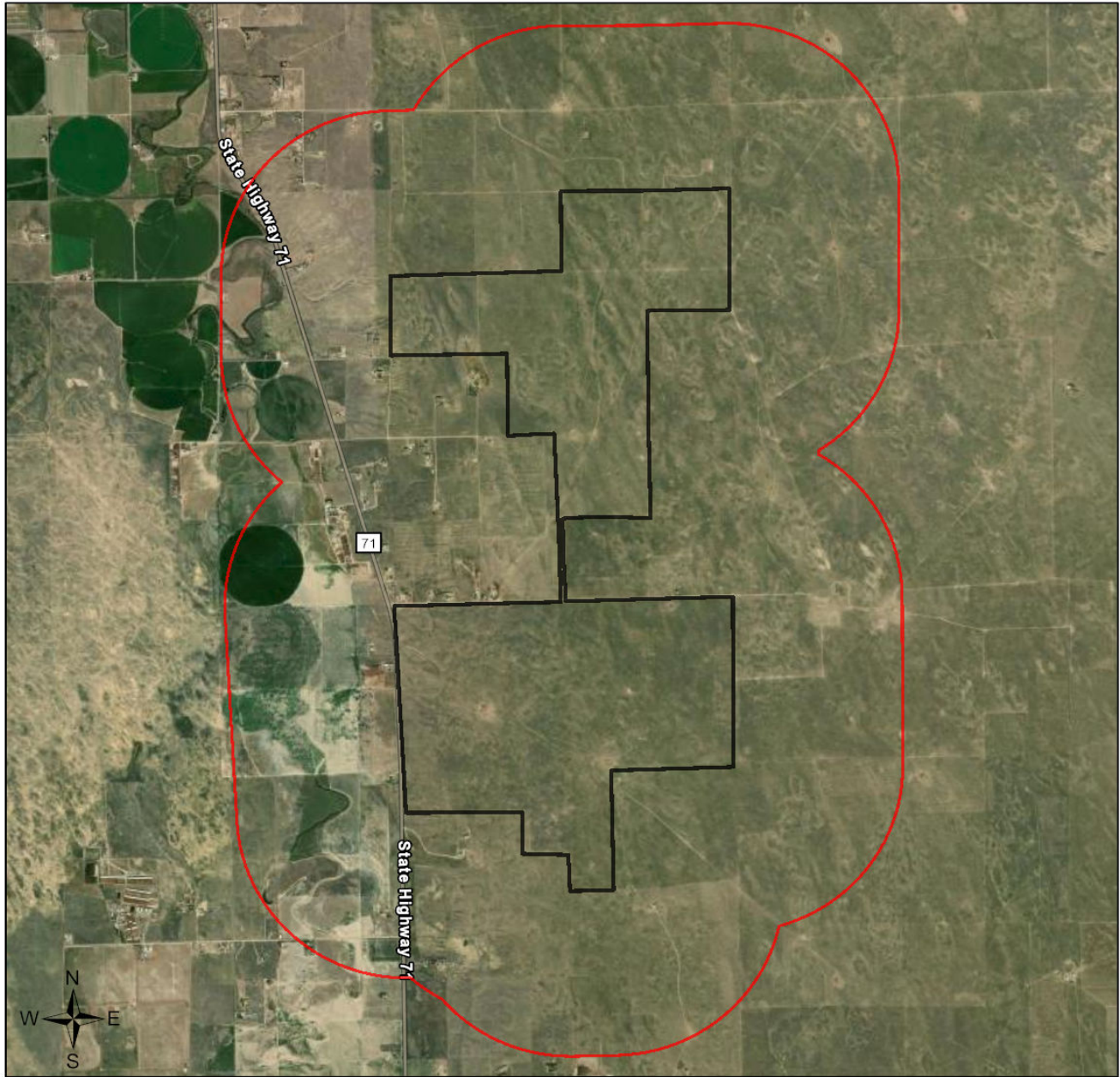
**Grand Junction Office**  
711 Independent Avenue  
Grand Junction, CO 81505  
Tel: [REDACTED]



#### Southwest Region

**Durango Office**  
151 East 16th Street  
Durango, CO 81301  
Tel: [REDACTED]

For questions regarding CPW data in CODEX please contact [REDACTED] or [REDACTED]

# Roadrunner Energy Farm Aerial Image with Locator Map



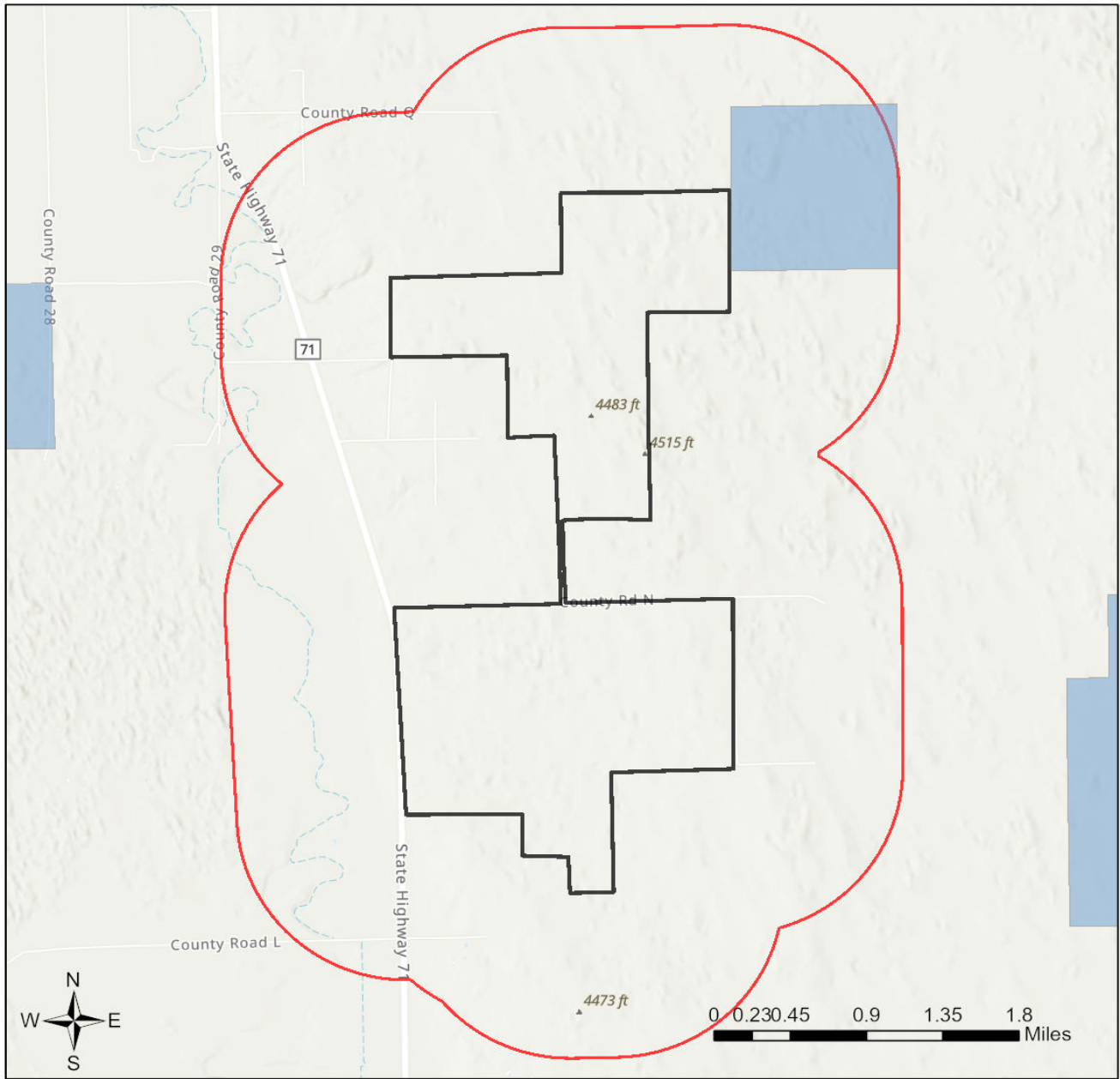
-  Buffered Search Area
-  Project Boundary



Earthstar Geographics  
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA  
Esri, USGS



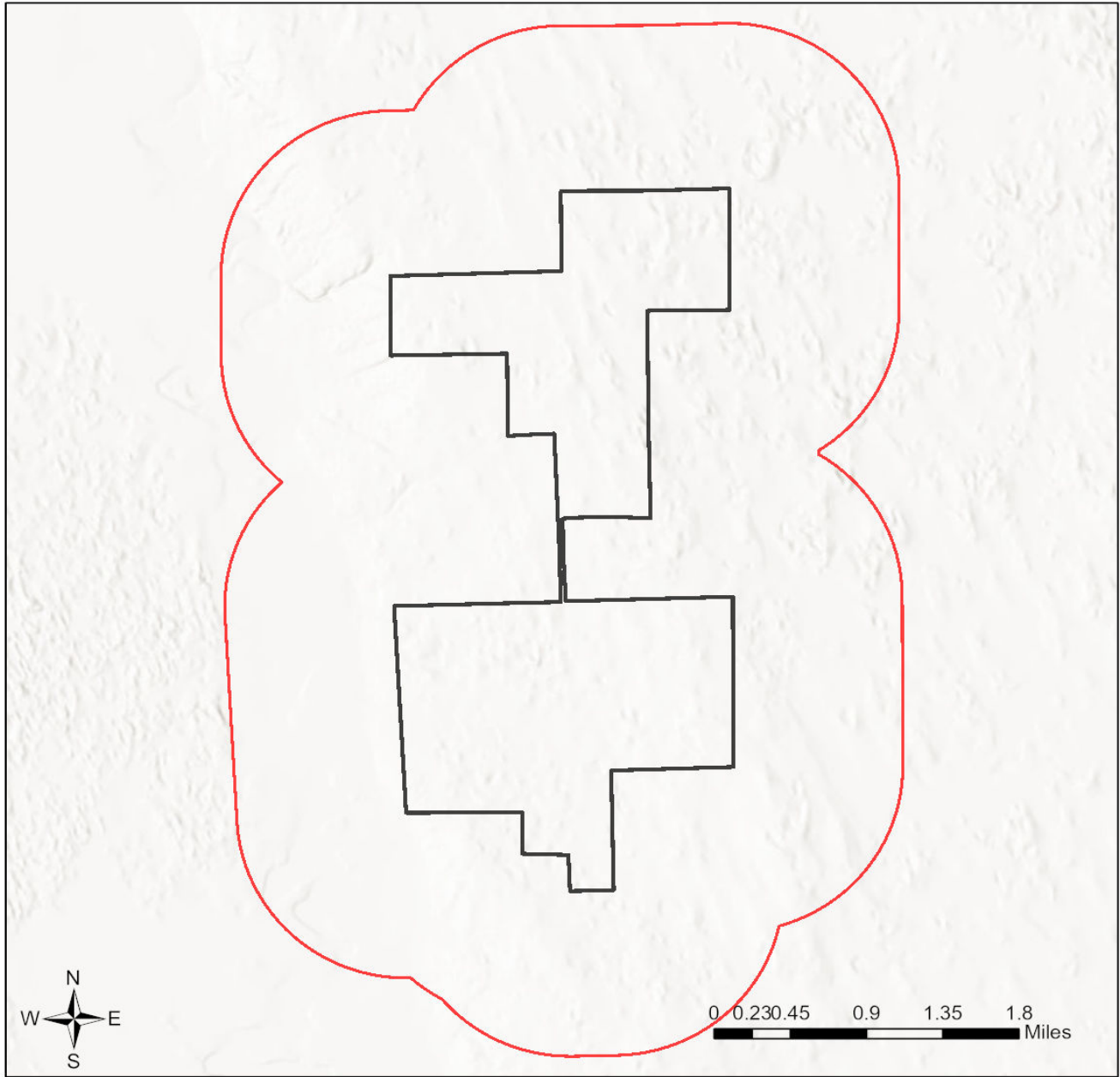
## Roadrunner Energy Farm Topographic Map with Land Management Status



- |   |  |  |
|---|--|--|
| <span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Buffered Search Area              | <span style="background-color: #800080; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> NPS    | <span style="background-color: #ADD8E6; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Local                |
| <span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Project Boundary                | <span style="background-color: #90EE90; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> USFS   | <span style="background-color: #8B4513; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> NGO/Land Trust       |
| <span style="background-color: #D8BFD8; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Misc Federal (BOR, DOD, Misc) | <span style="background-color: #2E8B57; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> USFWS  | <span style="background-color: #FFD700; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Private Conservation |
| <span style="background-color: #FFFF00; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> BLM                           | <span style="background-color: #D2B48C; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Tribal | <span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Private                |
|   | <span style="background-color: #6495ED; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> State  |  |

Esri, NASA, NGA, USGS, FEMA  
 Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

### Roadrunner Energy Farm Web Map As Submitted By User



-  Buffered Search Area
-  Project Boundary

## Regulatory Species

**Table 1. Documented Occurrences Within 1 Miles Of Project Area**

No results were found for this project area.

**Table 2. Potential Regulatory Species within Project Area: Models, Range Maps, or Records with Low Precision**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	ESA Status	CO Status	Other Status	Data Source
Birds	<a href="#">Aquila chrysaetos</a>	Golden Eagle	CPW Breeding Range	G5	S3S4B,S4N			BGEPA/SWAP Tier 1	CPW 20221213

**Table 3. Fish & Wildlife Service Critical Habitats within 1 Miles of Project Area**

No results were found for this project area.

## Other Species of Concern

**Table 4. Documented Occurrences within 1 Miles of Project Area: Rare Species, Natural Communities, and Species of Economic, Recreational or Conservation Value**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	Viability Rank	Last Observation	ESA Status	CO Status	Other Status	CNHP Identifier	Data Source
Birds	<a href="#">Ammodramus savannarum</a>	Grasshopper Sparrow	IMBCR Observation	G5	S3S4B		2021-05-20			SWAP Tier 2/USFS		BCR 20220301
Birds	<a href="#">Bartramia longicauda</a>	Upland Sandpiper	IMBCR Observation	G5	S3B		2012-05-17			SWAP Tier 2		BCR 20220301
Birds	<a href="#">Branta canadensis</a>	Canada Goose	CPW Winter Concentration Area	G5	S5							CPW 20221213
Birds	<a href="#">Buteo swainsoni</a>	Swainson's Hawk	IMBCR Observation	G5	S5B		2016-05-26			SWAP Tier 2		BCR 20220301
Birds	<a href="#">Calamospiza melanocorys</a>	Lark Bunting	IMBCR Observation	G5	S4		2021-05-20			SWAP Tier 2		BCR 20220301

**Table 4. Documented Occurrences within 1 Miles of Project Area: Rare Species, Natural Communities, and Species of Economic, Recreational or Conservation Value**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	Viability Rank	Last Observation	ESA Status	CO Status	Other Status	CNHP Identifier	Data Source
Birds	<a href="#">Circus hudsonius</a>	Northern Harrier	IMBCR Observation	G5	S3B		2010-06-04			SWAP Tier 2/USFS		BCR 2020301
Birds	<a href="#">Peucaea cassinii</a>	Cassin's Sparrow	IMBCR Observation	G5	S4B		2021-05-20			SWAP Tier 2/USFS		BCR 2020301
Birds	<a href="#">Phasianus colchicus</a>	Ring-necked Pheasant	CPW Concentration Area	G5	SNA							CPW 20221213
Birds	<a href="#">Spizella breweri</a>	Brewer's Sparrow	IMBCR Observation	G5	S4B		2021-05-20			BLM/SWAP Tier 2/USFS		BCR 2020301
Birds	<a href="#">Tympuchus cupido</a>	Greater Prairie-chicken	IMBCR Observation	G4	S3		2020-05-16			SWAP Tier 2/USFS		BCR 2020301
Mammals	<a href="#">Odocoileus hemionus</a>	Mule Deer	CPW Highway Crossing	G5	S4							CPW 20221213
Mammals	<a href="#">Odocoileus hemionus</a>	Mule Deer	CPW Severe Winter Range	G5	S4							CPW 20221213
Mammals	<a href="#">Odocoileus hemionus</a>	Mule Deer	CPW Winter Concentration Area	G5	S4							CPW 20221213
Mammals	<a href="#">Odocoileus virginianus</a>	White-tailed Deer	CPW Concentration Area	G5	S5							CPW 20221213

**Table 5. Potential Occurrences within Project Area: Models, Range Maps, or Records with Low Precision**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	ESA Status	CO Status	Other Status	Data Source
Birds	<a href="#">Ammodramus savannarum</a>	Grasshopper Sparrow	CPW Breeding Range	G5	S3S4B			SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Antigone canadensis</a>	Sandhill Crane	CPW Overall Range	G5	S3B,S4N				CPW 20221213
Birds	<a href="#">Athene cunicularia</a>	Burrowing Owl	CPW Breeding Range	G4	S4B		ST	BLM/SWAP Tier 1/USFS	CPW 20221213
Birds	<a href="#">Bartramia longicauda</a>	Upland Sandpiper	CPW Breeding Range	G5	S3B			SWAP Tier 2	CPW 20221213
Birds	<a href="#">Botaurus lentiginosus</a>	American Bittern	CPW Breeding Range	G5	S3S4B			SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Branta canadensis</a>	Canada Goose	CPW Foraging Area	G5	S5				CPW 20221213
Birds	<a href="#">Branta canadensis</a>	Canada Goose	CPW Winter Range	G5	S5				CPW 20221213
Birds	<a href="#">Buteo regalis</a>	Ferruginous Hawk	CPW Breeding Range	G4	S3B,S4N		SC	BLM/SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Buteo swainsoni</a>	Swainson's Hawk	CPW Breeding Range	G5	S5B			SWAP Tier 2	CPW 20221213

**Table 5. Potential Occurrences within Project Area: Models, Range Maps, or Records with Low Precision**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	ESA Status	CO Status	Other Status	Data Source
Birds	<a href="#">Calamospiza melanocorys</a>	Lark Bunting	CPW Breeding Range	G5	S4			SWAP Tier 2	CPW 20221213
Birds	<a href="#">Catharus fuscescens</a>	Veery	CPW Breeding Range	G5	S3B			SWAP Tier 2	CPW 20221213
Birds	<a href="#">Charadrius montanus</a>	Mountain Plover	CPW Breeding Range	G3	S2B		SC	BLM/SWAP Tier 1/USFS	CPW 20221213
Birds	<a href="#">Chen caerulescens</a>	Snow Goose	CPW Winter Range	G5	S4N				CPW 20221213
Birds	<a href="#">Circus hudsonius</a>	Northern Harrier	CPW Breeding Range	G5	S3B			SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Colinus virginianus</a>	Northern Bobwhite	CPW Breeding Range	G4G5	S4			SWAP Tier 2	CPW 20221213
Birds	<a href="#">Falco mexicanus</a>	Prairie Falcon	CPW Breeding Range	G5	S4B,S4N			SWAP Tier 2	CPW 20221213
Birds	<a href="#">Numenius americanus</a>	Long-billed Curlew	CPW Breeding Range	G5	S2B		SC	BLM/SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Peucaea cassinii</a>	Cassin's Sparrow	CPW Breeding Range	G5	S4B			SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Phasianus colchicus</a>	Ring-necked Pheasant	CPW Overall Range	G5	SNA				CPW 20221213
Birds	<a href="#">Spizella breweri</a>	Brewer's Sparrow	CPW Breeding Range	G5	S4B			BLM/SWAP Tier 2/USFS	CPW 20221213
Birds	<a href="#">Tympanuchus cupido pinnatus</a>	Greater Prairie Chicken	CPW Overall Range	G4T4	S3			USFS	CPW 20221213
Insects	<a href="#">Argia alberta</a>	Paiute Dancer	Range Map - present	G4	S4			SWAP Tier 2	CNHP 20210615
Insects	<a href="#">Danaus plexippus</a>	Monarch	Range Map - present	G4	S5			SWAP Tier 2	CNHP 20210615
Mammals	<a href="#">Antilocapra americana</a>	Pronghorn	CPW Overall Range	G5	S4				CPW 20221213
Mammals	<a href="#">Cynomys ludovicianus</a>	Black-tailed Prairie Dog	CPW Overall Range	G4	S3		SC	BLM/SWAP Tier 2/USFS	CPW 20221213
Mammals	<a href="#">Cynomys ludovicianus</a>	Black-tailed Prairie Dog	CPW Potential Occurrence	G4	S3		SC	BLM/SWAP Tier 2/USFS	CPW 20221213
Mammals	<a href="#">Eptesicus fuscus</a>	Big Brown Bat	CPW Overall Range	G5	S5				CPW 20221213
Mammals	<a href="#">Lasionycteris noctivagans</a>	Silver-haired Bat	CPW Overall Range	G3G4	S3S4				CPW 20221213
Mammals	<a href="#">Lasiurus borealis</a>	Eastern Red Bat	CPW Overall Range	G3G4	S2S3B				CPW 20221213
Mammals	<a href="#">Lasiurus cinereus</a>	Hoary Bat	CPW Overall Range	G3G4	S3S4B			SWAP Tier 2/USFS	CPW 20221213
Mammals	<a href="#">Lepus townsendii</a>	White-tailed Jackrabbit	CPW Overall Range	G5	S4			SWAP Tier 2	CPW 20221213
Mammals	<a href="#">Odocoileus hemionus</a>	Mule Deer	CPW Overall Range	G5	S4				CPW 20221213
Mammals	<a href="#">Odocoileus virginianus</a>	White-tailed Deer	CPW Overall Range	G5	S5				CPW 20221213
Mammals	<a href="#">Odocoileus virginianus</a>	White-tailed Deer	CPW Winter Range	G5	S5				CPW 20221213
Mammals	<a href="#">Perimyotis subflavus</a>	Tricolored Bat	CPW Overall Range	G3G4	S2				CPW 20221213
Mammals	<a href="#">Spilogale putorius</a>	Eastern Spotted Skunk	Range Map - within range	G4	S2				CNHP 20210615
Mollusks	<a href="#">Ferrissia fragilis</a>	Fragile Ancyloid	Range Map - within range	G5	S1			SWAP Tier 2	CNHP 20210615
Reptiles	<a href="#">Aspidoscelis sexlineata</a>	Six-lined Racerunner	CPW Overall Range	G5	S5				CPW 20221213

**Table 5. Potential Occurrences within Project Area: Models, Range Maps, or Records with Low Precision**

Major Group	Scientific Name	Common Name	Data Type	Global Rarity	State Rarity	ESA Status	CO Status	Other Status	Data Source
Reptiles	<a href="#">Chelydra serpentina</a>	Snapping Turtle	CPW Overall Range	G5	S4				CPW 20221213
Reptiles	<a href="#">Chrysemys picta</a>	Painted Turtle	CPW Overall Range	G5	S5				CPW 20221213
Reptiles	<a href="#">Coluber constrictor</a>	Racer	CPW Overall Range	G5	S5				CPW 20221213
Reptiles	<a href="#">Crotalus oreganus</a>	Western Rattlesnake	CPW Overall Range	G5	SNR				CPW 20221213
Reptiles	<a href="#">Crotalus viridis</a>	Western Rattlesnake	CPW Overall Range	G5	S5				CPW 20221213
Reptiles	<a href="#">Heterodon nasicus</a>	Plains Hognose Snake	CPW Overall Range	G5	S4				CPW 20221213
Reptiles	<a href="#">Holbrookia maculata</a>	Lesser Earless Lizard	CPW Overall Range	G5	S5				CPW 20221213
Reptiles	<a href="#">Lampropeltis gentilis</a>	Central Plains Milk Snake	CPW Overall Range	G5	S5			SWAP Tier 2	CPW 20221213
Reptiles	<a href="#">Nerodia sipedon</a>	Northern Water Snake	CPW Overall Range	G5	S4				CPW 20221213
Reptiles	<a href="#">Pituophis catenifer sayi</a>	Bullsnake	CPW Overall Range	G5T5	S5				CPW 20221213
Reptiles	<a href="#">Plestiodon multivirgatus</a>	Many-lined Skink	CPW Overall Range	G5	S4				CPW 20221213
Reptiles	<a href="#">Sceloporus consobrinus</a>	Fence/prairie/plateau Lizard	CPW Overall Range	G5	S5				CPW 20221213
Reptiles	<a href="#">Sceloporus tristichus</a>	Southern Plateau Lizard	CPW Overall Range	G5	S3				CPW 20221213
Reptiles	<a href="#">Terrapene ornata ornata</a>	Ornate Box Turtle	CPW Overall Range	G5T5	S5				CPW 20221213
Reptiles	<a href="#">Thamnophis radix</a>	Plains Garter Snake	CPW Overall Range	G5	S5				CPW 20221213
Vascular Plants	<a href="#">Asclepias uncialis</a>	Dwarf Milkweed	CNHP Model	G2	S2			BLM/SWAP Tier 2/USFS	CNHP 20210601

## Special Areas and Land Status

**Table 6. CNHP Potential Conservation Areas and Other Special Areas within 1 Miles of Project Area**

Name	Data Type	CNHP Biodiversity Rank	CNHP Edit Date	CNHP Identifier	Data Source
Aquatic Native Species Conservation Waters	SB181 High Priority Habitat				CPW 20220528

**Table 7. Managed Areas within Project Area**

Name	Owner	Manager	Management Description	Public Access*	Protection Mechanism	Easement Holder	Data Source
	PRIVATE	PRIVATE	Private Land	No	NA		COMaP 20230223

\* It is the responsibility of the user to verify public access on any site as access can change over time. Entering an area that is not open to the public subjects an individual to possible sanctions for trespass under Colorado law.

## Water and Wetlands

**Table 8. National Wetland Inventory (NWI) Features within Project Area**

NWI Code	Wetland Type	Total Acres	System	Class	Water Regime	Modifier	Data Source
PEM1J	Emergent	2.41	Palustrine	Emergent/Herbaceous	Intermittently Flooded	None	CNHP 20210122
R4SBC	Rivers & Streams	13.58	Riverine	Stream Bed	Seasonally Flooded	None	CNHP 20210122

## Project Report Appendix

Please visit the [CNHP website](#) for a more extensive collection of definitions for CODEX reports in addition to what is provided here below.

### About CNHP Data

One of CNHP's core research activities is managing a statewide database that details the locations of rare and imperiled species and natural plant communities in Colorado. We gather data from CNHP surveys and monitoring projects, as well as from partners and other trusted sources like herbariums. All of our data are compiled and managed in the Biodiversity Information Management System (Biotics), a web-enabled database platform hosted by [NatureServe](#). The species and natural plant communities we track are assigned global and state imperilment ranks based on rarity, threats, and trends, and their locations are mapped as element occurrences. Element occurrences include spatial data as well as details on condition, size, and landscape context. This information allows us to track both overall distribution and site-specific details describing how well

elements are thriving at each location. We use element occurrences to delineate Potential Conservation Areas that represent the primary area needed to support the element occurrences, and often include additional suitable habitat or buffers from disturbance. **Please visit the [CNHP website](#) for more definitions and details related to CNHP data in CODEX.**

## CODEX Report Definitions

**CNHP Biodiversity Rank** – The significance of a potential conservation area in terms of its biological diversity ranging from B1 (Outstanding Biodiversity significance meaning protection of this potential conservation area can prevent a species from going extinct) to B5 (General interest or open space for more globally secure species).

**CNHP Edit Date**– The date the CNHP potential conservation area record was last updated.

**CNHP Identifier**– A unique identifier for each CNHP data type, applicable only to CNHP data records.

**CO Status** – State status per Colorado Parks & Wildlife: Endangered (SE), Threatened (ST), or State Special Concern (SC).

**Common Name** – The common name of the species or plant community.

**Critical Habitat Status** – Critical habitat status for federally listed species under the Endangered Species Act.

**Proposed** – Proposed critical habitat

**Final** – Final critical habitat

**Critical Habitat Federal Register**- The volume number and first page of

**Managed Areas Name** – Name of the managed area.

**Manager** – The general land Manager.

**Management Description** - The general category of how the feature is managed.

**Other Species of Concern** – Other globally rare species and plant communities, BLM or USFS sensitive species, state listed species, or Tier 1 and Tier 2 priority species from Colorado's State Wildlife Action Plan, and species of economic and recreational value.

**Other Status** – Other status such as BLM sensitive species (BLM), U.S Forest Service sensitive species (USFS), and Tier 1 and Tier 2 priority species from Colorado's State Wildlife Action Plan (SWAP Tier 1, SWAP Tier 2).

**Owner** – The general land owner.

**Public Access** – Level of public access to the feature.

**Protection Mechanism** – Any mechanism of protection assigned to the managed area.



the federal register publication describing the critical habitat.

**Critical Habitat Publication Date** - Federal Register publication date.

**Data Source** – The agency and date of the data provided.

**Data Type** –

**[CNHP EO](#)** – A location in which an element is, or was, present.

**CNHP General EO** – An element occurrence with imprecise directions; broadly mapped and typically historical or extirpated.

**[CNHP Observation](#)** – Sightings of species on CNHP's watchlist or sightings of tracked elements that do not meet the minimum criteria necessary to make an occurrence.

**[CNHP PCA](#)** – Areas in the state contributing to Colorado's biological diversity.

**CNHP Model** – Modeled presumed presence or habitat for a particular species.

**CNHP PCA (Important Plant Area)** – B1 or B2 CNHP potential conservation area supporting globally rare plants.

**CNHP Range Map** – Overall range for a particular species by HUC 10 and HUC 12 for aquatics.

**[Important Bird Area](#)** – The most important places for birds as identified by the National Audubon Society.

**Regulatory Species** – Species with federal protection under the Endangered Species Act or Bald and Golden Eagle Protection Act along with FWS designated critical habitat.

**Return on Investment Report** - Provides maps and the estimated annual benefit in dollars of conserved ecosystem services by ecosystem type within the project area in PDF format. Ecosystem types are derived from the 2016 National Land Cover Database (NLCD).

**Scientific Name** – The scientific name of the species or plant community

**Special Areas and Land Status** – CNHP Potential Conservation Areas ([PCA](#)), [State Designated Natural Areas](#), [Important Bird Areas](#), and managed lands from the Colorado Ownership, Management and Protection database ([COMaP](#)), SB181 High Priority Habitat

**Special Areas Name** – The name of the special area.

**State Rarity** - The [rarity rank](#) used by CNHP and The Natural Heritage Network to track how rare a species or plant community is in Colorado, ranging from S1 (rarest) to S5 (most common).

**Viability Rank** – The estimated viability of the species or ecological integrity of the natural community based on condition, size, and landscape context, ranging from A (excellent) to D (poor).

**Water and Wetlands** – Wetland types from the [National Wetland Inventory database](#).

**Class** - The general appearance of the habitat in terms of either the

**State Natural Area** - Areas that contain at least one unique or high-quality natural feature of statewide significance as designated by the Colorado Natural Areas Program.

**CPW <description>** - CPW data with a long list of data types: observations, nest sites, leks, etc.

**Easement Holder** – Organization or agency holding an easement (if present).

**ESA Status** – Federal status under the [Endangered Species Act](#): Endangered (E), Threatened (T), or Federal Candidate (C) with qualifiers for Partial Status (PS) and experimental populations (XN).

**Global Rarity** – The [rarity rank](#) used by CNHP and The Natural Heritage Network to track how rare a species or plant community is globally, ranging from G1 (rarest) to G5 (most common).

**Last Observation** – The most recent field observation.

**Major group** – The major group in which the element falls: Amphibians, Birds, Crayfish, Fish, Insects, Mammals, Mollusks, Natural Communities, Nonvascular Plants, Reptiles, and Vascular Plants.

dominant life form of the vegetation, or the physiography and composition of the substrate.

**Modifier** - Modifier assigned to further describe wetlands and deepwater habitats within the classification hierarchy based on water chemistry or ph, wetland or deepwater alteration, or soil type.

**NWI Code** – An alpha-numeric code corresponding to the classification nomenclature that best describes a particular wetland habitat. For more information on NWI data values, visit <https://www.fws.gov/wetlands/data/wetland-codes.html>

**System** – A complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical or biological factors.

**Water Regime** - Description of water duration within a wetland habitat.

**Wetland Total Acres** - Total acres of the wetland type in the project area.

**Wetland Type** – The generalized [Cowardin](#) wetland type.

**Appendix F: Desktop Wetlands Review**

## MEMORANDUM

Date: December 29, 2023

Re: **Desktop Wetland Determination  
Road Runner Energy Farm-RAI**

Westwood File 0046541.00

To: Kristina Jansen – RAI Energy

From: Bobby Cress

### Introduction

The Memo with the attached exhibits and appendices constitutes the desktop wetland determination for the Road Runner Energy Farm Project, which is a proposed 500 MW solar farm located within an approximately 2,920-acre Project Area located in Morgan County, Colorado (**Exhibit 1**). Westwood completed a desktop wetland determination within the 2,920-acre Project Area using historical aerial photography as well as available desktop resources.

### Site Description

**Table 1** below lists the sections and townships which overlap the Project Area (**Exhibit 1**). Land use within the Project Area consists of pastureland used for animal grazing. Surrounding land use also consists mostly of undeveloped land. Elevations are undulating throughout the site, ranging from 4,320 feet to 4,510 feet above mean sea level (msl).

*Table 1 – Sections and Townships*

County	Township	Range	Sections
Morgan	2N	55W	5, 6
Morgan	3N	55W	17, 19, 20, 29, 30, 31, 32

### Methods

Westwood utilized the National Wetlands Inventory (NWI) (**Exhibit 2**), the National Hydrography Dataset (NHD) (**Exhibit 2**), Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) (**Exhibit 2**), and the NRCS SSURGO2 Web Soil Survey for Morgan County (**Exhibit 3**) to map wetlands within the Project Area. Westwood also reviewed several years of aerial photography to verify potential wetland boundaries.

## Results

The National Wetland Inventory maps one (1) freshwater pond feature within the northern portion of the Project Area (**Exhibit 2**).

The National Hydrography Dataset maps one (1) flowline feature located in the northwest portion of the Project Area (**Exhibit 2**).

The Flood Insurance Rate Maps indicate that the entire Project Area is located outside of the 100-year and 500-year floodplain (**Exhibit 2**).

The NRCS SSURGO2 for Morgan County indicates that the soils listed in **Table 2** are mapped within the Site (**Exhibit 3**). Based on NRCS Web Soil Survey Hydric rating, there are ten (10) soil units classified as non-hydric within the Site.

**Table 2 – Soil Summary Table**

Map unit symbol	Map unit name	Percent Hydric	Hydric Rating
Dl	Dune sand	0	Non-hydric
Sg	Shingle soils	0	Non-hydric
TaE	Tassel-Terry fine sandy loams, 5 to 20 percent slopes	0	Non-hydric
TeC	Terry fine sandy loam, 3 to 7 percent slopes	0	Non-hydric
Va	Valent sand, 0 to 3 percent slopes	0	Non-hydric
VcD	Valent sand, 3 to 9 percent slopes	0	Non-hydric
Vd	Valent-Duneland complex, rolling, 9 to 24 percent slopes	0	Non-hydric
VmB	Vona loamy sand, 1 to 3 percent slopes	0	Non-hydric
VmD	Vona-Dwyer loamy sands, 5 to 9 percent slopes	0	Non-hydric
VoD	Vona fine sandy loam, 5 to 9 percent slopes	0	Non-hydric

December 29, 2023

Page 3

Using the resources above as well as historical aerial photography data, Westwood mapped twenty-five (25) potential wetlands totaling approximately 10.9 acres within the Project Area (**Exhibit 4**).

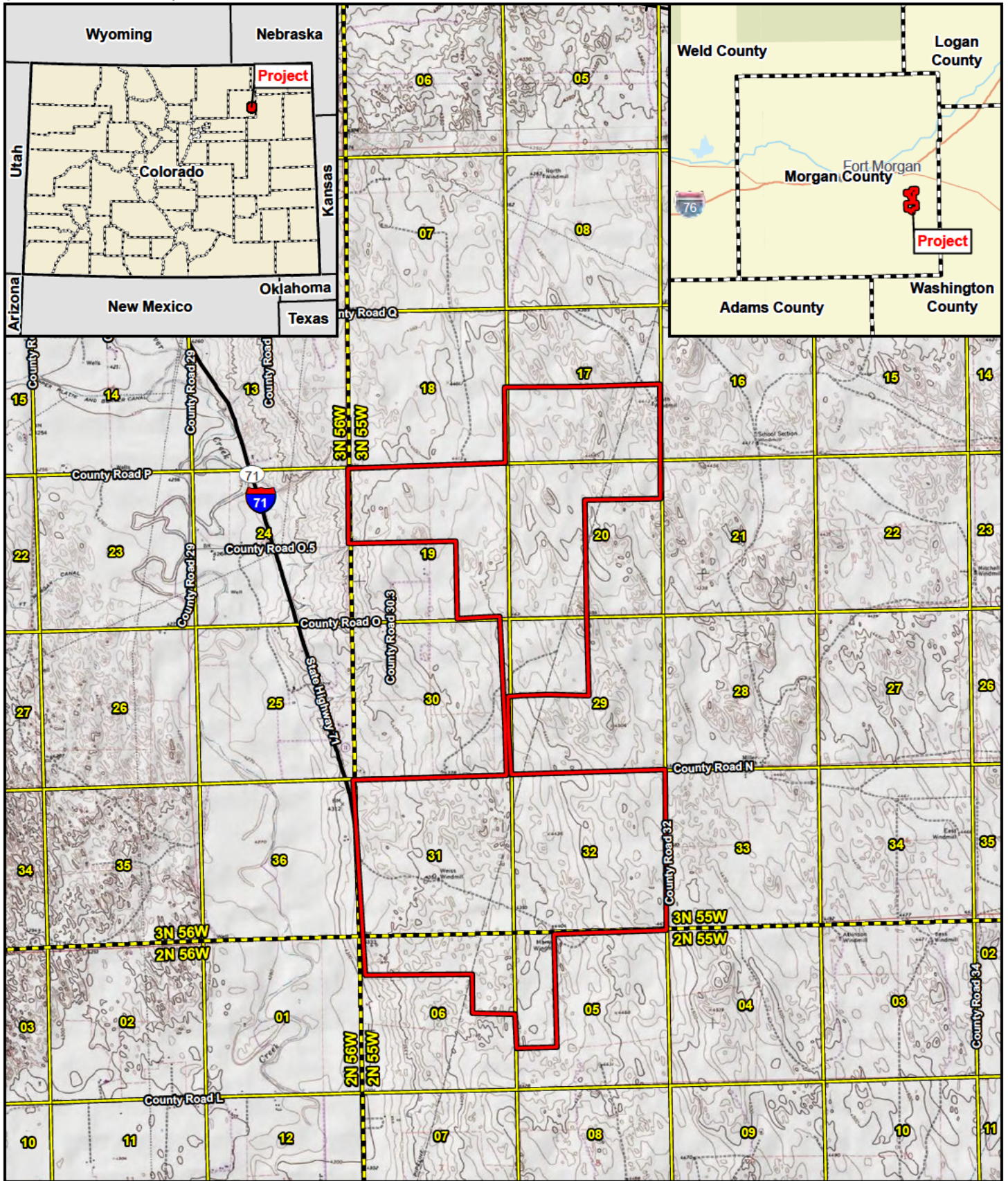
### **Conclusions**

Westwood conducted a desktop wetland determination and found twenty-five (25) potential wetlands totaling 10.9 acres within the Project Area. Westwood recommends that a field delineation be conducted to ascertain the exact extent of the wetlands on site.

Please contact Westwood if you have any questions related to this memorandum.

## Exhibits

**Road Runner Energy Farm**  
Morgan County, Colorado



Data Source(s): Westwood (2023); ESRI WMS U.S. Topography & World Streets Basemaps (Accessed 2023); U.S. Census Bureau (2022); PLS (2021); OpenStreetMap (2022).

**Legend**

- Project Area
- State Boundary
- County Boundary
- PLSS Township Boundary
- PLSS Section Boundary
- Municipal Boundary
- Major Road
- Local Road
- Railroad



**Westwood**

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Westwood Professional Services, Inc.

# Roadrunner Energy Farm Project

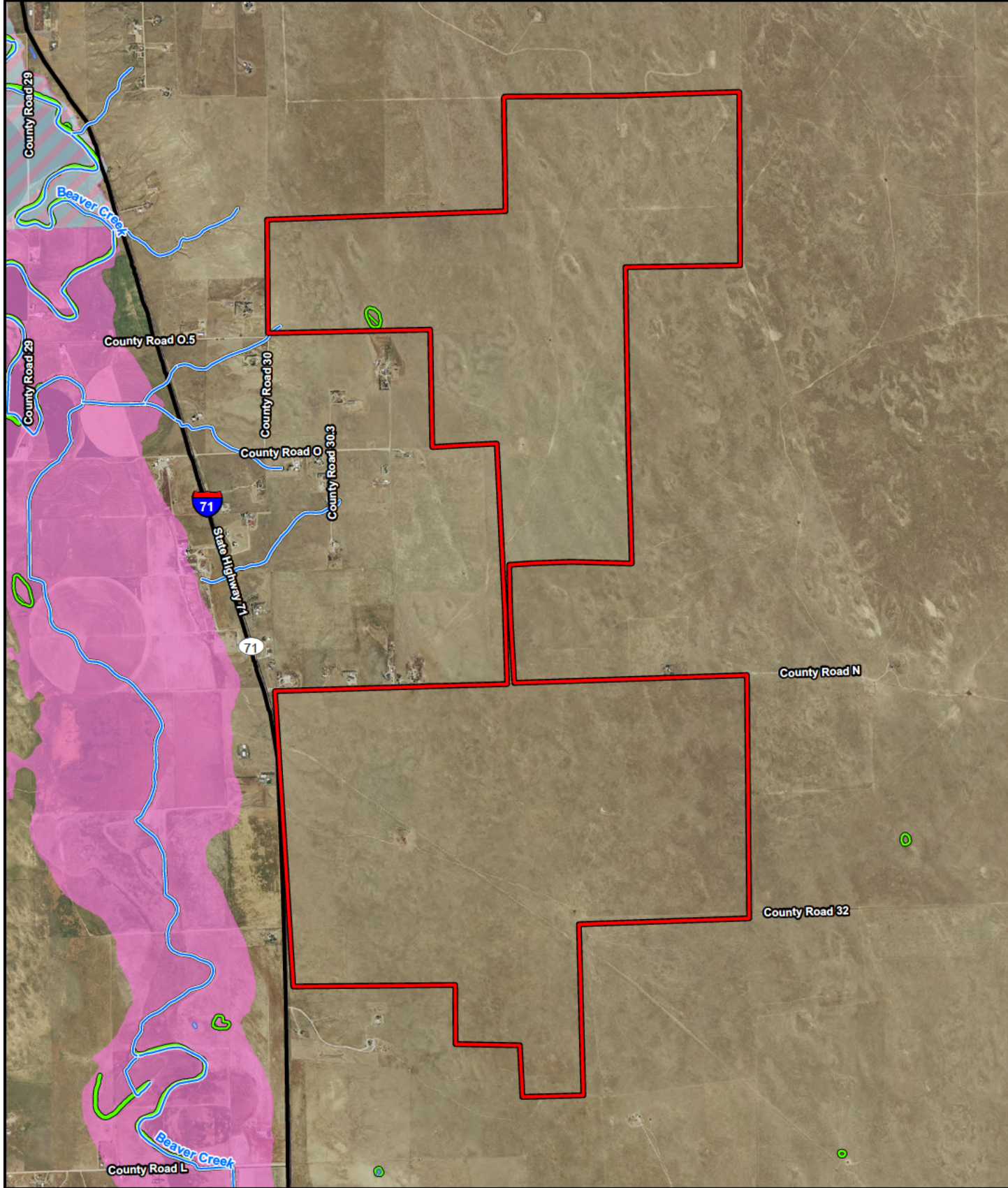
Morgan County, Colorado

**Project Location & USGS Topography**



Map Document: N:\046541.00\_GIS\_ArcPro\R0046541\_040\_WetlandExhibits\_231221.aprx 12/22/2023 8:21 AM LMalodonado

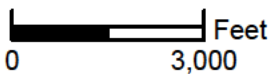




Data Source(s): Westwood (2023); NAIP Imagery (2021); U.S. Census Bureau (2022); OpenStreetMap (2022); NHD (2023); NWI (2023); FEMA (2023).

**Legend**

- Project Area
- NHD Flowline
- NHD Waterbody
- NWI Wetland
- Major Road
- FEMA Flood Hazard**
- 100-Year Flood Zone
- Regulatory Floodway



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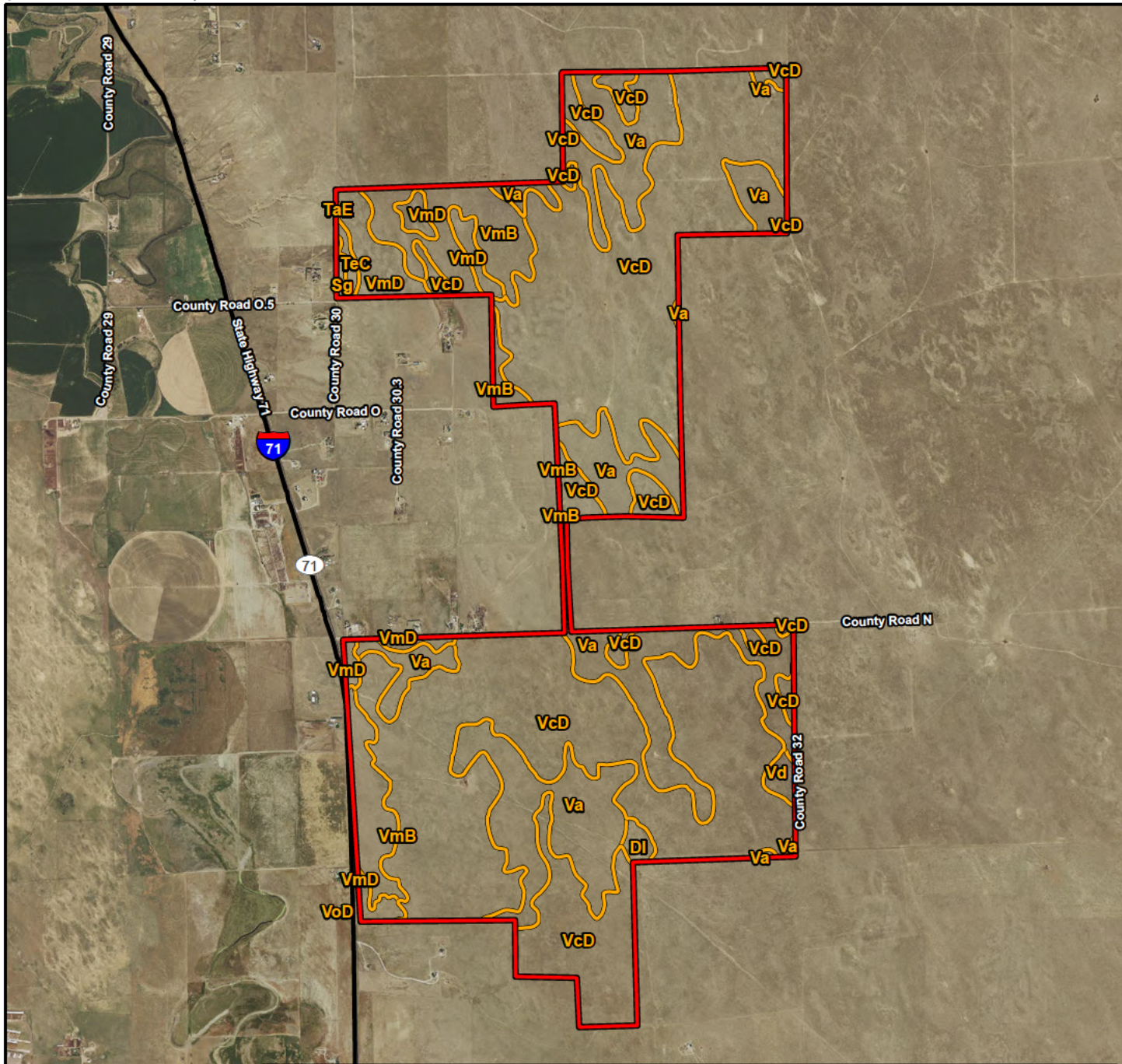
# Roadrunner Energy Farm Project

Morgan County, Colorado

## Water Resources



Map Document: N:\0046541\_00\_GIS\AcProcR0046541\_040\_WetlandExhibits\_231221.aprx 12/22/2023 8:22 AM LMaldonado



Map Unit Symbol	Map Unit Name	Hydric Classification	Percent Hydric Classification
County			
Dl	Dune land	Non-Hydric	0
Sg	Shingle soils	Non-Hydric	0
TaE	Tassel-Terry fine sandy loams, 5 to 20 percent slopes	Non-Hydric	0
TeC	Terry fine sandy loam, 3 to 7 percent slopes	Non-Hydric	0
Va	Valent sand, 0 to 3 percent slopes	Non-Hydric	0
VcD	Valent sand, 3 to 9 percent slopes	Non-Hydric	0
Vd	Valent-Duneland complex, rolling, 9 to 24 percent slopes	Non-Hydric	0
VmB	Vona loamy sand, 1 to 3 percent slopes	Non-Hydric	0
VmD	Vona-Dwyer loamy sands, 5 to 9 percent slopes	Non-Hydric	0
VoD	Vona fine sandy loam, 5 to 9 percent slopes	Non-Hydric	0

Data Source(s): Westwood (2023); NAIP Imagery (2021); U.S. Census Bureau (2022); OpenStreetMap (2022); SSURGO (2023).

**Legend**

Project Area

Soil Unit Boundary

Major Road



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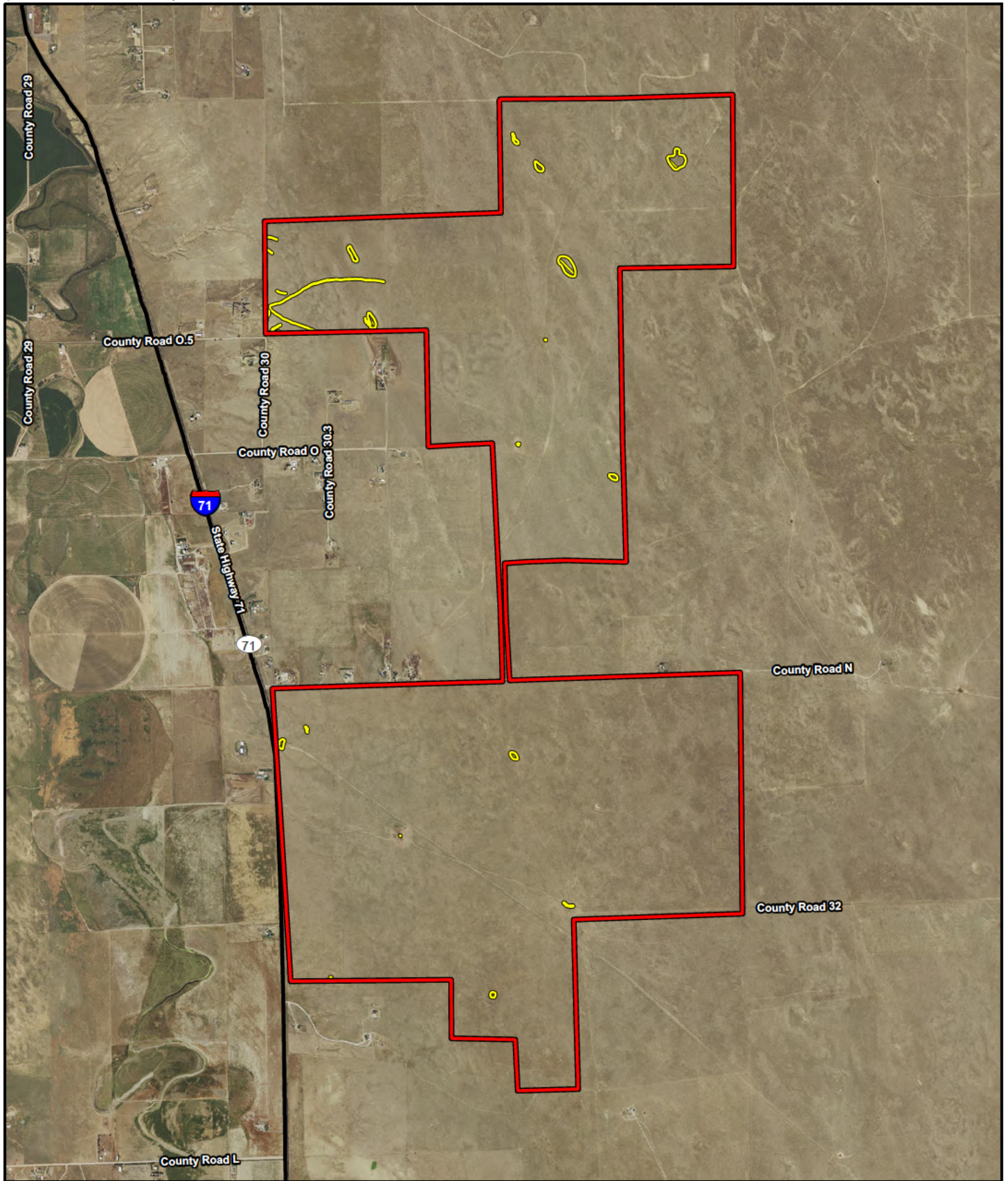
# Roadrunner Energy Farm Project

Morgan County, Colorado



Soils

Map Document: N:\0046541\_001\_GIS\AcProc\0046541\_040\_WetlandExhibits\_231221.aprx 12/22/2023 8:23 AM LMaldonado






Data Source(s): Westwood (2023); NAIP Imagery (2021); U.S. Census Bureau (2022); OpenStreetMap (2022).

### Legend



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-  Project Area
-  Desktop Delineated Suspect Area
-  Major Road

## Roadrunner Energy Farm Project

Morgan County, Colorado

Desktop Delineated Features



**Appendix G: Desktop Cultural Resources Review**



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and HISTORIC PRESERVATION

**Service and Price List**

**File Searches**

A file search is conducted when OAHP staff is asked to supply information concerning cultural resources or cultural resource surveys in a specific location. File search requests can be placed in person at OAHP or e-mailed to hc\_filesearch@state.co.us.

Results are provided in an excel spreadsheet containing 34 data fields that are sorted by site number. Also provided are corresponding GIS shapefiles (if available), and accompanying read-me document. Exact locations of archaeological and paleontological sites are only provided to professionals who qualify under the *Dissemination of Cultural Resource Information: Policy and Procedures*.

A basic file search is one based on locational criteria (map, UTM, PLSS, etc.), customized searches are based on criteria other than locational attributes. GIS clips (without accompanying spreadsheet) and information in other file formats may be provided on a case by case basis. Please contact OAHP at 303-866-5216 if you have any questions or to get more information concerning file searches.

**Reproductions**

Reproductions of OAHP site forms and reports are available upon request. Locations of archaeological and paleontological sites are only provided to professionals who qualify under the *Dissemination of Cultural Resource Information: Policy and Procedures*.

Reproductions are transmitted electronically as PDFs. Some items, including those over 11X17, are reproduced only on a case by case basis. Items that are not available for reproduction can be viewed in-house. If you have questions about requesting reproductions or would like to make an appointment to view records in-house, please contact OAHP at 303-866-3395.

**Fees**

Requests from students, private landowners, or individuals conducting personal research may be eligible for fee reductions or waivers. Under normal circumstances, file search results and reproductions will be sent out within seven business days of the request being received by OAHP. Larger requests may require more time to complete. Requests requiring a faster turnaround time will be assessed a **\$100.00** rush fee and will be done as time allows. File search fees are made up of a base fee + a site/survey fee. Reproductions are charged based on the cumulative file size of the requested items. Invoices will be mailed in hard copy unless otherwise requested.

- Basic File Search
  - **\$20.00 Base Fee (+ Site/Survey Fee)**
- Custom Search
  - **\$40.00 Base Fee (+ Site/Survey Fee)**
- Site/Survey Fee (applies to file searches only)
  - For each site or survey found according to the requested search criteria the following charges apply:
    - **0-5 sites/surveys = no charge**
    - **6+ sites/surveys = \$1.00 each**
- Digital Reproductions
  - **Under 1 MB = No Charge**
  - **Over 1MB = \$3.00 per MB**



OFFICE of ARCHAEOLOGY  
and HISTORIC PRESERVATION

**File Access Request**

A completed and signed copy of this form is necessary to access both electronic and hardcopy OAHp cultural resource records. Requests for information can be submitted by e-mail (hc\_filesearch@state.co.us), in hardcopy, or faxed (303-866-2711). If you have questions or concerns, please e-mail or call us at 303-866-5216 or 303-866-3395.

Some cultural resource information is confidential and may not be released to unauthorized individuals or organizations. Confidential information includes, but is not limited to, locational information for all archaeological and paleontological sites, and locational information on owner-restricted property listings. Individuals who are not granted release of confidential information will be referred to the landholding agency on record.

Requestor's Name: Ryan Grohnke, RA

Organization: Westwood Professional Services, Inc

Address, City, State, Zip: 12701 Whitewater Dr, Suite 300  
Minnetonka, MN 55343

Telephone, E-mail: [REDACTED]

Project Name/Number (for reference purposes): R0046541.00

Reason for request (please check all that apply):

Section 106 Related, lead government agency \_\_\_\_\_

I am a member of planning staff devoted to the day to day management of a CLG Preservation Commission, specify CLG \_\_\_\_\_

This request is related to an SHF project

I am a student or researcher seeking information for non-profit/personal research

Other, specify due diligence and potential local permitting

Remarks/Special Requests/Billing Information (if different from above):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

***Request Tracking - To be completed by OAHp staff***

Received by: \_\_\_\_\_ Date: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Requested: In-house \_\_\_\_\_ Mail \_\_\_\_\_ Phone \_\_\_\_\_ Fax \_\_\_\_\_ E-mail \_\_\_\_\_ Other: \_\_\_\_\_

File Search ID: \_\_\_\_\_ Locations of restricted resources provided? Yes \_\_\_\_\_ No \_\_\_\_\_

**Fees**

File Search \$ \_\_\_\_\_ Reproductions \$ \_\_\_\_\_ Custom Search \$ \_\_\_\_\_

Rush Job \$ \_\_\_\_\_ Other (specify) \$ \_\_\_\_\_

Total Cost \$ \_\_\_\_\_ Invoice Number: \_\_\_\_\_

**Requests for Forms, Documents or Maps:**

List all documents, maps, site forms, images, etc. using OAHP ID numbers when possible. Attach additional pages if needed.

Purpose:  View Records In-house       Reproductions (specify): Digital  Hard Copy

Record ID	Comments	Record ID	Comments

**Request for Database Search:**

	<u>County</u>	<u>Township</u>	<u>Range</u>	<u>Sections</u>
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____

UTM Reference (Please specify datum; NAD83 is preferred)

A. \_\_\_\_ \_\_\_\_; \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mE \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mN  
 B. \_\_\_\_ \_\_\_\_; \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mE \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mN  
 C. \_\_\_\_ \_\_\_\_; \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mE \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mN  
 D. \_\_\_\_ \_\_\_\_; \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mE \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ mN

Custom Search Criteria:

shp file provided. Please review project and one mile buffer

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## User Agreement: OAHP Cultural Resource Records

All individuals requesting access to cultural resource or paleontological records housed at the Office of Archaeology and Historical Preservation (OAHP) must complete and sign the following agreement prior to access. These records include but are not limited to site forms, documents, maps, images, and GIS information. This user agreement will outline the nature and extent of the records that will be provided.

Access to all or part of many cultural resource records is restricted. The criterion under which individuals may obtain access to cultural resource information is provided in OAHP's *Dissemination of Information: Policy and Procedures, 1991 (revised 2012)*. As outlined in that policy, access to archaeological information by non-archaeologists is on a case-by-case basis and generally includes only select information.

---

I request access to the documents, site forms, images, maps, or GIS information listed on this form. I have read and agreed to the following conditions:

1. Some of the information provided is confidential and may not be released to unauthorized individuals or organizations. Confidential information includes, but is not limited to, locational information for all archaeological and paleontological sites and locational information on owner-restricted property listings. Individuals who are not granted release of confidential information will be referred to the landholding agency on record.
2. There are no guarantees as to the information's accuracy or completeness and it may change frequently.
3. The information provided concerns cultural and paleontological resources that are under the jurisdiction, ownership, or control of other entities, such as state and federal agencies, private individuals, and tribal governments. These properties may be afforded additional levels of legislative protection related to the restrictions on cultural resource information. The information will be used in compliance with applicable municipal, county, state, tribal or federal laws and regulations.
4. Information provided in a digital format is to remain in the sole possession of the undersigned. If digital information is requested for use on a shared system, a signed statement detailing access and security on that system will be provided to OAHP prior to release of the information. OAHP staff will review the statement to determine the nature and extent of information to be provided.
5. OAHP documentary and photo collections are available to researchers for personal and scholarly use. Material from these collections may not be published or reproduced without permission, except that photocopies may be obtained under the fair use exception of the US copyright code. In most cases, OAHP does not hold the copyright to images and documentation. Researchers wishing to publish or publicly display images or other documentation assume responsibility for questions of copyright that may arise.
6. Access to records does not constitute permission to enter onto or conduct investigations on any of the land for which records are provided. It is the users responsibility to obtain permission from the appropriate municipal, county, state, federal, or tribal officials, or private property owners, before instituting any investigations on, or related to, their lands. Copies of the products of such research should be sent to appropriate officials or landowners, and all permit terms and conditions must be honored. Both the State and the landowner may pursue causes of action against the user in the event the information is misused.
7. The absence of information concerning resources in a particular area does not necessarily indicate that none exists. The absence of information concerning resources in a particular location may be due to a lack of survey investigations in that area or incomplete information.
8. I understand that obtaining information on previously recorded cultural and paleontological resources does not constitute review under Section 106 of the National Historic Preservation Act or the State Register of Historic Properties Act.



Signature of User

12/19/2023

Date



**Appendix H: BESS Site Design Manual and Specifications**

**Grid transformation for the world's largest energy projects**

- Best-in-class energy density and round-trip efficiency
- Industry-leading power electronics and thermal system performance
- Rapid and cost-effective deployment with factory-assembled and pre-tested solution

**Scaled and rigorously tested product safety and reliability**

- Comprehensive in-house reliability testing by the leading experts in the industry
- Engineered for safety and performance at every level
- Continuous improvement based on large-scale operational experience

**Designed with flexibility and configurability in mind**

- Modular architecture that allows for a range of configurations across multiple applications
- Industry experts available to identify site-specific needs
- Integrated solution that allows for battery augmentation over time



**POWER AND ENERGY**

Megapack duration is configurable. Standard configurations are 2-Hour and 4-Hour durations. Nominal energy is specified at 25°C (77°F).

	AC Power per Megapack	Energy per Megapack
<b>2-Hour</b>	1927 kW	3854 kWh
<b>4-Hour</b>	979 kW	3916 kWh

**ELECTRICAL**

<b>Nominal AC Voltage</b>	480 V AC 3-phase	
<b>Nominal Frequency</b>	50 or 60 Hz	
<b>Inverter Power per Megapack<sup>1</sup></b>	2-Hour Max:	2400 kVA
	4-Hour Max:	1320 kVA
<b>Round-Trip Efficiency<sup>2</sup></b>	2-Hour:	91.7%
	4-Hour:	93.7%

<sup>1</sup> Scalable from 400 kVA minimum in increments of 50 kVA

<sup>2</sup> Full-depth cycle including all power conversion and thermal system losses, at 25°C (77°F)

**WARRANTY**

<b>Coverage</b>	All-inclusive, equipment and energy retention
<b>Term</b>	15 years standard, extendable to 20 years

**PART NUMBER**

**1848844-XX-Y** Where X is a number between 0-9 and Y is a letter

**MECHANICAL AND MOUNTING**

<b>Ingress Ratings</b>	IP66/NEMA 3R (Main Enclosure) IP20 (Thermal System)	
<b>Enclosure Dimensions</b>	Width:	8800 mm (346 ½ in)
	Depth:	1650 mm (65 in)
	Height:	2785 mm (110 in)
	+/- 13 mm (½ in)	
<b>Maximum Weight</b>	38,100 kg (84,000 lb)	
<b>Operating Ambient Temperature</b>	-30°C to 50°C (-22°F to 122°F)	

**REGULATORY**

System is compliant to grid codes and safety standards of all major markets.

<b>System</b>	NRTL listed to UL 1973, UL 9540, UL 9540A, UL 1741 SB, IEC 62619, IEEE 1547	
<b>Cells</b>	NRTL listed to UL 1642	

**CONTROLS AND COMMUNICATIONS**

<b>Protocols</b>	Modbus TCP / DNP3 / REST API	
<b>Core Control Modes</b>	Direct Real Power	Ramp Rate Control
	Direct Reactive Power	Site Control
	Frequency Support	Power Factor Control
	Virtual Inertia	Voltage Control

**MONITORING**

<b>Powerhub</b>	Free-to-use cloud monitoring portal
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**Appendix I: Fire Mitigation and Emergency Response Plan**

# Fire Mitigation Emergency Response Plan (DRAFT)

ROADRUNNER ENERGY FARM - MORGAN COUNTY, CO  
IN SUPPORT OF SPECIAL USE PERMIT APPLICATION

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DRAFT

## 1.0 Introduction

### Objective:

The objective of this Fire Mitigation and Emergency Response Plan (“ERP”) is to establish a framework for managing emergency incidents at the Roadrunner Energy Farm Project, utilizing Tesla battery systems or equivalent Tier 1 Battery Systems, to ensure safety, minimize risks, and protect the environment.

### Facility Overview:

The Roadrunner Energy Farm Project (“Project”), located in Morgan County, Colorado, includes up to 500 megawatts (“MW”) of solar and battery energy storage (“BESS”) capacity. This plan covers the BESS, focusing on Tesla batteries and equivalent systems.

Roadrunner Energy Farm, LLC (the “Applicant”), which is a subsidiary of RAI Energy US Development LLC (“RAI Energy”), has prepared this Plan in furtherance of the Project. The Project is planned for construction from 2026 through 2027, with a target commercial operation date (“COD”) of September 2027.

This Plan is intended to detail the proper emergency responses to potential events at the site located approximately five miles south southeast of the City of Brush in unincorporated Morgan County, Colorado. In total, the Project consists of a 2,762.13 -acre solar array, an 8.3-acre BESS, a 10-acre Project substation, and a 0.5-mile generation-tie line for interconnection at the existing Public Service Company (“PSCO”) 230 kilovolt (“kV”) Story-Pawnee transmission line located to the west of the Project.

## 2.0 Scope and Application

This ERP applies to all operations at the Roadrunner Energy Farm Project involving the use of battery energy storage systems. It is designed to be flexible to accommodate both Tesla and other Tier 1 battery systems that share similar safety and operational characteristics.

This draft document shall be finalized prior to the start of construction activities, at which time it will be activated and be in effect during the commissioning and normal operation and through the decommissioning of the facility.

All alarms from the facility will be under 24-hour central monitoring by the Applicant’s Network Operation Center (“NOC”). In any event, the NOC will coordinate all the response as it pertains to the Project facility. The NOC will directly contact local emergency responders, including the fire department, as soon as an event requiring emergency response is reported.

The Applicant will periodically update this document with regards to input from stakeholders, federal, county, and local requirements, and facility updates. Appropriate parties will be notified of any revisions to this document.

## 3.0 Definitions

*ERP (Emergency Response Plan):* The document outlining the strategy and procedures for responding to emergencies within the facility.

*BESS (Battery Energy Storage System):* Systems that store energy via batteries for later use.

*ERT (Emergency Response Team):* The group responsible for executing the response activities outlined in this plan.

### 3.1 Technical Terminology

#### *Battery Management System (BMS)*

An integrated system that monitors, controls, and optimizes performance of an individual or multiple battery modules in an energy storage system and has the ability to control the disconnection of the module(s) from the system in the event of abnormal conditions. Each battery module has a dedicated BMS, with a Megapack level controller supervising output of all modules at the alternating current (“AC”) bus level.

#### *Local Controller*

The local controller is used for the communication integration of different equipment in the energy storage system, faults and alarms management, and parallel control of two or more energy storage inverters, and the design offers one universal communication interface of the system.

The local controller collects and uploads real-time information through an ethernet connection. At the same time, the Energy Management System (“EMS”) can control the storage system through the local controller. Within the control scope of the local controller, it processes the startup and shutdown procedure, protections, and alarms.

#### *Cell*

The basic functional electrochemical unit contains an assembly of electrodes, electrolyte, separators, container, and terminals. It is a source of electrical energy by direct conversion of chemical energy. This is the smallest non-divisible energy component of a BESS.

#### *Battery Module*

A subassembly which is a component of a BESS that consists of a group of cells or electrochemical capacitors connected together either in a series and/or parallel configuration with or without protective devices and monitoring circuitry.

In the case of the Megapack, battery modules are factory installed into battery module bays and contain lithium-ion cells, the smallest component of the energy system. Each module integrates battery cells, fusing, and battery management system functions. A battery module is in turn the smallest field-replaceable battery unit. Each Megapack contains up to 24 modules.

Each module includes an integrated inverter module for power conversion. Battery modules are connected serially or in parallel to produce the required usable voltage/potential.



### *Thermal System*

The thermal system provides active cooling and heating to the internal components of the Megapack. An external heating, ventilation, and air conditioning (“HVAC”) or thermal system is therefore not required. The thermal system is comprised of the thermal cabinet and the thermal roof.

The thermal cabinet includes pumps that circulate coolant through the Megapack and a compressor that maintains thermal control in addition to an in-line heater that can warm the coolant. The thermal cabinet also contains a power conversion system for drawing power from the Megapack’s internal AC bus.

The thermal roof, or top of the cabinet of the enclosure, provides ventilation airspace and contains fans and radiators that cool the ethylene glycol-water coolant solution.

### *Customer Interface Bay*

The Customer Interface Bay is a single bay that includes all the external connections needed for initial installation (the customer I/O area and the AC bus bar area) and the Megapack AC circuit breaker.

### *Cell venting*

In this initial stage of failure, a flammable electrolyte vents from the module in gaseous state. Based upon UL9540a testing, the critical temperature where sustained venting begins is 147 C/297 F. Gas venting is often a precursor of thermal runaway.

### *Thermal Runaway*

The incident when an electrochemical cell’s temperature increases at an accelerated rate in an uncontrollable fashion sufficient to result in damage to the cell. Thermal runaway progresses when the cells’ generation of heat is at a higher rate than the heat it can dissipate. Based on UL9540a testing, thermal runaway begins at 150 C/302 F.

### *Stranded Energy*

During an emergency at a BESS facility, E-Stops may be operated to stop charging and discharging of modules. However, the E-Stop feature does not discharge the electrical potential remaining in the cells/modules, which is known as stranded energy.

### *Critical Temperatures*

Temperature plays a significant role in the health of batteries. Manufacturers provide thermal operating guidelines and UL9540a testing serves to inform on Critical Temperature thresholds that result in cell venting and thermal runaway.

### *Explosion Control*

**Explosion Protection by Deflagration Venting (NFPA68):** This standard applies to the design, location, installation, maintenance, and use of devices and systems that vent the combustion gases and pressures resulting from a deflagration within an enclosure so that structural and mechanical damage is minimized.

**Explosion Prevention Systems (NFPA69):** This standard provides requirements for installing systems for the prevention and control of explosions in enclosures that contain flammable concentrations of flammable gases, vapors, mists, or hybrid mixtures.

#### *Alternating Current (AC) / Direct Current (DC)*

Energy produced by the Modules can be categorized as direct current (“DC”). During electrical emergencies, the fire services traditionally use non-contact voltage testers to identify energized equipment. It should be noted that non-contact voltage detectors cannot detect the presence of DC and should never be used.

#### *BESS – Subject Matter Expert (SME)*

The code requires the facility owner/operator to designate and train staff to respond 24/7 within a timely manner to investigate all BESS incidents. They will serve as the site subject matter expert (“SME”) and work closely with the fire services to investigate and mitigate conditions while ensuring the safety of fire service members operating on the scene.

#### *Site Operator*

At the direction of the BESS SME, the Site Operator will conduct or coordinate field switching to isolate equipment not automatically isolated by the BMS. Switching may involve the operation of breakers, disconnects and the application of grounds to facilitate suppression and inspection.

## 4.0 System Description

The Project is a utility scale hybrid solar and BESS Facility. The Project as proposed will include 1,089,420 photovoltaic panels, 120 solar inverters, and 528 Tesla Megapack 2XLs. As the Project advances in design, specific components may be adjusted or substituted with equivalent Tier 1 equipment. These details will be finalized and updated in the ERP before construction.

Access would be provided to the Project site via Interstate Highway 76 to State Highway 71 in the southern section of the Project, as well as County Road O.5 in the northern section of the project. Site access will be either through improvements to existing public roadways and/or via up to three new 20-foot-wide gravel access roads that would be constructed to access the Project from County Road O, County Road N, and/or County Road O.5. Internal 16-foot-wide gravel access roads will be constructed within the facility to access the solar arrays, Project substation and switchyard, operations and maintenance shed, and the BESS area. The Applicant will maintain the Project access roads as all-weather, compacted gravel beds to provide a sufficient turning radius for emergency vehicles.

*See Appendix C for Facility Layouts and Site Access Points*

## 4.1 Energy Storage System Conceptual Overview

### *Energy Storage System Concept*

Energy Storage Systems are charged from renewable energy such as solar and wind, or from grid ties. These systems can be charged at night when the cost to produce power is lower and discharged at peak loading times during the day or evening for grid sustainability.

### *Battery Management System*

The BMS has a wide-reaching oversight to control charging, discharging, fault detection and equipment isolation. The BMS has design parameters that evaluate the state of charge (“SOC”) and the state of health (“SOH”) of the batteries along with critical temperature thresholds that generate alarms accordingly. The BMS is designed to monitor, relay, and balance battery cell voltages, currents, and temperatures. The BMS is integrated into the BESS and will disconnect electrical equipment or place it in safe operating conditions if potentially hazardous temperatures or other conditions, such as short circuits, over-voltages, over-currents, etc., are detected. The system plays a key role in the timely response to system emergencies, such as cell venting and thermal runaway. The BMS shall have the ability to isolate trouble modules as necessary to mitigate emergencies and communicate directly with the NOC. The BMS exists at a module, Megapack, and system level for layered control.

In order to make informed decisions during system emergencies, the BMS should be reviewed with an emphasis on the SOC for cells/modules on troubled strings. A full SOC will increase the duration of the emergency. In addition, the temperature of cells will be an indication of fire propagation within the troubled module or adjacent modules.

## 4.2 Tesla Megapack Overview

The Project BESS, as currently proposed, is comprised of 528 Tesla Megapack 2XLs. All units have been designed with the highest level of safety protection for energy storage systems. Each component configuration and system conforms to or exceeds industry standards and certification requirements. The battery specification sheet will be provided as Appendix B in the final plan.

Megapack is a fully integrated battery energy storage unit capable of charging and discharging real power and injecting and absorbing reactive power. Megapack converts power for storage in rechargeable lithium-ion battery modules. Each Megapack will be pre-integrated with battery modules and includes a thermal management system, monitoring equipment and safety equipment such as gas and heat detectors, and a fire suppression system.

- System protection features:
  - Battery module overcurrent protection
  - Inverter DC protection
  - Inverter AC protection
  - Ground fault protection
- Safety disconnect features including:
  - Megapack AC circuit breaker
  - Enable circuit
  - Enable switch
  - Remote shutdown terminals
- Fire safety features:
  - Runaway gas igniters
  - Overpressure vents

The facility also incorporates a Supervisory Control and Data Acquisition (SCADA) system that communicates all necessary operations data to the Applicant. The BESS can also be operated

remotely by the NOC via SCADA. The installed system is always connected in stand-by mode except when charging, discharging or offline for maintenance.

### 4.3 Fire Protection Systems

#### *Explosion Protection (internal Sparker System)*

Each Megapack enclosure is equipped with explosion protection via internal sparker system and overpressure vents to manage a potential deflagration vent. The sparker system is designed to ignite flammable gases before an explosive atmosphere is allowed to develop within the enclosure. Following combustion of the gases by the sparker systems, the passive over-pressure vents allow flames and smoke to safely exit via the top of the Megapack enclosure.

The sparker system is always on and is powered by internal battery power, and thus will remain operational even during the loss of grid power or if an external shutdown is triggered for the battery equipment. If an event were to occur under these considerations, the sparker system and corresponding overpressure vents would still operate as described.

#### *Emergency Shutoffs*

Emergency shutoff is provided at multiple levels, though the Fire Department should not engage with E-stops, as BESS shutdown may adversely affect the electrical grid.

**The Fire Department should not engage with E-Stops, as BESS Shutdown may adversely affect the electrical grid. Any interaction with E-stops should only be initiated in coordination with the System Owner and other SMEs as is deemed necessary.**

#### *Automatic E-stops*

Automatic shutdown is provided at different levels for the Tesla Megapack battery modules, depending on the type of failure:

- For major faults within battery module(s) – such as overtemperature, overcharge, or ground fault – the faulted module(s) will be isolated by DC converters, disconnects, and / or DC fuses, and an alarm will be generated. This may not result in complete shutdown of the system.
- If a large propagating thermal runaway occurs, the faulted Megapack is isolated by opening its AC contactors and over temperature loss faults will be sent to the service team.

#### *Enclosure Level E-stop*

Each Megapack unit is equipped with AC circuit breakers located within the Megapack Customer Interface Bay door and is to be used only by authorized maintenance or operations personnel.

**In the event of a battery related failure, the Fire Department should not approach any battery enclosures or engage with any enclosure E-Stops.**

#### *Battery Management System (BMS)*

An integrated BMS monitors key datapoints such as voltage, current and SOC of battery cells, in addition to providing control of corrective and protective actions in response to any abnormal conditions. Each battery module is equipped with a dedicated BMS and a Megapack-level bus

controller supervising output of all modules at the AC bus level. In the event of abnormal conditions, the BMS will generally first raise an information warning, and then trigger a corresponding corrective action should certain levels be reached. Critical BMS sensing parameters include:

- Over / under temperature limits
- Over / under voltage limits
- Over / under current limits
- Communications loss

## 4.4 Fire Detection, Alarming and Notification

### *Fire Detection*

The energy facility is equipped with multi-spectrum ultraviolet / infrared (UV/IR) flame detectors directed at the Megapack units. The exact number and location of the flame detectors will be finalized prior to construction. In the event of a battery-related fire or thermal event emanating from the Megapack units, the flame detectors shall issue the following actions:

- Display and sound event at Control Panel
- Display and sound event at Annunciator
- Activate horn strobe
- Send alarm signal to Central Station
- Send trouble signal to Central Station
- Send alarm signal to BMS

*TBD: Figure (x). Flame Detector Layout (to be finalized prior to construction)*

### *Central Station Monitoring*

In the event of flame detection via external IR flame detectors, the Central Station shall send alarm and trouble signals to the Central Station, which shall then be relayed to the local Fire Department to coordinate dispatch of responding units.

*Table (x). – Central Station Monitoring (Facility Information to be finalized prior to construction)*

<b><u>Central Station Monitoring Facility (NAME)</u></b>
--

- |  |
|--|
| <ul style="list-style-type: none"><li>• <b>Phone:</b> (XXX) XXX-XXXX</li><li>• <b><u>Additional Information:</u></b></li></ul> |
|--|

### *Remote Monitoring Facility*

In addition to monitoring by the Central Station, remote monitoring of BMS operation is provided by the 24/7 Tesla Operations Center. In the event of a battery related failure transmitted by the BMS, alarm notifications and other pertinent information on the state of the BESS shall be sent to the System Owner to inform potential emergency response procedures as needed.

Additionally, if more detailed information on the State of the Megapack units is required, the Tesla Network Operations Center should be contacted.

Table (x) – Tesla 24/7 Operations Center Information (Table numbers to be updated in final draft prior to construction)

<b>Tesla 24/7 Operations Center (for Emergency Use)</b> <ul style="list-style-type: none"><li>• <b>24/7 Emergency Hotline:</b> +1 (650) 681-6060</li><li>• <b>Email support:</b> <a href="mailto:IndustrialStorageSupport@tesla.com">IndustrialStorageSupport@tesla.com</a></li></ul>
---

*Additional Contact Information as Needed (to be finalized prior to construction and in coordination with local Fire Department and any other members of the ERT)*

[Description]

Table (x) – Description

<b>Description</b> <ul style="list-style-type: none"><li>• <b>Emergency Hotline:</b></li><li>• <b>Email :</b></li></ul>
---

*See Appendix B for Tesla Technical Data Sheets and Safety Information.*

## 5.0 Handling and Safety Precautions

### Battery Handling

Batteries must not be punctured, immersed, or exposed to temperatures outside the range specified by the manufacturer.

Handling of batteries should only be performed by trained personnel following the guidelines provided by Tesla and aligned with industry best practices.

### Safety Precautions

Ensure all battery systems are installed with appropriate spacing to prevent thermal propagation as recommended by Tesla.

Regularly inspect battery installations for signs of damage or leakage using non-contact methods as detailed in the Tesla guide.

## 6.0 Emergency Response Procedures

In the event of an emergency at the BESS Facility, the response will be spearheaded by the Project ERT. The ERT is staffed by the NOC. All Relevant contact information for the Roadrunner Energy Farm Project is listed in Appendix C.

The following responses to events are considered:

- General facility emergency shutdown;
- Lightning storm;
- Tornado;
- Medical emergency;

- Chemical spill;
- Unauthorized individual; and
- Fire or thermal event.

## General Facility Emergency Shutdown

In the event of a power system failure within the Project, on the power grid, or at the direction of the power grid operators, the NOC will coordinate a facility-wide shut down in accordance with Tesla's guidelines, ensuring that all battery systems are safely isolated.

The NOC will:

- Log the status of the facility equipment.
- Obtain communication with power grid operators and report facility conditions. Obtain permission to reestablish connection.
- Prepare facility equipment for restart while awaiting reconnection or permission to reconnect.
- Restart facility equipment and ready BESS and solar equipment for synchronization / operation.
- Operate the solar and BESS equipment in accordance with power grid operations.

Specific details pertaining to the solar and BESS operations, including equipment isolation procedure in a shut-down, will be provided in the Facility Operations and Maintenance Procedures. It should be noted that there is no expected impact to the grid during an emergency shutdown. The NOC will work in a coordinated effort with the grid operations to ensure that the system will shut down in a controlled manner and grid stability will not be affected.

## Lightning Storm

In the event a lightning storm is within 10-30 miles and approaching the site, the following procedures shall apply:

- Notify the NOC, ERT, Site Manager and all on-site employees.
- If lightning approaches to five miles, stop work, get in and stay in company or personal vehicles that have rubber tires.
- Remain in vehicles for at least 30 minutes depending on passing storm severity and wait for an "OK" from Site Manager in charge of monitoring the storm.

Lightning can be a source of fire both within the Project Area and the area surrounding. Monitor areas of lightning strike for signs of ignition.

## Tornado

Upon the issuance of a tornado warning, site personnel will evacuate the site and report to the predesignated shelter area. In the even site personnel are outside and unable to evacuate to the shelter, the following procedures will be followed:

- Lie flat in a nearby ditch or depression, covering the head with the hands. Be aware of the potential for flooding.
- It is safest to leave a vehicle for safe shelter.
- Be aware of flying debris.

Following tornado or high wind events, facility equipment will be evaluated by the Site Manager for damage. All repairs will be performed under standard operational procedures. The Site Manager shall notify the NOC and the Project Owner when it is safe to do so.

## Medical Emergency

In the event of a medical emergency within the Project facility, the NOC should be notified. Depending on the severity, local emergency responders will be requested. See Appendix C for contact information for medical emergency responders.

## Chemical Spill

Chemical spills can potentially come from three major sources: battery electrolyte, transformer oil, or HVAC condensate. Spills are highly unlikely, and remote monitoring and periodic facility inspections during routine maintenance of the Project facility are adequate to recognize them in a timely manner. Once identified, spills will be cleaned up by the designated maintenance contractor for the Project under the direction of the designated Project Manager/Site Manager. Any required risk mitigating actions have been taken by Project personnel in the design of the facility. It should be noted that all electrical insulating oil used at the site is free of polychlorinated biphenyls (“PCBs”).

## Unauthorized Access

Personnel visiting the Project facility will only do so with the express consent of the NOC, and the Applicant will be notified of their expected presence at the facility in advance of arrival.

The NOC will monitor the facility through remote surveillance, and appropriate action will be taken if the presence of unauthorized individuals is suspected. Trespassing individuals will be asked to leave the facility, and local law enforcement will be asked for assistance as required. The project site will be equipped with cameras and 24-hour monitoring.

## Fire or Thermal Event

In the event of a fire or thermal event in the battery boxes, inverter or other electrical equipment, the SCADA or site controller will notify the NOC, the ERT, and the grid operator. The ERT will lead the response and notify all other relevant responding agencies. Follow Tesla’s recommendation for handling fire events on an industrial Megapack site (see Appendix B).

**IN NO SITUATION SHOULD THE BESS ENCLOSURES/MEGAPACKS BE OPENED. ALL RESPONSE IS TO BE COORDINATED BY ROADRUNNER ENERGY FARM PROJECT PERSONNEL AND ITS SUBVENDORS. DO NOT APPLY WATER TO A BURNING UNIT. THE FIRE DEPARTMENT IS ADVISED TO PROTECT OUTSIDE OF THE FENCED AREA ONLY.**

Evacuate the area as necessary and ensure that all personnel are accounted for at a designated safe location.



### *Battery Enclosures*

The battery enclosures are intended to be left alone and will respond to any thermal event automatically. It is essential to maintain the integrity of the battery box until a Roadrunner Energy Farm Project representative is on-site.

#### **DO NOT ATTEMPT TO OPEN THE BATTERY ENCLOSURES.**

The battery enclosures are designed with an integrated fire detection and suppression system, including a fire suppression clean agent to prevent the spread of fire. Each enclosure is equipped with explosion protection via internal sparker system and overpressure vents to manage a potential deflagration vent. The sparker system is designed to ignite flammable gases before an explosive atmosphere is allowed to develop within the enclosure. Following combustion of the gases by the sparker system, the passive over-pressure vents allow flames and smoke to safely exit via the top of the enclosure.

The sparker system is always on and is powered by internal battery power, and thus will remain operational even during loss of grid power or if an external shutdown is triggered for the battery equipment. If an event were to occur in these conditions, the sparker system and corresponding overpressure vents would still operate as described.

Local emergency responders shall be directed to standby on-site only to prevent the spread of fire outside of the battery enclosure **IF NECESSARY**. No one shall attempt to extinguish the battery fire on or within the battery enclosure. Please refer to Section 7.0 and 8.0 for more detailed battery fire considerations for firefighters.

### *Inverters and Other Electrical Equipment*

The standard responses to fires in a substation should be followed when responding. They are summarized below:

- The NOC will open the breaker to isolate and deenergize the affected equipment.
- Any personnel present should be staged uphill/upwind until the arrival of emergency responders.
- The ERT shall ensure that isolation exists on both the line and load side of the inverter through the operations of breaker and disconnect switches.
- Local emergency responders should perform the following actions:
  - Do not engage burning equipment; it may still be energized.
  - Isolate the surrounding area and keep unauthorized individuals away.
  - A smaller fire can be suppressed using carbon dioxide, which has a class C rating to 100,000 volts.
  - Dry chemicals are not recommended as they offer no cooling.
  - For a larger fire, a 25-foot standoff distance is required; agents should be applied using a combo nozzle (bubble cup) employing a 30-degree fog pattern, no straight streams.

## 7.0 Training and Communication

### Training Overview

The Roadrunner Energy Farm Project will provide training for local emergency responders pertaining to emergencies with the BESS. This training will be administered in collaboration with the battery suppliers and coordinated directly with the local emergency teams. Refreshers will be offered periodically as needed, and revisions to this document will be highlighted.

The following topics will be covered in the training program:

- System overview
  - Equipment and Definitions
  - Battery Types, Chemistry, and Geometry
- Battery Management System
- Detection and Suppression
- Emergency System Shutdown
- Hazards
  - Chemical
  - Electrical
  - Explosion
- Suppression agents
  - Product/Pattern/Pressure
  - Safe Standoff Distances
  - Agents and Fires
  - Exposure Control
- Response Tactics
  - Module venting /Fire
  - Power conversion system (PCS) Inverter failure / Fire
  - Step-up Transformer Fire
  - Breaker Failure
- Post-Fire Operations
  - Lock-out Tag-out
  - Stray Voltage Testing
  - Thermal Assessment
  - Air Monitoring

### *Ongoing Training Programs*

In addition to the initial training programs, the Project will conduct bi-annual training sessions for the ERT, focusing on the specific characteristics and risks associated with the battery systems used onsite. Training materials will be updated to reflect any changes in the Tesla emergency response protocols or new technology adoption.

## Communication During an Emergency

To keep clear communication channels between the site’s NOC, local emergency services, and Tesla’s support center (if Tesla batteries are used) the ERT will be empowered to lead communication efforts. Use real-time data transmission to inform all parties of the status during an emergency.

### Organizational Structure

The Roadrunner Energy Farm Project ERT shall manage and control the facilities by monitoring and operating the solar, BESS, and interconnection equipment, including all emergency alarms. A full ERT contact list for the Project will be provided (and added to this manual) prior to construction.

### Notifications

Figure 7.1 Notification Flow

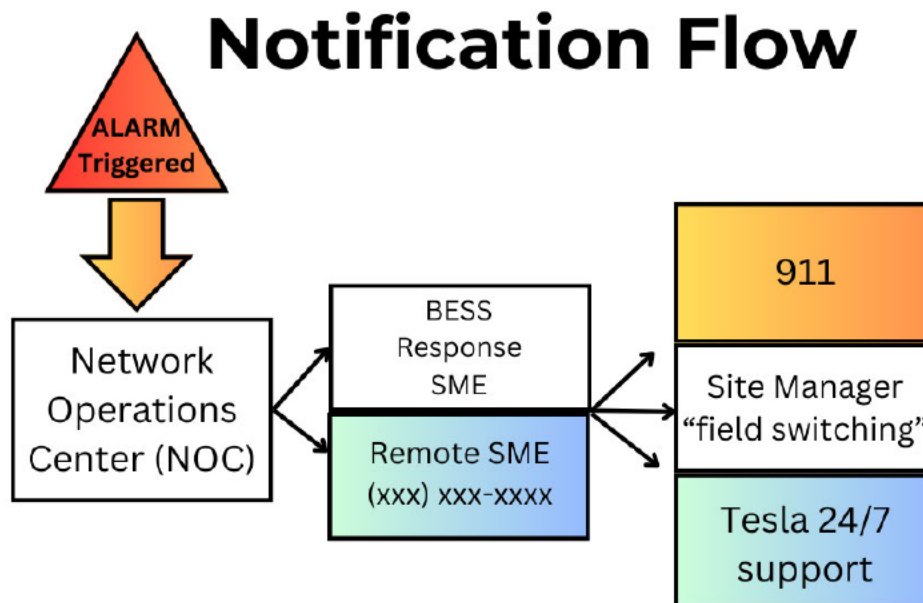


Figure 7.1 Notification Flow

## Unified Command

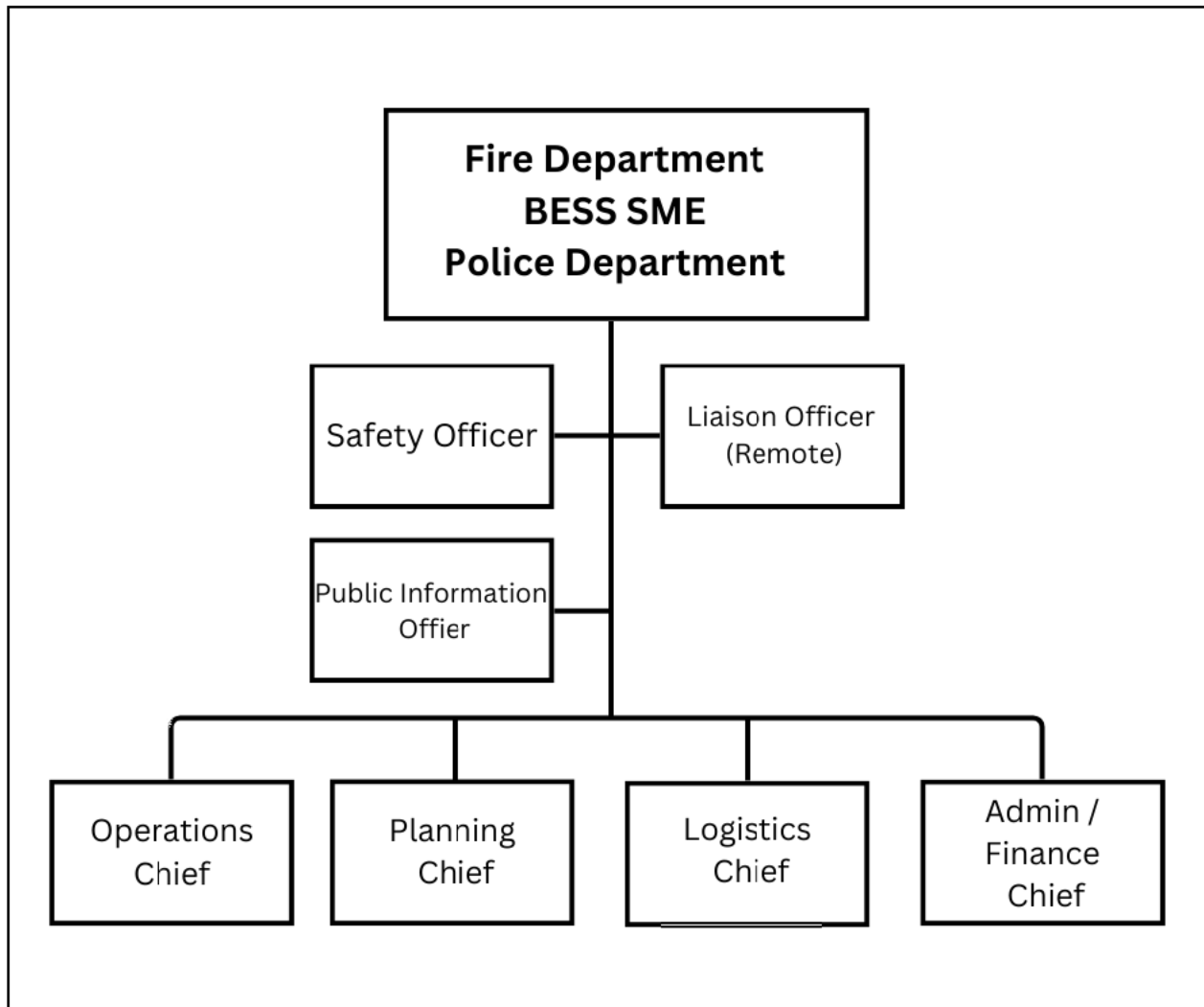
Unified Command is used for improved unity of effort in multijurisdictional or multiagency incident management.

Unified Command enables different jurisdictions and organizations to jointly manage and direct incident activities through a common set of incident objectives, strategies and a single incident action plan.

Each partner in the Unified Command maintains authority, responsibility and accountability for its own personnel and other resources, but the members of the Unified Command work together to:

- Determine objectives, priorities and strategic guidance
- Establish a single system for ordering resources
- Execute integrated incident operations
- Maximize the use of assigned resources

Figure 7.2 Typical Unified Command Structure



#### Subject Mater Expert

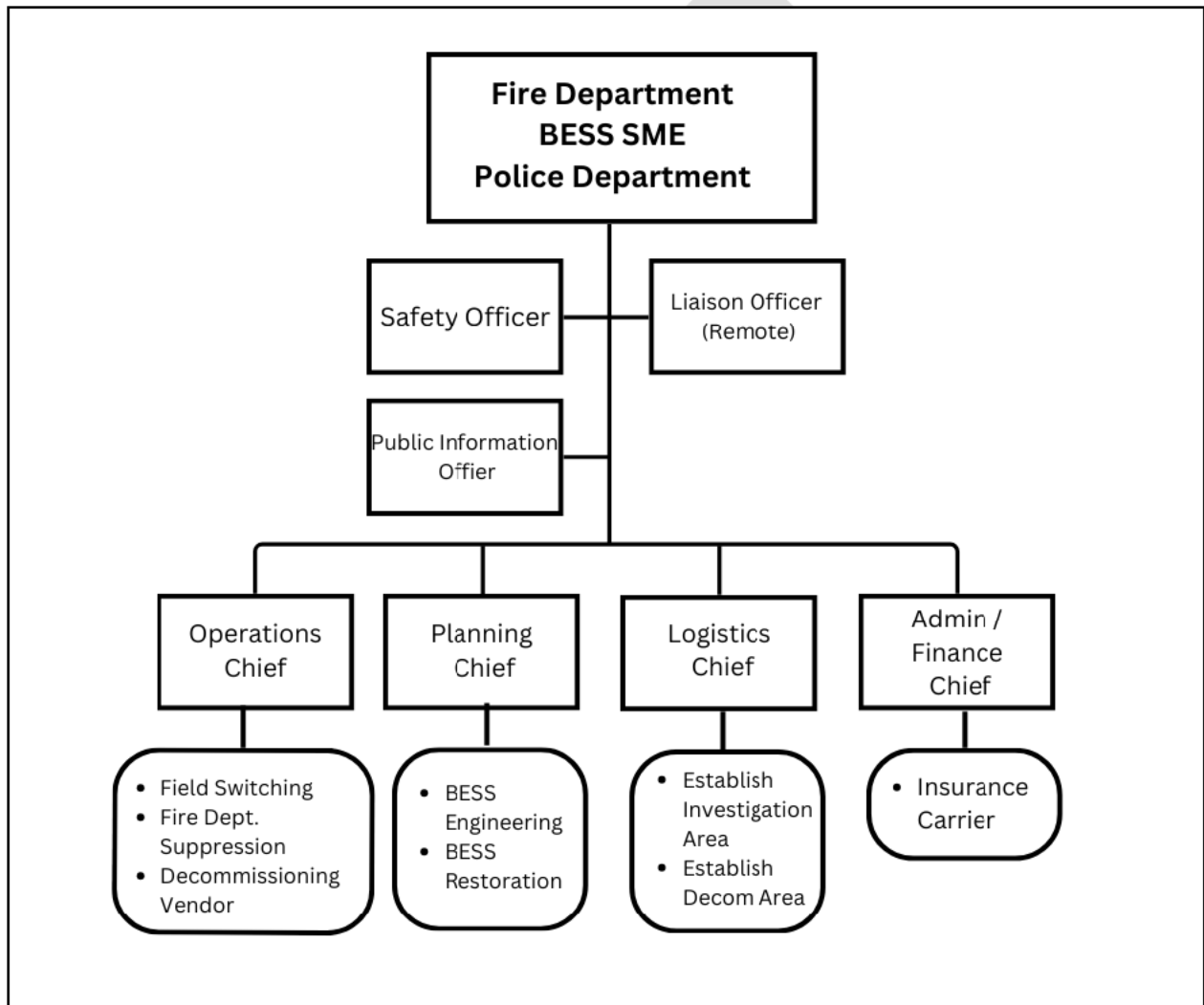
The BESS SME will play a critical role guiding members of the fire services through the response posture associated with a BESS emergency. The SME will fall under the Unified Command structure, where they will collaborate with members of the fires services and other first responders if needed to bring the incident under control. The SME will be responsible for the coordinating the following:

- Review fire alarm control panel (FACP)

- Review and interpret BMS data, such as gas alarms, module isolation and cell temperatures
- Operation of E-Stops and Disconnect switches
- Coordinate field switching
- Coordinate isolation of auxiliary power supply
- Post-incident operations
- Administration of Decommissioning Plan

Low frequency / high hazard incidents such as a BESS emergency will not be managed by one individual incident commander. The command structure will include all stakeholders necessary to mitigate risk and ensure the safety of first responders.

Figure 7.3 Typical Incident Command Structure



### Emergency Response

In the event of an emergency at the BESS Facility, the response will be spearheaded by Project ERT. The ERT is staffed by the NOC. All relevant contact information for the Roadrunner Energy Farm Project is listed in Appendix A.

## 8.0 Response Tactics

### Facility Evacuation

Once an alarm is received, all personnel shall exit the facility and proceed to the main entrance or predesigned rally point to conduct an accountability rollcall as required by OSHA 29 CFR 1910.38 or local regulations. The fire department will be alerted to provide support with evacuation and firefighting. Upon arrival of the fire services, the primary concern is life safety.

NOTE: Personnel should not re-enter the site until the arrival of the fire department.

### Staging

Site Personnel: Personnel should not encroach within 100 feet of the battery enclosure that is in alarm mode when within the site facility.

Fire Department: Upon arrival, fire department units should stage all apparatus until the scene size up has been completed. Staging shall be upwind at a minimum of 100 feet from any troubled enclosure.

Consideration shall be given to assigning a Staging Officer within the Incident Command Structure to manage parking. Impeding roadway traffic can have significant consequences if an injury were to occur and an ambulance could not access or leave the site.

### Personal Protective Equipment (PPE)

Electrical Switching: OSHA requires a hazard assessment under 29 CFR 1910.269 to identify fire resistant clothing and insulated PPE required to conduct switching operations.

Fire Operations: Fire services personnel engaged in operations that can expose members to heat, flame, flammable gas and chemical hazards shall use NFPA 1971 structural firefighting equipment along with a Self-Contained Breathing Apparatus (“SCBA”) for respiratory protection.

### Exposure Control

UL9540a Large Scale Fire Testing suggests that cell failure will not propagate beyond the module. In the remote event that a container becomes fully involved in fire, consideration may be given to providing exposure protection to adjacent BESS units or Megapacks as required. During the application of water stream for exposure protection, the potential exists to contact energized electrical components in the trouble container.

### Size-up

Status briefing: Upon arrival, the fire officer will look for the BESS SME to obtain a status briefing which should provide a snapshot of existing conditions and at a minimum should cover the following:

- Accountability: Locate and evacuate all non-essential site personnel
- Exclusion Zone: Establish an exclusion zone of 100 feet around the trouble container to manage the safety of members if an explosive event should occur. Containers have been

outfitted with explosion control measures; however, if this system were to fail, we must assume that enclosure doors can become projectiles.

- Exposures: Conduct a visual assessment to identify fire impingement on surrounding equipment; a similar assessment should be done with a thermal imaging gun and record temperatures. Reading should be taken every 15 minutes until readings begin to decrease. Utilize the BMS system to identify any rise in temperature of surrounding equipment that would require exposure control.
- Electrical Hazards: BESS SME shall ensure the troubled equipment has been electrically isolated through SCADA or field switching.
- Chemical Hazards: Stage all department members and apparatus upwind of the incident and remain cognizant of changing wind conditions and manage accordingly. A fully involved container can result in the failure of the thermal management system which will introduce freon into the fire scenario and discharge plume.
- Battery Management System: BMS shall be reviewed to determine trending rise in temperature of cells/modules every 15 minutes to determine if propagation into adjacent modules has occurred.

## 8.1 Firefighting Considerations

In the event of an emergency, the ERT should be immediately notified (See Appendix A for Emergency Contact list).

**IN NO SITUATION SHOULD THE BESS ENCLOSURES BE OPENED BY ANY UNAUTHORIZED PERSONS OR EMERGENCY RESPONDERS; ALL RESPONSE IS TO BE COORDINATED BY ROADRUNNER ENERGY FARM PERSONNEL AND ITS SUBVENDORS. DO NOT APPLY WATER TO A BURNING UNIT. THE FIRE DEPARTMENT IS ADVISED TO PROTECT OUTSIDE THE FENCED AREA ONLY.**

### *Fire Incident*

Upon detection of fire or excessive heat emanating from an affected BESS enclosure by external IR detectors, an audible and visual alarm shall be signaled at the Annunciator Panel. Smoke and flames may be visible from the outside of the BESS enclosure. Fire growth may be slow, fast, or ultra-fast (e.g. during deflagration event) in nature.

**A safe stand-off distance of at least 100-feet shall be maintained between individuals and the BESS enclosure(s) exhibiting fire conditions. Staging of personnel and equipment shall be on the angles of the BESS enclosure to stay out of potential blast radius of any enclosure doors or other possible projectiles. Attempt to extinguish the fire only if imminent threat to life safety exists.**

### **If there is no immediate threat to life safety:**

1. Allow the BESS to burn in a controlled fashion until all fuel sources are depleted.
2. A defensive approach should be considered, utilizing water to cool and protect adjacent exposures and mitigate the spread of fire to areas outside the fenced installation. Manage the fire incident, utilizing the reach of the hose stream to protect exposures and control the off-gassing and smoke from the enclosure.

3. Remember that even after the BESS is isolated from the electric grid, there may still be considerable energy stored in the batteries that poses a potential electric shock hazard to anyone in the nearby vicinity.

Additionally, chemicals released during a fire or explosion event will be in a gaseous form and primarily pose an inhalation hazard. A fog pattern from a handline or monitor nozzle provide an effective means of controlling an off-gassing event on the exterior of the battery enclosure from migrating to unwanted areas such as public muster points, emergency responders, building intakes, etc.

Hose streams may also be applied to adjacent exposures for cooling purposes based on consultation with NOC and other required BESS SMEs. BMS data available via the 24/7 Tesla Operations Center should be closely monitored for the adjacent system(s) for any indicators of heat impact or water damage to any adjacent BESS units and relayed to the appropriate individual within the Incident Command System.

Following partial or complete consumption of the system by fire, batteries may continue to emit flammable gases and toxic gases for an extended period of time. Continuous monitoring of gas levels in and around the incident location is recommended. Full firefighter PPE and SCBA shall be utilized until gas levels are confirmed to be at safe levels. A Firewatch shall be provided to ensure the continued safety of the site after the situation appears stable.

## 8.2 Post Incident Operations

### *Personal Protective Equipment*

While operating near trouble equipment, the fire services personnel should remain in NFPA 1971 structural firefighting gear with respiratory protection, and facility personnel should don the appropriate PPE for arc flash hazards associated with potential stranded energy conditions and an SCBA until Post-Fire Assessment has been completed.

### *Lock out /Tag Out*

Once emergency conditions have concluded, prior to accessing the trouble container or removing any modules. E-stops and disconnect switches shall be locked or tagged out as required by OSHA 29 CFR 1910.147 or local regulations.

### *Stray Voltage*

**DC/AC Stray Voltage:** If stray voltage is identified, standard response tactics would focus on isolating the source potential. However, stranded energy may be the source of the stray voltage. In response, rubberized PPE outlined under 29 CFR 1910.269 or local electrical safety standards should be used until the source of the stray voltage has been eliminated.

**Stray Voltage Testing:** To accurately assess this condition, a multimeter must be used along with a ground reference.

### *Thermal Exposure Assessment*

**Initial Thermal Scan:** Scan and record with a thermal imaging camera module temperature in each rack. The BMS will serve as an excellent guide in terms of evaluating thermal impact on



cells/modules within the trouble equipment. If this system is not viable, use a thermal imaging camera.

**Thermal Trending:** Rescan and record every 15 minutes over the course of one hour to identify any rise in temperature above 20 F. Modules that have greater than a 20 F rise in temperature may have cells beginning to vent, causing the increased temperature. If this condition is observed, leave the area and stage upwind maintaining a 50-foot standoff distance. Let modules stand for one hour and rescan temperature.

**End of Useful Life:** Although cells/modules may not have reached a venting or thermal runaway temperature, we must evaluate modules that were operating outside of their normal range. Modules that are beyond their useful life must be identified so that they are not re-energized during repair / restoration process. Cells/modules with temperatures above 40C/104F must be removed for disposal by authorized personnel.

#### *Disposal of Damaged Equipment*

In the event BESS equipment is damaged in a fire or other emergency event, the Applicant will immediately contact a qualified recycling / disposal vendor to safely remove the damaged BESS equipment from the facility. For disposal after a fire or thermal event, contact Tesla for guidance (Identification of Company and Contact Information is included in Appendix B).

In most cases, the product can be recycled. Contact Tesla to return the product to a Tesla facility for disassembly and further processing. If disposing of the product without returning it to Tesla, consult with local, state and/or federal authorities on the appropriate methods for disposal and recycling of lithium batteries. Note that the products do not contain heavy metals such as lead, cadmium, or mercury.

### 8.3 Fire Mitigation Considerations

#### *Education and Awareness*

The ERT will pay close attention to weather and drought-conditions which may affect the flammability of vegetation. During periods of high fire danger, potential sources of fire ignition (vehicle exhaust systems, cigarettes, matches, propane torches, sparks from hot work operations, etc.) must be used with extra precaution.

#### *Vegetation Management*

The Applicant will manage vegetation on site to provide defensible space for fire protection throughout the construction and operation of the facility. Ongoing maintenance would be provided to ensure removal of grass, weeds, and other flammable materials from defensible space areas. Any vegetation control at the site will use materials and methods that ensure the protection of groundwater.

#### *Water Source for Fire Suppression*

The Applicant will maintain an emergency supply of water on site to be used in the event of a fire for suppression purposes. Water would be stored on site in above ground tanks and/or cisterns near the entrance of the facility from County Road O.5. The water tanks and / or cisterns will be located

and installed per compliance with NFPA Standards to ensure maximum safety and effectiveness in the event of a fire emergency.

#### *Fire Risk Evaluation*

Prior to the start of construction and prior to commencement of operations, the Applicant will schedule a site evaluation with the local fire department to assure potential fire risks have been evaluated and sufficiently mitigated.

## 9.0 Regular Reviews and Updates

This ERP will be reviewed annually and updated as necessary to reflect new technological developments, changes in Tesla's safety recommendations, or modifications to regulatory requirements. Stakeholders will be involved in the review process to provide insights and feedback.

#### Appendices

Appendix A: Emergency Contact Information

Appendix B: Facility Layout and Access Points

Appendix C: Tesla Technical Data Sheets and Safety Information

Appendix D: Tesla Industrial Lithium-Ion Battery Emergency Response Guide

## Appendix A: Contact Information

Position/ Agency	Contact Name	Contact Number
Site Manager	TBD	TBD
Alternate Site Manager	TBD	TBD
NOC and ERT	TBD	TBD
Alternate NOC and ERT	TBD	TBD
BESS Subject Mater Expert	TBD	TBD
Alternate BESS Subject Mater Expert	TBD	TBD
<b>Recycling/Disposal of Damaged Equipment - Tesla/</b> TBD	TBD	TBD
<b>TESLA 24/7 Support HOTLINE</b>	NA	+1-650-681-6060
<b>Fire - Brush Volunteer Fire Department</b>	Tad Anderson - Fire Chief	Department: 970-842-5150  Mobile: 970-768-4412
<b>Fire - Brush Volunteer Fire Department</b>	Ray Uhrick - Assistant Fire Chief	Department: 970-842-5150  Mobile: 970-768-4412
<b>Fire - Brush Rural Fire Protection District</b>	NA	970-842-2264
<b>Fire - Hillrose - Snyder Volunteer Fire Protection District</b>	NA	970-847-3028
<b>Police - Morgan County Sheriff's Office</b>	David Martin - Sherif	Emergency: 911  Non-emergency: 970-542-3445  Non-emergency after hours: 970-867-2461
<b>Police - Brush Police Department</b>	Brandon Flecksteiner - Interim Chief of Police	Emergency: 911  Non-emergency: 970-842-5074
<b>Ambulance - Morgan County Ambulance Service</b>	Travis Freeman - Director	970-542-3570

<b>Position/ Agency</b>	<b>Contact Name</b>	<b>Contact Number</b>
<b>Ambulance</b> - Morgan County Ambulance Service	John Collins - Ambulance Physician Advisor Director	970-221-5878
<b>Emergency Dispatch Center</b> - Morgan County Communications Center	Danette Martin - Director	Emergency: 911  Non-emergency: 970-867-8531
<b>Hospital</b> - East Morgan County Hospital	N/A	970-842-6200
<b>Other</b> - Morgan County Emergency Management Department	Roger Doll - Director	970-867-8506

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## Appendix B: Facility Layout

[To Be Inserted Prior To Construction]

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**Grid transformation for the world's largest energy projects**

- Best-in-class energy density and round-trip efficiency
- Industry-leading power electronics and thermal system performance
- Rapid and cost-effective deployment with factory-assembled and pre-tested solution

**Scaled and rigorously tested product safety and reliability**

- Comprehensive in-house reliability testing by the leading experts in the industry
- Engineered for safety and performance at every level
- Continuous improvement based on large-scale operational experience

**Designed with flexibility and configurability in mind**

- Modular architecture that allows for a range of configurations across multiple applications
- Industry experts available to identify site-specific needs
- Integrated solution that allows for battery augmentation over time



**POWER AND ENERGY**

Megapack duration is configurable. Standard configurations are 2-Hour and 4-Hour durations. Nominal energy is specified at 25°C (77°F).

	AC Power per Megapack	Energy per Megapack
<b>2-Hour</b>	1927 kW	3854 kWh
<b>4-Hour</b>	979 kW	3916 kWh

**ELECTRICAL**

<b>Nominal AC Voltage</b>	480 V AC 3-phase	
<b>Nominal Frequency</b>	50 or 60 Hz	
<b>Inverter Power per Megapack<sup>1</sup></b>	2-Hour Max:	2400 kVA
	4-Hour Max:	1320 kVA
<b>Round-Trip Efficiency<sup>2</sup></b>	2-Hour:	91.7%
	4-Hour:	93.7%

<sup>1</sup> Scalable from 400 kVA minimum in increments of 50 kVA

<sup>2</sup> Full-depth cycle including all power conversion and thermal system losses, at 25°C (77°F)

**WARRANTY**

<b>Coverage</b>	All-inclusive, equipment and energy retention
<b>Term</b>	15 years standard, extendable to 20 years

**PART NUMBER**

**1848844-XX-Y** Where X is a number between 0-9 and Y is a letter

**MECHANICAL AND MOUNTING**

<b>Ingress Ratings</b>	IP66/NEMA 3R (Main Enclosure) IP20 (Thermal System)	
<b>Enclosure Dimensions</b>	Width:	8800 mm (346 ½ in)
	Depth:	1650 mm (65 in)
	Height:	2785 mm (110 in)
<b>Maximum Weight</b>	38,100 kg (84,000 lb)	
<b>Operating Ambient Temperature</b>	-30°C to 50°C (-22°F to 122°F)	

**REGULATORY**

System is compliant to grid codes and safety standards of all major markets.

<b>System</b>	NRTL listed to UL 1973, UL 9540, UL 9540A, UL 1741 SB, IEC 62619, IEEE 1547	
<b>Cells</b>	NRTL listed to UL 1642	

**CONTROLS AND COMMUNICATIONS**

<b>Protocols</b>	Modbus TCP / DNP3 / REST API	
<b>Core Control Modes</b>	Direct Real Power	Ramp Rate Control
	Direct Reactive Power	Site Control
	Frequency Support	Power Factor Control
	Virtual Inertia	Voltage Control

**MONITORING**

<b>Powerhub</b>	Free-to-use cloud monitoring portal
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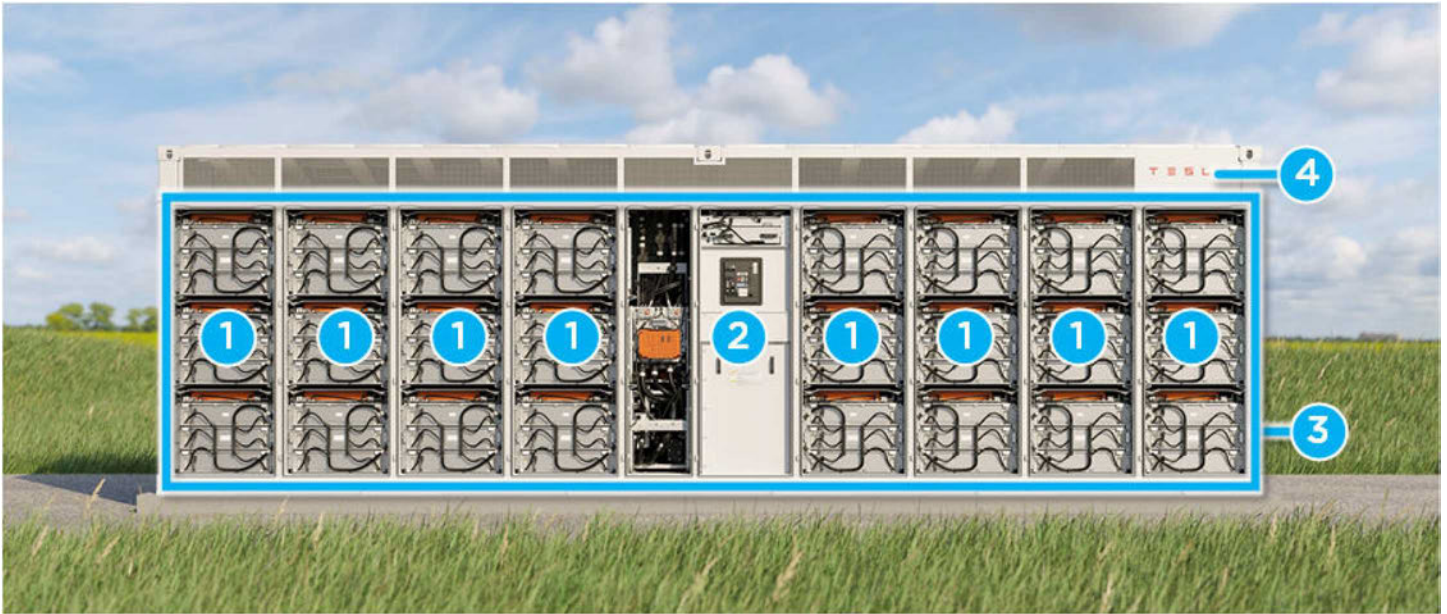
# MEGAPACK 2 XL SAFETY OVERVIEW

## ENHANCED SAFETY ARCHITECTURE

Tesla’s commitment to safety informs every Megapack design decision and has guided 15+ years of experience in battery module design and manufacturing for both vehicle and energy storage applications. Megapack 2 XL (Megapack) is designed with features that make the product safe throughout the entire product lifecycle — during transit, installation, commissioning, operation, maintenance, and decommissioning.

Tesla’s approach to safety involves comprehensive design and testing at every level of Megapack. Vertical integration across design, manufacturing, and testing ensures that safety features of the cell, battery module, inverter, thermal system, and overall system-level components are closely linked and not decoupled.

In addition, Tesla is continually improving Megapack safety features and capabilities based on data from operational experience.



1. Battery modules with active and passive fuses – externally serviceable
2. Touch-safe Customer Interface Bay
3. Non-walk-in IP66 enclosure and deflagration mitigation
4. Thermal roof with overpressure vents

## INDUSTRY-LEADING COMPLIANCE AND THIRD-PARTY VALIDATION

Tesla is constantly pushing the boundaries and raising the bar on product safety. This commitment to safety not only ensures that Tesla’s products are compliant to the industry’s most stringent global standards, but also sets a benchmark for the industry to follow regarding energy storage safety. Megapack has met and exceeded many industry safety standards and has demonstrated through extensive third-party testing that it is one of the safest energy storage systems on the market.





# MEGAPACK 2 XL SAFETY OVERVIEW

Megapack 2 XL is listed to the following standards by OSHA-recognized Nationally Recognized Testing Laboratories:

- UL 1642 (cell-level certification)
- UL 1973 and IEC 62619 (battery module-level certification)
- UL 9540, IEC 62933-5-2, IEC 62109-1 (system-level certification)
- UL 1741, CSA C22.2 #107.1 (power electronics)
- UL 1998 and IEC 60730 Annex H (functional safety of software)
- IEC 61000-6-2, and EN 55011 (EMC)
- UN 38.3 (transportation, self-certified)
- IEEE 693 (seismic safety)
- UL 9540A (large-scale fire testing): Tested at the cell, module, and unit level
- And many more, including compliance to major market grid codes

Megapack 2 XL, like Megapack, is designed to comply with major installation codes for energy storage systems, including NFPA 855, IFC 2018 and 2021, and NEC 2020.

Megapack 2 XL has been reviewed and validated by an Independent Engineer, both at the product level and for the results of large-scale fire testing.

## ENHANCED APPROACH TO FIRE SAFETY

To date, Tesla has deployed more than 10 GWh of stationary energy storage products globally with a strong safety track record.

Through vertical integration, Tesla has designed Megapack with fire safety built directly into the product at every level. This makes the product safer and reduces overall project costs by eliminating the need for fire suppression systems.

At the cell level, Tesla's latest generation of Megapacks leverages the lithium iron phosphate (LFP) chemistry and a new industry-leading cell design. Testing has demonstrated a strong ability to resist thermal runaway, and has shown controlled venting in worst-case events, without explosive bursts or fire.

All Tesla products also undergo rigorous testing at the module level. While standards such as UL 1973 and IEC 62619 ensure propagation resistance to single-cell thermal runaway, testing has shown that Megapack battery modules are resistant to multiple co-located cells sent into runaway at the same time. This greatly mitigates the risk of a thermal event.

At the system level, Megapack is designed with a combination of dedicated runaway gas igniters and overpressure vents built into the roof that passively mitigate the risk of deflagration hazards in case of unlikely accumulation of flammable gases due to arc flash events or thermal runaways.

In the unlikely event of a fire, rigorous full-scale fire testing has shown that Megapack performs in a safe and controlled manner, consuming itself slowly and without explosive bursts, projectiles, or unexpected hazards. The vents are designed to direct all gases, smoke, and flame out of the top of the Megapack, minimizing risk to nearby response personnel and exposures.

In the event of a fire at a Megapack site, the fire service will be able to manage the event with standard fire service response equipment. Tesla's *Lithium-Ion Battery Emergency Response Guide* provides more details on that subject. The cells used in Tesla products do not contain solid metallic lithium and thus do not react with water. When required by local code, Tesla recommends fire detection at the site level with the use of third-party thermal imaging cameras that can detect fires on site.



# MEGAPACK 2 XL SAFETY OVERVIEW

## 24/7 GLOBAL SUPPORT

Megapack is supported by Tesla's Network Operations Center, designed to support the global fleet of energy storage products. The 24/7 operations center offers remote monitoring, diagnostics, and troubleshooting capabilities, without the need of having a Tesla technician on site. Customers and first responders also benefit from immediate hotline support from trained technicians in case of emergencies.



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Rev 1.0 — September 13, 2022

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**MEGAPACK**

**POWERPACK**

# Industrial Lithium-Ion Battery Emergency Response Guide

For Tesla Industrial Energy Products including Megapack and Powerpack

## PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Tesla, we reserve the right to make product or documentation modifications at any time, with or without notice.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

This document does not create contractual obligations for Tesla or its affiliates and is provided without warranty of any kind, except to the extent expressly agreed in a contract.

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## ERRORS OR OMISSIONS

To communicate inaccuracies or omissions in this document, reach out to your Tesla representative.

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TESLA

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# 1 Introduction and Scope

This emergency response guide (ERG) serves as a resource for emergency responders and Authorities Having Jurisdiction (AHJs) with regard to safety surrounding Tesla Industrial Energy products. This guide should also be reviewed by customers, site managers, and operators to ensure a clear understanding of potential hazards and the procedures to follow in case of emergencies.

Tesla Industrial Energy products are defined as rechargeable lithium battery energy storage products designed, manufactured, and sold by Tesla, and include all versions of Megapack and Powerpack, collectively referred to in this guide as "Tesla Industrial Energy products," "Tesla Energy products," or "the product" unless otherwise noted. The information and recommendations set forth in this ERG are made in good faith and believed to be accurate as of the date of preparation.

 **NOTE:** The guidance in this publication applies to Megapack and Powerpack only and may not extend to the entire site's structures or equipment. As each site differs, accordingly each site's requirements for first responders differ, and this guide does not replace a site-wide plan.

## 1.1 Available ERG Translations

The *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) is available in various languages as indicated below. As information in the ERG is periodically updated and translations are periodically added, always check the Tesla First Responders Information page at <https://www.tesla.com/firstresponders> for the latest revision of this guide, for ERGs for other Tesla products, and for the latest additional translated versions.



<p><i>English</i></p> 	<p><i>Deutsch</i></p> 	<p><i>Español</i></p> 	<p><i>Français</i></p> 
<p><i>עברית</i></p> 	<p><i>Italiano</i></p> 	<p><i>日本語</i></p> 	<p><i>한국어</i></p> 
<p><i>Nederlands</i></p> 	<p><i>简体中文</i></p> 	<p><i>繁體中文</i></p> 	<p><i>Português</i></p> 
<p><i>Slovenščina</i></p> 			





## 2 Company, Contact, & Product Info

### 2.1 Identification of Company and Contact Information

Table 1. Company and Contact Information

Products	Tesla Industrial Energy products, designed for industrial, utility, or commercial energy applications, and modules and sub-assemblies that can be installed in such products. Descriptions and specific part numbers are listed in <a href="#">Product Descriptions on page 6</a> .	
Locations	Headquarters (USA)	1 Tesla Road Austin, TX 78725 USA Tel. No. +1 512-516-8177 (do not use for emergencies; see below)
	Europe and Africa	Burgemeester Stramanweg 122 1101EN Amsterdam, The Netherlands Tel. No. +31 20 258 3916 (do not use for emergencies; see below)
	Australia and Asia	Level-14, 15 Blue Street North Sydney NSW, 2060, Australia Tel. No. 1800 686 705 (do not use for emergencies; see below)
	Manufacturer (USA)	1 Tesla Road Austin, TX 78725 USA Tel. No. +1 512-516-8177 (do not use for emergencies; see below)
Emergency Contacts	CHEMTREC (Transportation)	For hazardous materials (or dangerous goods) incidents during transportation such as spill, leak, fire, exposure, or accident, call CHEMTREC, day or night.  Contract Number: CCN204273  Within USA and Canada: 1-800-424-9300  Outside USA and Canada: +1 703-741-5970 (collect calls accepted)
	Tesla Energy Technical Support Contacts	Hotline telephone numbers: <ul style="list-style-type: none"> <li>• Asia (24x7): +1 571 573 9163</li> <li>• Australia/New Zealand (24x7): +61 2 432 802 81</li> <li>• Europe/Middle East/Africa: +31 2 08 88 53 32</li> <li>• France: +33 173218702</li> <li>• Japan: +0120 312-441 / (24x7) +1 571 573 9163</li> </ul>



		<ul style="list-style-type: none"> <li>• North America (24x7): +1 650-681-6060</li> <li>• Slovenia: +38 617778699</li> <li>• South Africa: +27 213004878</li> <li>• Switzerland: +41 445155607</li> <li>• The Netherlands: +31 208885332</li> <li>• United Kingdom: +44 1628450645</li> </ul>
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## 2.2 SDS Information

Safety Data Sheets (SDS) are available for materials in Tesla Energy products. Contact Tesla for a copy of these documents.

Table 2. Thermal Contents

Materials with SDS	Approximate Quantity
Ethylene glycol 50/50 mixture with water	<ul style="list-style-type: none"> <li>• Powerpack 1: 22 L of 50/50 mixture</li> <li>• Powerpack 2: 26 L of 50/50 mixture</li> <li>• Powerpack 1 or 2 Inverter: 11 L of 50/50 mixture</li> <li>• Powerpack 3: 37 L of 50/50 mixture</li> <li>• Powerpack 3 battery module: 20 L of 50/50 mixture</li> <li>• Megapack: 540 L of 50/50 mixture</li> <li>• Megapack battery module: 20 L of 50/50 mixture</li> <li>• Megapack 2: 360 L of 50/50 mixture</li> <li>• Megapack 2 battery module: 5 L of 50/50 mixture</li> <li>• Megapack 2 XL: Up to 380 L of 50/50 mixture</li> <li>• Megapack 2 XL battery module: 5 L of 50/50 mixture</li> </ul>
R-134a: 1,1,1,2-Tetrafluoroethane refrigerant	<ul style="list-style-type: none"> <li>• Powerpack 1 or 2: 400 g</li> <li>• Megapack: 7.6 kg</li> <li>• Megapack 2: 7.6 kg</li> <li>• Megapack 2 XL: Up to 3.0 kg</li> </ul>
R-1234yf: 2,3,3,3-Tetrafluoroethane refrigerant	<ul style="list-style-type: none"> <li>• Powerpack 3: Up to 650 g</li> </ul>

## 2.3 Lithium Cells

The products contain sealed lithium battery cells (cells). Cells each contain lithium electrodes, which can be composed of:

- Lithium Nickel Cobalt Aluminum Oxide (NCA material),  $\text{LiNi}_x\text{Co}_y\text{Al}_z\text{O}_2$
- Lithium Nickel, Manganese, Cobalt Oxide (NMC material)  $\text{LiNi}_x\text{Mn}_y\text{Co}_z\text{O}_2$
- Lithium Iron Phosphate (LFP material)  $\text{LiFePO}_4$
- Lithium Nickel, Manganese Oxide (NMO material),  $\text{LiNi}_x\text{Mn}_y\text{O}_2$
- Lithium Cobalt Oxide,  $\text{LiCoO}_2$



- or a mixture of these compounds

The cells and batteries do not contain metallic lithium. Individual cells have nominal voltages of up to approximately 3.6 V.

## 2.4 Product Descriptions

Individual lithium-ion cells are connected to form modules. Modules are battery sub-assemblies. These modules are installed into the products. Approximate product specifications are listed below.

### 2.4.1 Powerpack

Powerpack is Tesla's energy storage system for commercial and industrial use and for system augmentation.


 **NOTE:** Images below are indicative representations designed to assist with product identification. Existing product models may vary.

Figure 1. Powerpack 1 or 2: Units and Inverter



1. Powerpack Units (include lithium-ion cells)
2. Powerpack Inverter

Figure 2. Example of a Powerpack 1 or 2 Site





Figure 3. Powerpack 3 Units (3)



Figure 4. Example of a Megapack Augmented with Powerpack 3 Units (3)



1. Megapack 2 XL
2. Powerpack 3 Units



Table 3. Approximate Powerpack Specifications

Part Number (Reman Number if available)	Description	Module Voltage - as shipped (V)	Max System DC Voltage	Max System AC Voltage	Weight	Height	Width	Depth
<b>Powerpack 1 Versions</b>								
1047404-x*y*-z*	POWERPACK  (2hr continuous net discharge)	<30 (DC)	450 (DC)	480 (AC)	1680 kg (3700 lb)	219 cm (86 in)	97 cm (38 in)	132 cm (52 in)
1060119-x*y*-z*	POWERPACK  (4hr continuous net discharge)	<30 (DC)	450 (DC)	480 (AC)	1665 kg (3670 lb)	219 cm (86 in)	97 cm (38 in)	132 cm (52 in)
1121229-x*y*-z*	POWERPACK  (4hr continuous net discharge)	<30 (DC)	450 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	97 cm (38 in)	132 cm (52 in)
<i>* The 8th or 9th digit could be any number or letter and the 10th digit could be any letter.</i>								
<b>Powerpack 1.5 Version</b>								
1089288-x*y*-z*	POWERPACK 1.5 C/2 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	1622 kg (3575 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)
<i>* The 8th or 9th digit could be any number or letter and the 10th digit could be any letter.</i>								
<b>Powerpack 2 / 2.5 Versions</b>								
1083931-x*y*-z* (1130518-x*y*-z*)	POWERPACK 2,C/4 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)



Part Number (Reman Number if available)	Description	Module Voltage - as shipped (V)	Max System DC Voltage	Max System AC Voltage	Weight	Height	Width	Depth
1083932-x*y*-z*	POWERPACK 2,C/2 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)
1490025-x*y*-z*	POWERPACK 2.5,C/4 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)
1490026-x*y*-z*	POWERPACK 2.5,C/2 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)
1490027-x*y*-z*	POWERPACK 2.5,C/2 SYSTEM	<30 (DC)	960 (DC)	480 (AC)	2160 kg (4765 lb)	219 cm (86 in)	131 cm (51 ½ in)	82 cm (32 ½ in)

\* The 8th or 9th digit could be any number or letter and the 10th digit could be any letter.

**Spare Parts - Powerpack 1-2**

N/A	POWERPACK POD MODULE	<30 (DC)	960 (DC)	N/A	98 kg (215 lb)	12 cm (5 in)	100 cm (39 ½ in)	75 cm (29 ½ in)
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**Powerpack 3 Version**

1930712-x*y*-z*	POWERPACK 3	480 (AC)	<1230 (DC)	480 (AC)	4760 kg (10,500 lb)	253 cm (99 ½ in)	110 cm (43 ¼ in)	180 cm (71 in)
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\* The 8th or 9th digit could be any number or letter and the 10th digit could be any letter.

**Spare Parts - Powerpack 3**

N/A	POWERPACK 3 BATTERY MODULE	480 (AC)	<1230 (DC)	480 (AC)	1,250 kg (2,760 lb)	67 cm (26 ½ in)	81 cm (32 in)	149 cm (59 ½ in)
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## 2.4.2 Megapack

Megapack is Tesla's all-in-one utility-scale energy storage system.


 **NOTE:** Images below are indicative representations designed to assist with product identification. Existing product models may vary.

Figure 5. Megapack



Figure 6. Example of a Megapack Site





Table 4. Approximate Megapack Specifications

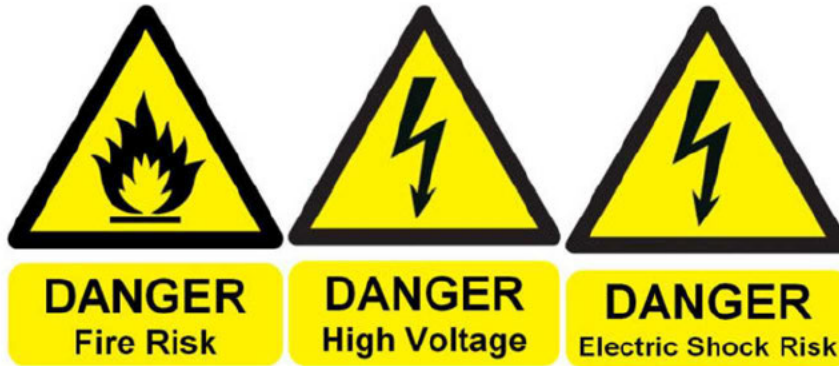
Part Number (Reman Number if available)	Description	Module Voltage - as shipped (V)	Max System DC Voltage	Max System AC Voltage	Weight	Height	Width	Depth
<b>Megapack (all versions - dimensions as measured for enclosure envelope for 1462965-x*y*-z*)</b>								
1462965-x*y*-z*	MEGAPACK	<450 (DC)	960 (DC)	518 (AC)	25,400 kg (56,000 lb) (max)	252.2 cm (99 ¼ in)	716.8 cm (282 ¼ in) (length)	165.9 cm (65 ¼ in)
1748844-x*y*-z*	MEGAPACK 2	480 (AC)	<1230 (DC)	480 (AC)	30,500 kg (67,250 lb) (max)	250.6 cm (98 ¾ in)	725.0 cm (285 ½ in) (length)	163.7 cm (64 ½ in)
1848844-x*y*-z*	MEGAPACK 2 XL	480 (AC)	<1230 (DC)	480 (AC)	38,100 kg (84,000 lb) (max)	278.5 cm (110 in)	880 cm (346 ½ in) (length)	165 cm (65 in)
<i>* The 8th or 9th digit could be any number or letter and the 10th digit could be any letter.</i>								
<b>Spare Parts</b>								
N/A	MEGAPACK BATTERY MODULE	<450 (DC)	960 (DC)	N/A	1,085 kg (2,400 lb)	66 cm (26 in)	81 cm (32 in)	149 cm (59 ½ in)
N/A	MEGAPACK 2 BATTERY MODULE	480 (AC)	<1230 (DC)	480 (AC)	1,250 kg (2,760 lb)	67 cm (26 ½ in)	81 cm (32 in)	149 cm (59 ½ in)
N/A	MEGAPACK 2 XL BATTERY MODULE	480 (AC)	<1230 (DC)	480 (AC)	1,250 kg (2,760 lb)	67 cm (26 ½ in)	81 cm (32 in)	149 cm (59 ½ in)





## 3 Handling, Use, & Hazard Precautions

### 3.1 General Precautions




The products described by this document are dangerous if mishandled. Injury to property or person, including loss of life is possible if mishandled.

The products contain lithium batteries. A battery is a source of energy. Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the operating temperature range of the product as discussed in [Hazards Associated with Elevated Temperature Exposure on page 13](#). An internal or external short circuit can cause significant overheating and provide an ignition source resulting in fire, including surrounding materials or materials within the cell or battery. Under normal conditions of use, the electrode materials and electrolyte they contain are not exposed, provided the battery integrity is maintained and seals remain intact. The risk of exposure may occur only in cases of abuse (mechanical, thermal, electrical).

### 3.2 High-Voltage Hazards

Under normal conditions of use, provided that the product enclosure remains closed, handling the product does not pose an electrical hazard. Numerous safeguards have been designed into the product to help ensure that the high voltage battery is kept safe and secure under a number of expected abuse conditions. All of the component battery cells are sealed within the product as sub-groups within enclosures (Pods or battery modules), cannot be accessed from the exterior, and are not accessible to non-Tesla personnel.

A high voltage and electrocution risk may present if the product's outer enclosure and/or safety circuits have been compromised or have been significantly damaged. A battery pack, even in a normally discharged condition, is likely to contain substantial electrical charge and can cause injury or death if mishandled. If the product has been significantly visibly damaged or its enclosure compromised, practice appropriate high-voltage preventative measures until the danger has been assessed (and dissipated if necessary).

 **WARNING:** Never cut into a sealed product enclosure due to high voltage and electrocution risks.

For proper installation / removal instructions, contact Tesla ([Identification of Company and Contact Information on page 4](#)).



### 3.3 Hazards Associated with Elevated Temperature Exposure

This product is designed to withstand operating ambient temperatures up to 50°C (122°F), or as indicated in the product specification, with up to 100% operating humidity (condensing). This product is designed to withstand storage temperatures up to 60°C (140°F), or as indicated in the product specification, and <95% relative humidity (non-condensing) for up to 24 hours without affecting the health of the unit.

Prolonged exposure of the product to conditions beyond these limits may increase the potential of thermal runaway and result in a fire. Exposure of battery packs to localized heat sources such as flames may result in cell thermal runaway reactions and should be avoided.

### 3.4 Hazards Associated with Mechanical Damage

Mechanical damage to the product can result in a number of hazardous conditions (discussed below) including:

- Leaked battery pack coolant (see [Hazards Associated with Leaked Coolant on page 13](#))
- Leaked refrigerant (see [Hazards Associated with Leaked Refrigerant on page 13](#))
- Leaked cell electrolyte (see [Hazards Associated with Leaked Electrolyte on page 13](#))
- Rapid heating of individual cells due to exothermic reaction of materials (cell thermal runaway), venting of cells, and propagation of self-heating and thermal runaway reactions to neighboring cells.
- Fire

To prevent mechanical damage to the product, these items should be properly stored when not in use or prior to being installed (see [Storage Precautions on page 20](#)).

### 3.5 Hazards Associated with Leaked Coolant

Thermal management of the product is achieved via liquid cooling using coolant in quantities as indicated in [Thermal Contents on page 5](#). Mechanical damage to a product that has been installed could result in leakage of the coolant. The fluid may be blue, green, or orange in color and does not emit a strong odor.

For information regarding the toxicological hazards associated with ethylene glycol, as well as ecological effects and disposal considerations, refer to the specific Safety Data Sheet (SDS) for battery coolant (see [SDS Information on page 5](#)).

Extended exposure of the product to leaked coolant could cause additional damage to the product such as corrosion and compromise of protection electronics.

### 3.6 Hazards Associated with Leaked Refrigerant

The product's thermal management systems include refrigerant in a sealed system in quantities as indicated in [Thermal Contents on page 5](#). Mechanical damage to the product could result in a release of the refrigerant. Such a release would appear similar to the emission of smoke.

For information regarding the toxicological hazards associated with refrigerant, as well as ecological effects and disposal considerations, refer to the appropriate Safety Data Sheet (SDS) for refrigerant (see [SDS Information on page 5](#)).

### 3.7 Hazards Associated with Leaked Electrolyte

The possibility of an electrolyte spill from the product's cells is very remote for the following reasons:



- Liquid electrolyte is largely absorbed within the cell materials during the manufacturing process. The electrolyte also gets consumed during the normal operation of the batteries.
- The cells are hermetically sealed. Even if a single cell were damaged in a manner that could cause a leak, the volume would be of negligible concern.
- Cells are assembled into enclosed module compartments and inaccessible to personnel. The product architecture prevents any direct contact with the battery cells.

As such, the absence of free liquid electrolyte makes it impractical to report the volume of electrolyte within the product, and the cell and product design prevent the possibility for spills at the project site.

### 3.8 Hazards Associated with Vented Electrolyte


Lithium cells are sealed units, and thus under normal usage conditions, venting of electrolyte should not occur. If subjected to abnormal heating or other abuse conditions, electrolyte and electrolyte decomposition products can vaporize and be vented from cells. Vented gases are a common early indicator of a thermal runaway reaction – an abnormal and hazardous condition.


Regulatory testing has shown that the products of combustion of lithium batteries can include flammable and nonflammable gases. Based on this testing, the flammable gases are found to be below their lower flammable limit (LFL) and do not pose a deflagration or explosion risk to first responders or the general public. The nonflammable gases were found to be comparable to smoke encountered in a Class A structure fire and do not produce any unique, or atypical, gases beyond what you would find in the combustion of modern combustible materials.


In close proximity, vented gases may irritate the eyes, skin, and throat. Cell vent gases are typically hot; upon exit from a cell, vent gas temperatures can exceed 600°C (1,110°F). Vented electrolyte is flammable and may ignite on contact with a competent ignition source such as an open flame, spark, or a sufficiently heated surface. Vented electrolyte may also ignite on contact with cells undergoing a thermal runaway reaction.



## 4 In Case of Emergency

 **WARNING:** In case of emergency, severe physical impact, or transportation accident, do not approach the product or open any of its doors.

 **WARNING:** In case of severe physical impact or transportation accident, it may take time before any visible indication of an abnormal and hazardous condition (e.g., smoke or fire) can be observed. Contact Tesla for guidance ([Identification of Company and Contact Information on page 4](#)).

 **CAUTION:** Response should only be performed by trained professionals.

### 4.1 During Storage or Operation

During storage or operation, emergencies include but are not limited to:

- Suspicious odor observed near the product
- Smoke or fire emanating from the product
- Severe physical impact on the product

In case of emergency, isolate, deny entry, and perform the following:

1. If possible, and if trained and properly equipped, shut off the unit/system (see [Shutting Down in an Emergency on page 18](#)).
2. Evacuate the area.
3. If not already present, notify appropriately trained first responders, the local fire department, and any appointed subject matter expert (SME) if available.
4. Contact Tesla for guidance ([Identification of Company and Contact Information on page 4](#)).



## 4.2 During Transportation

During transportation, emergencies include but are not limited to:

- Suspicious odor observed near the product
- Smoke or fire emanating from the product
- Transportation accident causing a severe physical impact on the product
- Transportation accident leading to tipping over of the product

In case of emergency, perform the following:

1. If possible, move the unit/system to an open area and away from exposures (such as buildings, flammable material, or people).
2. Evacuate the area.
3. Notify appropriately trained first responders, the local fire department, and any appointed subject matter expert (SME) if available.
4. Contact Tesla for guidance ([Identification of Company and Contact Information on page 4](#)).



## 5 Firefighting Measures

### 5.1 Firefighter PPE

Firefighters should wear self-contained breathing apparatuses (SCBAs) and structural firefighting gear. Industry testing has shown that standard structural firefighting gear provides adequate protection.

### 5.2 Responding to a Venting Product



**WARNING:** Do not approach the unit and attempt to open any doors.

Smoke or suspicious odor emanating from a Tesla Energy product can be an indication of an abnormal and hazardous condition. Battery thermal runaway fires (also known as thermal events) are preceded by a period of smoke. If fire, smoke, or suspicious odor is observed emanating from the product at any time, assume a thermal event is occurring and perform the following:

1. If possible, shut down the system (see [Shutting Down in an Emergency on page 18](#)).
2. Evacuate the area of all non-emergency personnel.



**WARNING:** When responding to a fire event, do not approach the unit and attempt to open any doors. The doors are designed to remain shut.

3. If not already done, contact Tesla Energy Technical Support for assistance ([Identification of Company and Contact Information on page 4](#)).
4. While maintaining a safe distance from the unit:
  - Complete area size-up and identify water supply.
  - If needed, pre-position hose lines to protect adjacent exposures.
  - Monitor for evidence of continued smoke venting or fire.
5. If a fire develops:
  - Allow the affected unit to consume itself as it is designed to do. Applying water to the burning unit will have minimal effect and will only slow its eventual combustion.
  - At the discretion of first responders, apply water to the exposures. Tesla recommends using a fog pattern, if possible, to maximize cooling of the exposure.





**NOTE:** Water has been deemed appropriate for use on Tesla Energy products, thus will not create a hazard while protecting exposures.


6. Allow the unit to cool down while maintaining contact with Tesla for guidance (this process may take 12-48 hours or longer) and continuing to maintain a safe distance.
7. Contact Tesla Energy Technical Support for next steps ([Identification of Company and Contact Information on page 4](#)).



## 6 Shutting Down in an Emergency

 **WARNING:** Shutting off power to the product does not de-energize the battery, and a shock hazard may still be present.

 **WARNING:** If smoke or fire is visible, do not approach the product or open any of its doors.

 **WARNING:** In case of flooding, stay out of the water if any part of the product or its wiring is submerged.

To shut the product down in an emergency, perform the appropriate steps below and then contact Tesla ([Identification of Company and Contact Information on page 4](#)):

### 6.1 Powerpack System

1. If an external emergency stop (E-Stop) button or remote shutdown contact to the Powerpack is present, engage it.
2. If the Powerpack is serviced upstream by an external AC breaker or disconnect, open the breaker or disconnect.

### 6.2 Megapack System

1. If an external emergency stop (E-Stop) button or remote shutdown contact to the Megapack is present, engage it.
2. If the Megapack is serviced upstream by an external AC breaker or disconnect, open the breaker or disconnect.



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## 7 First Aid Measures

### 7.1 Electric Shock / Electrocutation

Seek immediate medical assistance if an electrical shock or electrocution has occurred (or is suspected).

### 7.2 Contact with Leaked Electrolyte

Battery cells are sealed. Contents of an open (broken) battery cell can cause skin irritation and/or chemical burns. If materials from a ruptured or otherwise damaged cell or battery contact skin, flush immediately with water, remove all clothing around affected area, and wash affected area with soap and water. If a chemical burn occurs or if irritation persists, seek medical assistance.

For eye contact, flush with significant amounts of water for 15 minutes without rubbing and see a physician at once.

### 7.3 Inhalation of Electrolyte Vapors

If inhalation of electrolyte vapors occurs, move person into fresh air. If throat irritation is present, seek immediate medical assistance.

### 7.4 Vent Gas Inhalation

Battery cells are sealed and venting of cells should not occur during normal use. If inhalation of vent gases occurs, move person into fresh air. If signs of respiratory distress are present, seek immediate medical assistance.





## 8 Storage Precautions

Powerpack systems and sub-assemblies should be stored in approved packaging prior to installation. Megapack does not include packaging and can be stored as-shipped with a tarp.

Elevated temperatures can result in reduced battery service life. The product can withstand ambient temperatures of -40°C to 60°C (-40°F to 140°F) for up to 24 hours. Do not store the product near heating equipment.

Ideally, the product should be stored at 50% state of charge (SOC) or less. The product should not be stored for extended periods either at a full SOC or completely discharged since both conditions adversely impact battery life.

The storage area should be protected from flooding.

Long-term storage areas should be compliant with the appropriate local fire code requirements.

Acceptable storage density of battery packs and storage height of battery packs will be defined by the local authority having jurisdiction (AHJ). Requirements and limits will be based upon a number of factors including the structural and fire protection characteristics of the storage area and recommendations for fire protection promulgated by the National Fire Protection Association (NFPA) and similar organizations. At the time of this writing, no standard Commodity Classification has been defined for lithium cells or battery packs (see 2016 NFPA 13: Standard for the Installation of Sprinkler Systems). The product only has a 30-40% state of charge (SOC) while in storage which reduces the energy impact on fire occurrences. As an example of the reduced energy, the 30% level has been determined to be acceptable for air flight shipping based upon extensive testing and analysis in conjunction with the FAA. Tesla recommends treating lithium cells and batteries in packaging as equivalent to a typical Group A plastic commodity.



## 9 Damaged Product Handling

This section describes the handling, storage, and transportation of damaged products.

If the event of damage to a product, contact Tesla immediately ([Identification of Company and Contact Information on page 4](#)).

If a product has been damaged (for example, its battery enclosure has been dented or compromised), it is possible that heating is occurring that may eventually lead to a fire. Damaged or opened cells/batteries can result in rapid heating (due to exothermic reaction of constituent materials), the release of flammable vapors, and propagation of self-heating and thermal runaway reactions to neighboring cells.

Before handling or transporting a damaged product, wait at least 24 hours. Smoke may be an indication that a thermal reaction is in progress. If no smoke, flame, sign of coolant leakage, or signs of heat has been observed for 24 hours, the product may be disconnected and moved to a safe location. Contact Tesla ([Identification of Company and Contact Information on page 4](#)) to obtain specific instructions for evaluating, disconnecting, and preparing a damaged product for transport.

A damaged product should be monitored during storage for evidence of smoke, flame, sign of coolant leakage, or signs of heat. If full-time monitoring of the product is not possible (for example during extended storage), the product should be moved to a safe storage location.

A safe storage location for a damaged battery will be free of flammable materials, accessible only by trained professionals, and 50 feet (15 m) downwind of occupied structures. For example, a fenced, open yard may be an appropriate safe location. Do not store damaged products adjacent to undamaged products. It is possible that a damaged product may sustain further damage during transportation and may lead to a fire. To further reduce this risk, handle the damaged product with extreme caution.



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## 10 Disposal Procedures

For disposal after a fire or thermal event, contact Tesla for guidance ([Identification of Company and Contact Information on page 4](#)).

In most cases, the product can be recycled. Contact Tesla to return the product to a Tesla facility for disassembly and further processing. If disposing of the product without returning it to Tesla, consult with local, state and/or federal authorities on the appropriate methods for disposal and recycling of lithium batteries. Note that the products do not contain heavy metals such as lead, cadmium, or mercury.



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## 11 Maintenance or Repair

Tesla requests all maintenance, service, and repairs of the product be performed by Tesla-approved service personnel or Tesla-authorized repair facilities. This includes all proactive and corrective maintenance over the lifetime of the product. Improper service or repair by personnel not approved nor authorized by Tesla could void the product's Limited Warranty, lead to failure of the product, and potentially result in development of an unsafe condition and unexpected electrical events.



## 12 Transportation

Lithium batteries are regulated as Class 9 Miscellaneous dangerous goods (also known as “hazardous materials”) pursuant to the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air, International Air Transport Association (IATA) Dangerous Goods Regulations, the International Maritime Dangerous Goods (IMDG) Code, European Agreements concerning the International Carriage of Dangerous Goods by Rail (RID) and Road (ADR), and applicable national regulations such as the USA’s hazardous materials regulations (see 49 CFR 173.185). These regulations contain very specific packaging, labeling, marking, and documentation requirements. The regulations also require that individuals involved in the preparation of dangerous goods for transport be trained in how to properly package, label, mark and prepare shipping documents.

 **NOTE:** Transportation regulations vary by region. To ensure compliant transportation, always refer to local regulations as applicable.

<b>UN Number, Proper Shipping Name</b>	<p><b>Powerpack 1 or 2:</b> 3480, Lithium-Ion Batteries</p> <p><b>Powerpack 3:</b> 3536, Lithium batteries installed in cargo transport unit</p> <p><b>Megapack:</b> 3480, Lithium-Ion Batteries OR 3536, Lithium batteries installed in cargo transport unit</p>
<b>Hazard Classification</b>	Class 9 Miscellaneous
<b>Packing Group</b>	N/A



## Revision History

Revision	Date	Description
2.7	February 16, 2024	<ul style="list-style-type: none"> <li>Improved firefighting guidance (<a href="#">Firefighting Measures on page 17</a>)</li> <li>Modified Asia-specific hotline numbers (<a href="#">Identification of Company and Contact Information on page 4</a>).</li> <li>Modified UN Number and Proper Shipping Name information (<a href="#">Transportation on page 24</a>)</li> <li>Updated (decreased) Megapack 2 and Megapack 2 XL coolant volume (<a href="#">SDS Information on page 5</a>)</li> <li>Added Powerpack 3</li> </ul>
2.6	November 11, 2022	<ul style="list-style-type: none"> <li>Decoupled Powerwall information, now focusing on Industrial Energy products (including Megapack and Powerpack). Visit <a href="https://tesla.com/firstresponders">https://tesla.com/firstresponders</a> for all versions.</li> <li>Deleted trademarked brand name from <a href="#">Firefighting Measures on page 17</a></li> <li>Improved language in <a href="#">Hazards Associated with Vented Electrolyte on page 14</a></li> <li>Improved language in <a href="#">Hazards Associated with Elevated Temperature Exposure on page 13</a></li> <li>Simplified language in <a href="#">Hazards Associated with Leaked Electrolyte on page 13</a></li> <li>Simplified language in <a href="#">Disposal Procedures on page 22</a></li> <li>Improved overall hazard and firefighting recommendations (<a href="#">Firefighting Measures on page 17</a>)</li> <li>Improved first aid recommendations (<a href="#">First Aid Measures on page 19</a>)</li> <li>Updated Tesla headquarters address (<a href="#">Identification of Company and Contact Information on page 4</a>)</li> <li>Modified SDS language to reflect latest guidance (<a href="#">SDS Information on page 5</a>)</li> <li>Clarified refrigerant volume (<a href="#">Hazards Associated with Leaked Refrigerant on page 13</a>)</li> </ul>
2.5	May 23, 2022	<ul style="list-style-type: none"> <li>Added Megapack 2 XL (<a href="#">SDS Information on page 5</a>, <a href="#">Product Descriptions on page 6</a>)</li> </ul>
2.4	February 16, 2022	<ul style="list-style-type: none"> <li>Enhanced firefighting guidance regarding neighboring battery enclosures (<a href="#">Firefighting Measures on page 17</a>)</li> <li>Clarified products of combustion (<a href="#">Firefighter PPE on page 17</a>)</li> <li>Added Powerwall+ and Megapack 2 information.</li> <li>Provided reference to safety data sheet specific to Australia/New Zealand (<a href="#">SDS Information on page 5</a>)</li> <li>Amended that coolant color can be blue, green, or orange (<a href="#">Hazards Associated with Leaked Coolant on page 13</a>)</li> </ul>



Revision	Date	Description
		<ul style="list-style-type: none"> <li>• Added links and QR codes to download this guide in additional languages (<a href="#">Introduction and Scope on page 2</a>)</li> <li>• Updated contact information (<a href="#">Identification of Company and Contact Information on page 4</a>), including: Tesla headquarters, Powerwall North America hotline, Megapack and Powerpack Japan technical support</li> </ul>
2.3	July 28, 2021	<ul style="list-style-type: none"> <li>• Added coolant volume for separately shipped Megapack battery modules (<a href="#">SDS Information on page 5</a>)</li> <li>• Clarified firefighting guidance (<a href="#">Firefighting Measures on page 17</a>)</li> <li>• Enhanced product identification information (<a href="#">Product Descriptions on page 6</a>)</li> <li>• Simplified emergency shut-down procedures for Megapack and Powerpack (<a href="#">Shutting Down in an Emergency on page 18</a>)</li> </ul>
2.2	June 23, 2021	<ul style="list-style-type: none"> <li>• Updated contact information in <a href="#">Identification of Company and Contact Information on page 4</a></li> <li>• Updated specs according to updated products in <a href="#">SDS Information on page 5</a></li> <li>• Added Powerwall part numbers to <a href="#">SDS Information on page 5</a></li> <li>• Enhanced firefighting guidance: <a href="#">Firefighting Measures on page 17</a></li> <li>• Added guidance in case of emergency: <a href="#">In Case of Emergency on page 15</a></li> <li>• Added additional early signs of thermal runaway: <a href="#">Hazards Associated with Vented Electrolyte on page 14</a></li> <li>• Updated Powerwall instructions in <a href="#">Shutting Down in an Emergency on page 18</a></li> </ul>
2.1	August 28, 2020	<p>Added spare parts specifications:</p> <ul style="list-style-type: none"> <li>• Megapack battery module</li> <li>• Powerpack Pod module</li> </ul>
2.0	July 8, 2020	<ul style="list-style-type: none"> <li>• Updated formatting</li> <li>• Updated product specs</li> <li>• Updated contact info</li> <li>• Corrected elevated temperature topic to include Megapack</li> <li>• Corrected name of Tesla Inverter to Powerpack Inverter</li> <li>• Separated information on shutting down into its own topic for visibility</li> <li>• Reorganized the Firefighting section for clarity</li> <li>• Updated language on re-ignition risks</li> </ul>
1.8	March 11, 2020	Fixed footer; fixed styles.
07	17-Dec-2019	Updates to contact information (Tesla contact), product specs section, leaked electrolyte section, and inclusion of Megapack throughout the document.



Revision	Date	Description
06	27-Feb-2019	Updated storage conditions and firefighting measures section to provide further context on response tactics to Tesla Energy Product fires. Adjusted formatting, included graphics for warnings and notices.
05	22-Oct 2018	Reformatted for ease of use and translation; removed Confidential status; corrected phone number for CHEMTREC
04	30-June-2017	Added fire ground operations response for Powerpack 2, including approach; exhaust gases; and safety. Updated general product information and contacts, as well as part numbers and reman numbers
03	3-Oct-2016	Added part numbers, minor edits
02	3-Sept-2015	Added part numbers, updated weights, voltages, and temperatures, clarified hazards associated with spilled electrolyte, updated storage requirements, updated warning label icons, updated packing group.
01	14-July-2015	ERG for Tesla Powerpack systems, Powerwalls, and Sub-assemblies



TESLA




# BATTERY ENERGY STORAGE SYSTEMS (BESS) EMERGENCIES

## QUICK REFERENCE GUIDE

### Initial Response Actions:

Conduct an Initial Scene Assessment as well as:

1. **IDENTIFY** the location and type of system
2. **SHUTDOWN** the BESS if necessary
3. **WATCHOUT** for high voltage & other hazard

IDENTIFY	SHUTDOWN	WATCH OUT
<p><b>LABELS:</b></p> <p>Battery Disconnect Emergency Stop (ESTOP) Battery Room</p>  <p><b>COMPONENTS:</b></p> <p>Battery racks or cabinets Gas detection equipment SDS's</p>	<p>If system is on fire or other life safety/property hazard exists</p>  <p>Locate emergency stop, disconnect or circuit breaker</p> <p>Shutdown the BESS</p>	<p>Stay away from open bus bars (shock hazards)</p> <p>Monitor for re-ignition with thermal imaging camera (TIC)</p>  <p>Look for electrolyte spills</p> <p>Monitor air for toxic/flammable gases</p> <p>Ventilate as required</p>

# BATTERY ENERGY STORAGE SYSTEMS (BESS) EMERGENCIES

## QUICK REFERENCE GUIDE

### General Warning and Cautions

**In the event of damage or fire involving battery energy storage systems (BESS):**

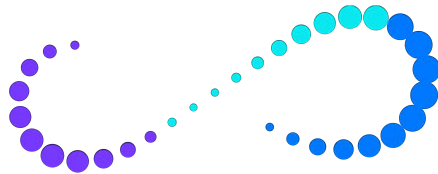
- Always assume the batteries and associated components are energized and fully charged.
- Safety Data Sheets (SDS) can provide important information regarding battery chemistry
- Exposed electrical components, wires, and batteries present potential shock hazards.
- **During incidents involving a BESS, responders should follow the steps: IDENTIFY, SHUTDOWN, WATCH OUT**
- Wear all PPE and look away when operating disconnects to protect against arc flash injuries.
- Locate building personnel responsible for the system and/or locate emergency contact numbers.
- Be prepared to control HVAC systems to prevent spread of smoke and toxic/flammable gases

ALARM ACTIVATIONS		FIRES	
Overheated Batteries/Gas Sensor Activation	Electrolyte Spill	Small Fires	Large Fires
<ul style="list-style-type: none"> <li>• Shutdown of system may not be required, especially if critical systems will be disabled</li> <li>• Monitor battery for potential ignition with thermal imaging camera (TIC)</li> <li>• Check for deformities or bulging of batteries</li> <li>• Check for electrolyte spills</li> <li>• Monitor for toxic/flammable gas release, ventilate the area as necessary</li> <li>• Turn over incident to a qualified, responsible party for additional monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Spill may not be visible if batteries are mounted inside a cabinet</li> <li>• Ventilate battery room as necessary</li> <li>• Check safety data sheet for specific hazards and mitigation information</li> <li>• Wearing PPE with SCBA, contain the spill (ensure compatibility with spilled product)</li> <li>• Neutralize &amp; absorb corrosive liquids (only by qualified personnel)</li> <li>• Decontaminate PPE</li> <li>• Turn over incident to a qualified, responsible party for additional monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• SHUTDOWN\ESTOP entire system</li> <li>• Control ventilation of smoke and toxic gases</li> <li>• If applicable, use a dry chemical extinguisher to extinguish the fire</li> <li>• Do not overhaul electrical components</li> <li>• Check for electrolyte spills</li> <li>• Monitor battery for re-ignition</li> <li>• Turn over incident to a qualified, responsible party for additional monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• SHUTDOWN\ESTOP entire system</li> <li>• Control ventilation of smoke and toxic gases</li> <li>• Secure an adequate water supply</li> <li>• Extinguish the fire using a fog pattern from a sufficiently sized hose line (Except Sodium Sulfur BESS)</li> <li>• Do not overhaul electrical components</li> <li>• Check for electrolyte spills</li> <li>• Monitor battery for re-ignition</li> <li>• Turn over incident to a qualified, responsible party for additional monitoring</li> </ul>

**Appendix J: Hydrologic & Hydraulic Assessment**

Roadrunner Energy Farm LLC  
Hydrologic & Hydraulic  
Assessment

-  
Completed for:



**RAI**ENERGY

Completed By:



**soa**

**SIERRA OVERHEAD ANALYTICS**

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## Introduction

On behalf of RAI Energy, Sierra Overhead Analytics, Inc. (SOA) has prepared this hydrology and hydraulic report (report) for the Roadrunner Energy Farm LLC, located in Morgan County, near Brush, Colorado. The approximate center point of the project is located at 40.2175°, -103.5824°. This report summarizes the results of the hydrology study, which was performed to assess peak flows and flood risk across the project site. A two-dimensional (2D) hydraulic model was developed in GeoHECRAS to represent the site and the contributing watershed areas. This model was used to assess on-site depth and velocity during the 100-year 24-hour recurrence interval storm event for pre-construction and post-construction conditions.

## Site Data

### Topography and Drainage

SOA utilized USGS LiDAR data for the region to create a 1 x 1 meter cell size Digital Elevation Model. The site is sloped, about 1.3 % southeast to northwest. The site is in FEMA Zone X (0.2% annual chance flood hazard), as shown in Appendix A, Figure 1.

### Site Soils and Land Use

Soils data was downloaded from United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) SSURGO database. Soils in the site outline are 82.7% Valent sand, 10.8% Vona loamy sand, and 4.9% Vona-Dwyer loamy sands. The soils in the 2D model domain are classified as hydrologic soil group (HSG) A, which is characterized by a high infiltration rate, HSG B, which is characterized by a moderate infiltration rate, HSG C, which is characterized by a slow infiltration rate, and HSG D, which is characterized by a very slow infiltration rate, as shown in Appendix A, Figure 2. A copy of the NRCS Custom Soil Resource Report, which describes the soil types in the site outline in detail, is included in Appendix B.

The USGS National Land Cover Database (NLCD) was used to determine land use for model domain. The majority of the site outline is classified as undeveloped grassland and shrub-scrub.

### Precipitation

NOAA Atlas 14 publicly available rainfall data was used to determine the precipitation depth for the 100-year 24-hour storm event near the center of the 2D model area, which was found to be 4.46 inches. This precipitation amount was temporally distributed through use of the Soil Conservation Service (SCS) Type-II, 24-hour storm. The NOAA Point Precipitation Frequency Estimate printout is included in Appendix B.

## Model Setup

### 2D Hydraulic Modeling

CivilGeo's GeoHECRAS was used to develop pre- and post-construction 2D hydraulic models for the 100-year 24-hour storm event to model maximum depths and velocities across the site. Adaptive mesh grid cells generated by GeoHECRAS were used in the 2D model domain. Topography was

interpolated to the grid cells based on the topographic data described above. Land use and soils layers were developed using the data described above, and they were combined to form an infiltration layer. Each land use was associated with a Manning’s n value, as shown in Table 1.

Table 1: *Land Cover Types and Associated Manning’s n Values*

Land Cover	Manning’s n
Developed, Low Intensity	0.08
Developed, Medium Intensity	0.1
Developed, Open Space	0.04
Undeveloped, Barren Land	0.03
Undeveloped, Deciduous Forest	0.1
Undeveloped, Shrub-Scrub	0.085
Undeveloped, Grassland	0.035
Agricultural, Cultivated Crops	0.035
Wetlands, Non-Forested	0.07

Hydrologic soil group data was combined with land use data to assign a Curve Number (CN) to each land use/hydrologic soil group combination, as shown in Table 2. These CN values were used in the infiltration layer. Appropriate initial abstraction ratios were determined by GeoHECRAS based on infiltration data. For the post-construction model, CNs in the approximate site outline were increased by 10% compared to pre-construction conditions to represent post-construction land cover changes.

Table 2: *Curve Numbers*

Land Use	Curve Number			
	HSG A	HSG B	HSG C	HSG D
Developed, Open Space	49	69	79	84
Developed, Low Intensity	77	86	91	94
Developed, Medium Intensity	89	92	94	95
Undeveloped, Barren Land	77	86	91	94
Undeveloped, Deciduous Forest	32	48	57	63
Undeveloped, Shrub-Scrub	49	68	79	84
Undeveloped, Grassland	64	71	81	89
Agricultural, Cultivated Crops	71	80	87	90
Wetlands, Non-Forested	89	90	91	92

The 100-year 24-hour precipitation event was simulated as spatially constant across the 2D model domain using an internal precipitation boundary condition. Infiltration was modeled using the SCS Curve Number method. The edges of the model domain were represented by external boundary conditions of normal depth with friction slopes measured by GeoHECRAS.

Two-dimensional unsteady flow routing was performed in GeoHECRAS using the Diffusion Wave Equations, as described in the HEC-RAS Hydraulic Reference Manual. Model stability was maintained by using a small timestep, 0.2 seconds.

## Results

### 2D Hydraulic Model Results

Pre- and post-construction runoff was calculated using the NRCS Runoff Equation (Part 650 Engineering Field Handbook, Appendix B). Using the average pre- and post-construction CNs for the site outline, 62.6 and 67.2, respectively, and the NOAA Atlas 14 100-year 24-hour precipitation depth, 4.46 inches, pre-construction runoff depth was 1.16 inches, and post-construction runoff depth was 1.46 inches.

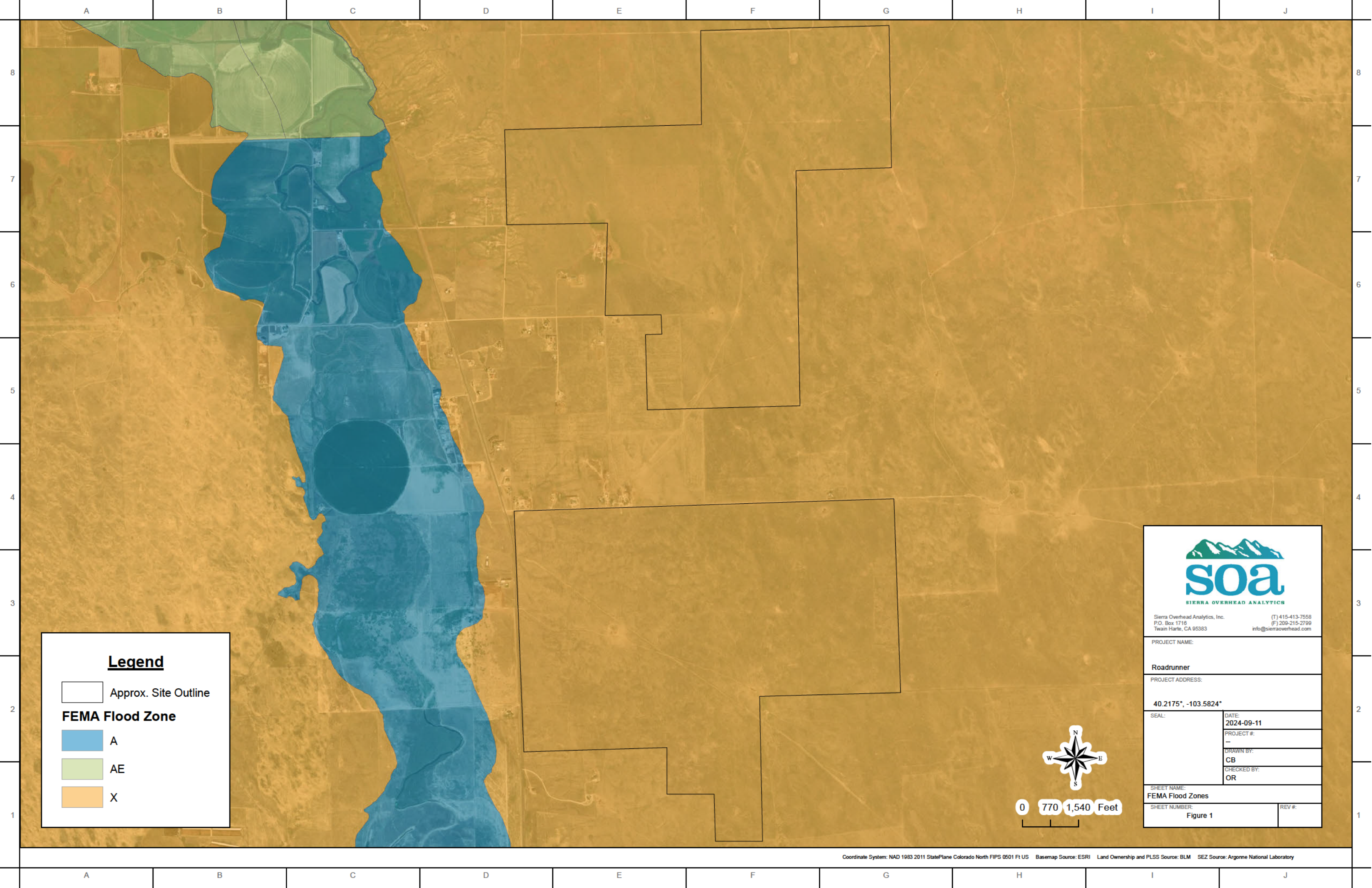
Potential pile scour depth was calculated using the methods of Chapter 7 of the HEC 18 Scour Manual. K1, K2, and K3 were calculated to be 1.1, 1.3, and 1.1 respectively, and a box pile of dimensions  $a=1/3'$  and  $L=1/2'$  were used. For simplicity, the angle of attack was assumed to be zero for all piles. The proper excerpt pages are included in Appendix B.

HEC-RAS outputs for the 100-year 24-hour pre-construction flow event maximum depth, velocity, and scour are shown in Appendix A, Figures 3 - 5. During the 100-year 24-hour pre-construction storm event, on-site flow depths reached approximately 6.2 feet in a depression in the northeast area of the site outline. On average, depths in the site outline were less than 1 foot. The highest on-site velocity, approximately 3.4 feet per second, occurred in the southwest area of the site outline, just east of the Heartland Expressway. Flow velocities were, on average, less than 1 foot per second across the remainder of the site. The highest on-site pile scour potential, approximately 1.2 feet, occurred in the same area where velocity was highest, but were, on average, less than 0.75 feet across the rest of the site.

HEC-RAS outputs for the 100-year 24-hour post-construction flow event maximum depth, velocity, and scour are shown in Appendix A, Figures 6 - 8. During the 100-year 24-hour post-construction storm event, on-site flow depths reached approximately 7.4 feet in a depression in the south-central area of the site outline. On average, depths in the site outline were less than 1 foot. The highest on-site velocity, approximately 3.8 feet per second, occurred near the site outline's southwest border, east of the Heartland Expressway. Flow velocities were, on average, less than 1 foot per second across the remainder of the site outline. The highest on-site pile scour potential, approximately 1.25 feet, occurred where post-construction velocities were highest, but were, on average, less than 0.75 feet.



## APPENDIX A - Figures



**Legend**

Approx. Site Outline

**FEMA Flood Zone**

- A
- AE
- X

**soa**  
SIERRA OVERHEAD ANALYTICS

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 Twain Harte, CA 95383 info@sierraoverhead.com

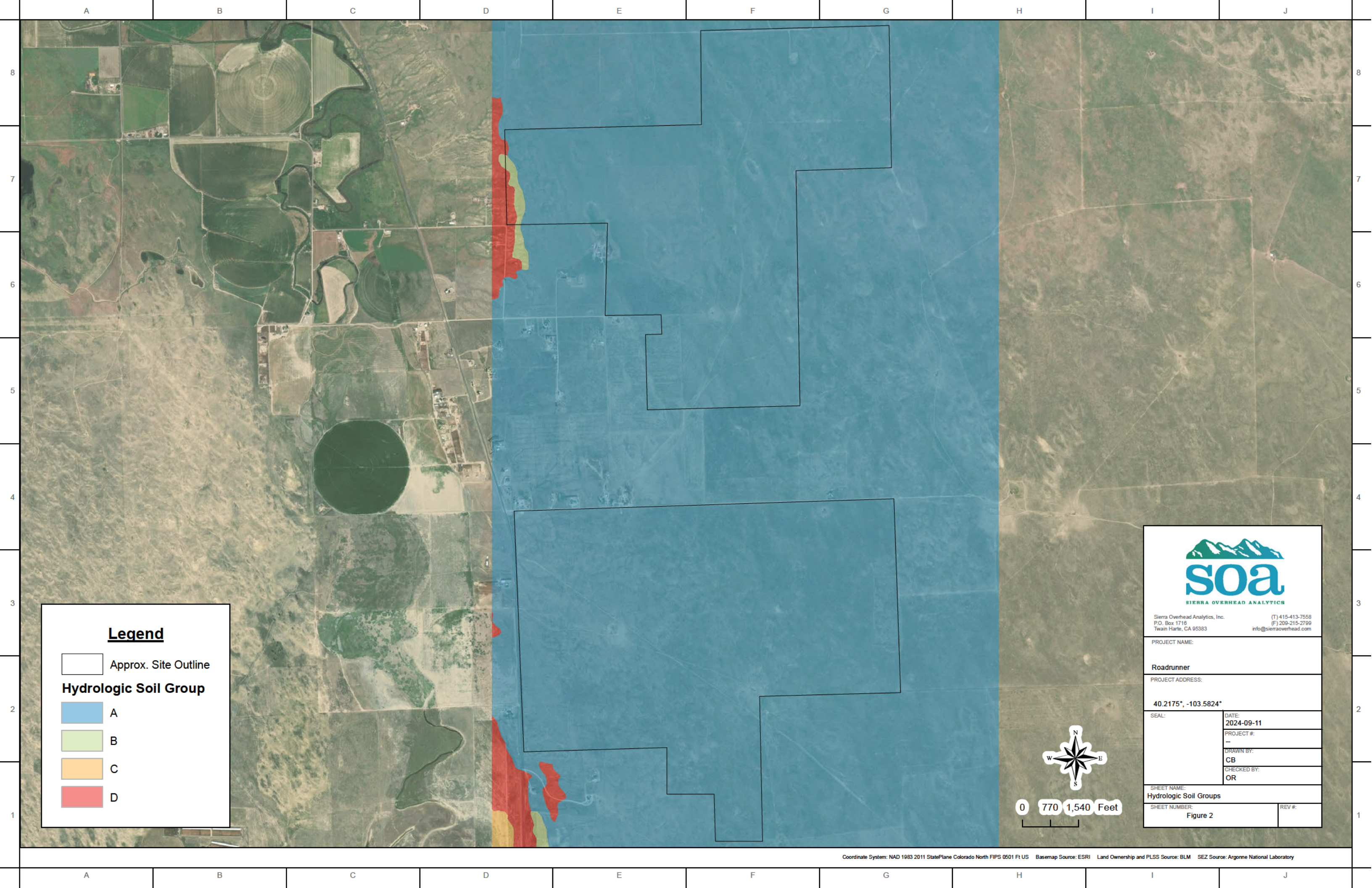
PROJECT NAME:  
**Roadrunner**

PROJECT ADDRESS:  
**40.2175°, -103.5824°**






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	PROJECT #: -
	DRAWN BY: <b>CB</b>
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SHEET NAME:  
**FEMA Flood Zones**

SHEET NUMBER: <b>Figure 1</b>	REV #:
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**Legend**

 Approx. Site Outline  
**Hydrologic Soil Group**  
 A  
 B  
 C  
 D



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SEAL:	DATE: <b>2024-09-11</b>
	PROJECT #: -
	DRAWN BY: CB
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SHEET NAME:  
**Hydrologic Soil Groups**

SHEET NUMBER: Figure 2	REV #:
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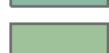

















0 770 1,540 Feet

**Legend**

Approx. Site Outline

**Depth (ft)**

-  0 - 0.5
-  0.5 - 1
-  1 - 1.5
-  1.5 - 2
-  2 - 2.5
-  2.5 - 3
-  3 - 3.5
-  3.5 - 4
-  4 - 4.5
-  4.5 - 5
-  5 - 5.5
-  5.5 - 6
-  6 - 6.5
-  6.5 - 7
-  7 - 7.5
-  7.5 - 8
-  8 - 8.5
-  8.5 - 9
-  9 - 9.5
-  9.5 - 10
-  > 10



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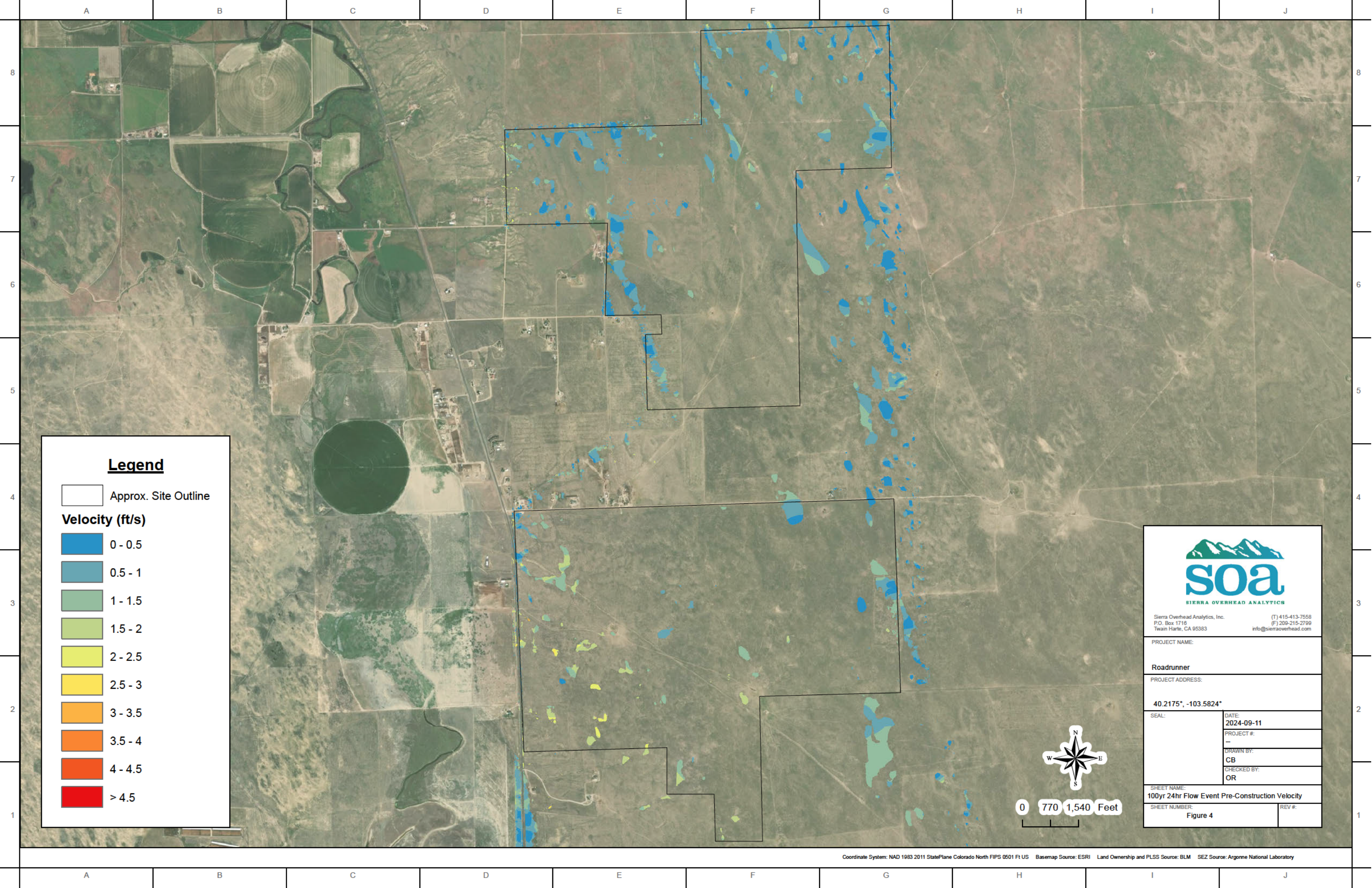
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SHEET NAME:  
**100yr 24hr Flow Event Pre-Construction Depth**

SHEET NUMBER: <b>Figure 3</b>	REV #:
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0 770 1,540 Feet



**Legend**

Approx. Site Outline

**Velocity (ft/s)**

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- > 4.5



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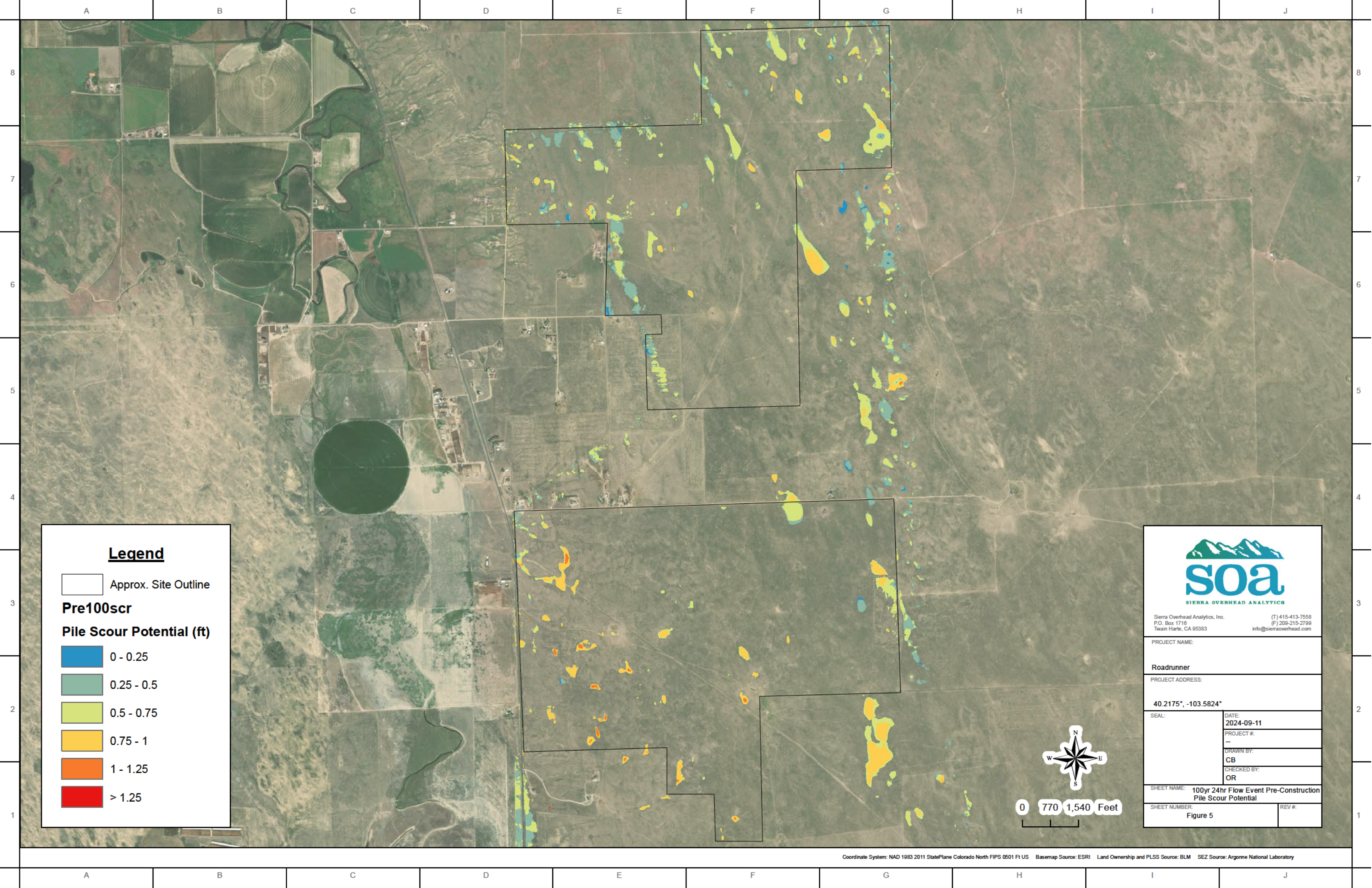
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SHEET NAME:  
**100yr 24hr Flow Event Pre-Construction Velocity**

SHEET NUMBER: <b>Figure 4</b>	REV #:
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0 770 1,540 Feet



**Legend**

Approx. Site Outline

**Pre100scr  
Pile Scour Potential (ft)**

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- > 1.25



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	PROJECT #: -
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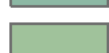















SHEET NAME: **100yr 24hr Flow Event Pre-Construction  
Pile Scour Potential**

SHEET NUMBER: **Figure 5** REV #:

**Legend**

 Approx. Site Outline

<VALUE>

-  0 - 0.5
-  0.5 - 1
-  1 - 1.5
-  1.5 - 2
-  2 - 2.5
-  2.5 - 3
-  3 - 3.5
-  3.5 - 4
-  4 - 4.5
-  4.5 - 5
-  5 - 5.5
-  5.5 - 6
-  6 - 6.5
-  6.5 - 7
-  7 - 7.5
-  7.5 - 8
-  8 - 8.5
-  8.5 - 9
-  9 - 9.5
-  9.5 - 10
-  > 10



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PROJECT NAME:

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**40.2175°, -103.5824°**

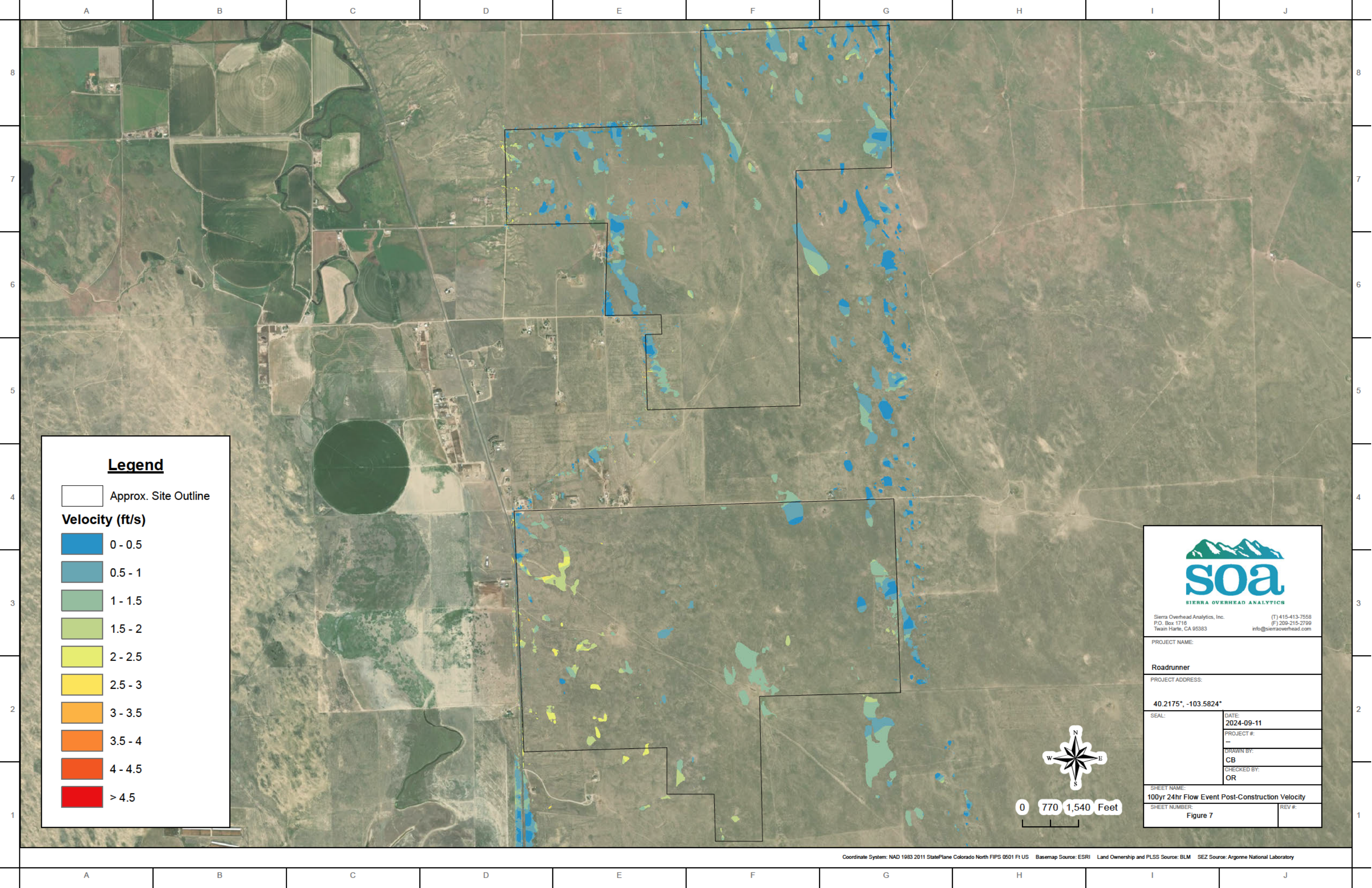
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	CHECKED BY: <b>OR</b>

SHEET NAME:  
**100yr 24hr Flow Event Post-Construction Depth**

SHEET NUMBER: **Figure 6** REV #:



0 770 1,540 Feet



**Legend**

Approx. Site Outline

**Velocity (ft/s)**

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- > 4.5



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PROJECT NAME:

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PROJECT ADDRESS:

**40.2175°, -103.5824°**

SEAL:	DATE: <b>2024-09-11</b>
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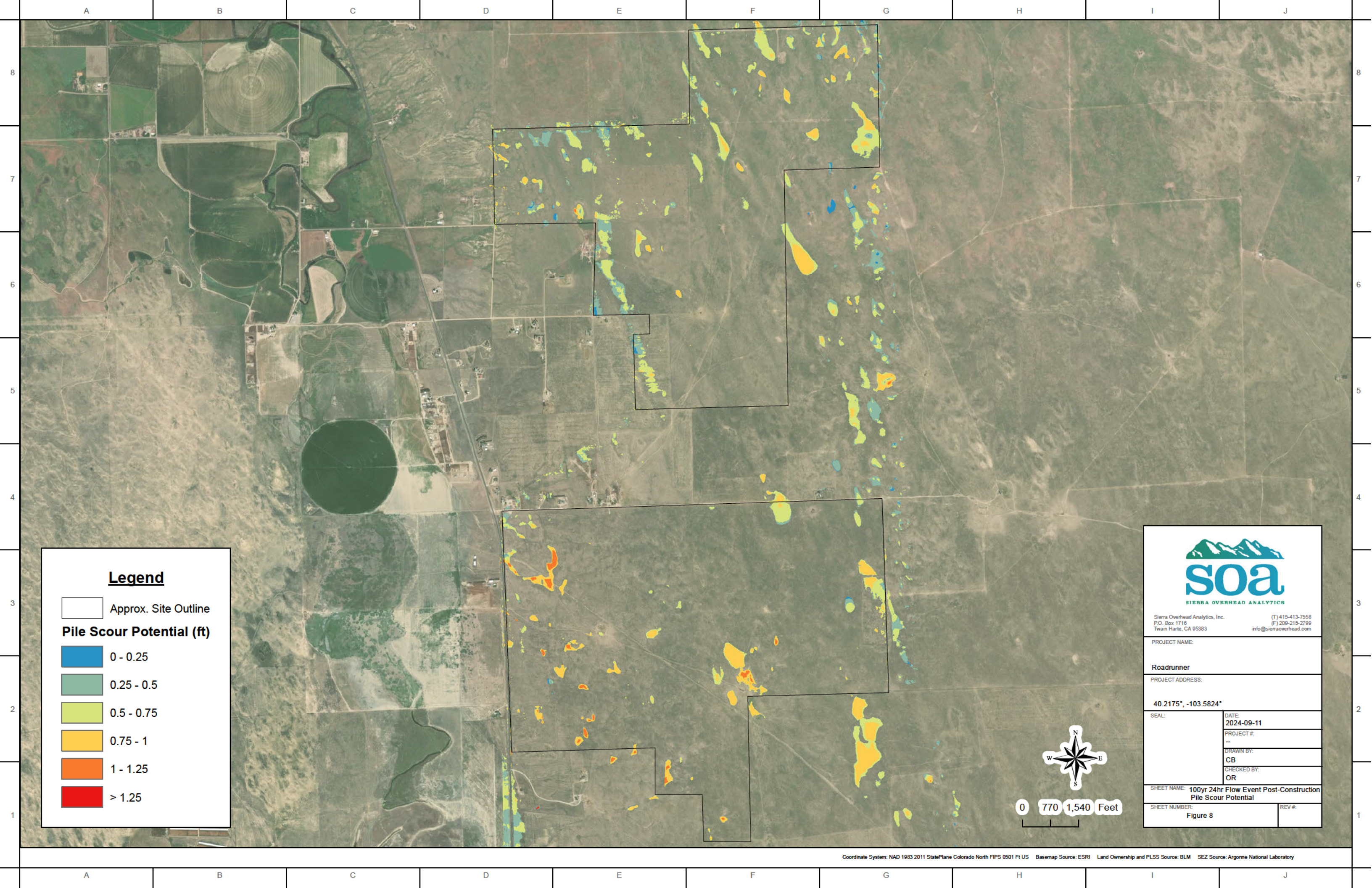
SHEET NAME:  
**100yr 24hr Flow Event Post-Construction Velocity**

SHEET NUMBER: <b>Figure 7</b>	REV #:
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0 770 1,540 Feet





**Legend**

Approx. Site Outline

**Pile Scour Potential (ft)**

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- > 1.25

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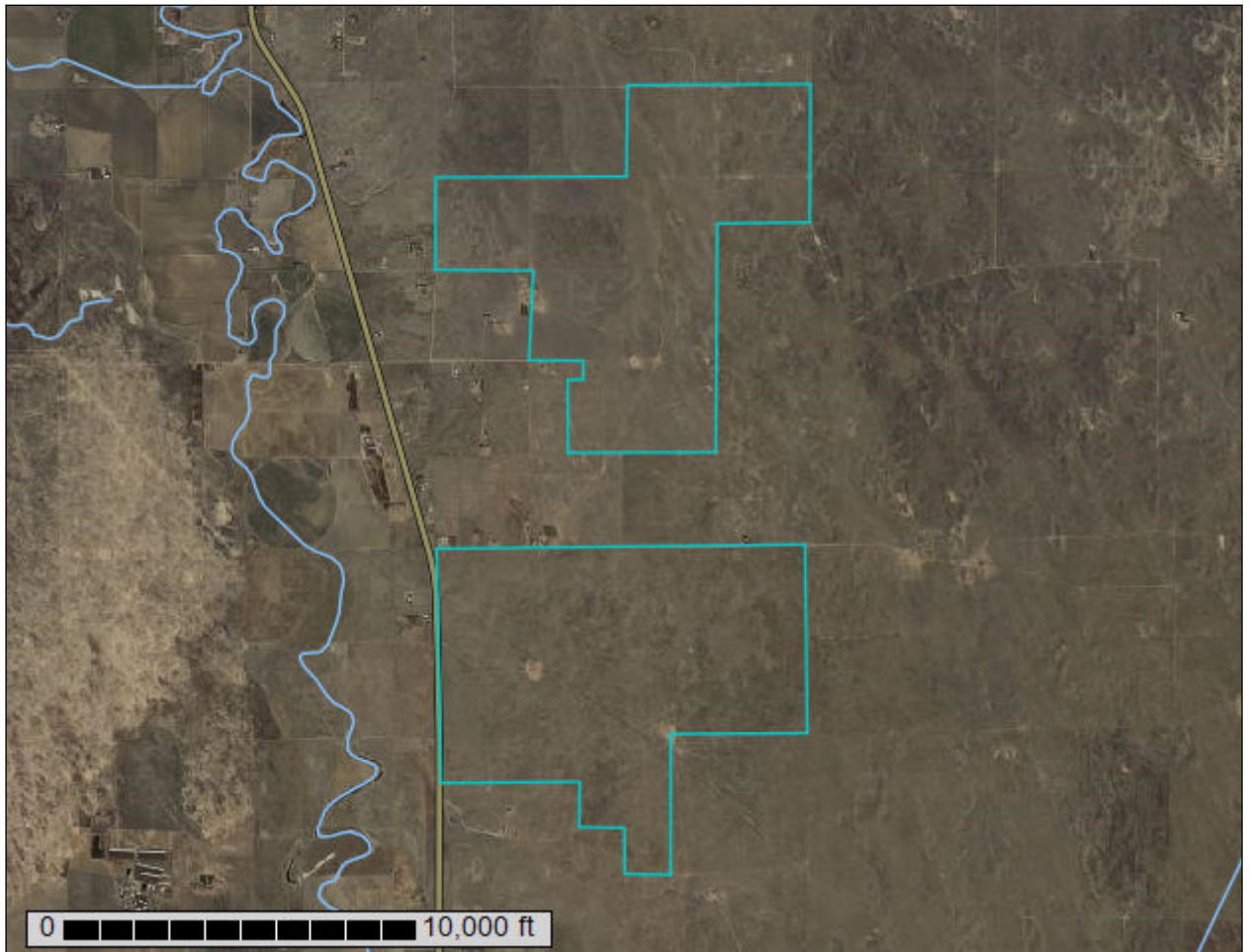
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SHEET NAME: **100yr 24hr Flow Event Post-Construction Pile Scour Potential**

SHEET NUMBER: <b>Figure 8</b>	REV #:
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## **APPENDIX B - Supporting Documentation**

# Custom Soil Resource Report for **Morgan County, Colorado**



# Preface

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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](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.

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# How Soil Surveys Are Made

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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

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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



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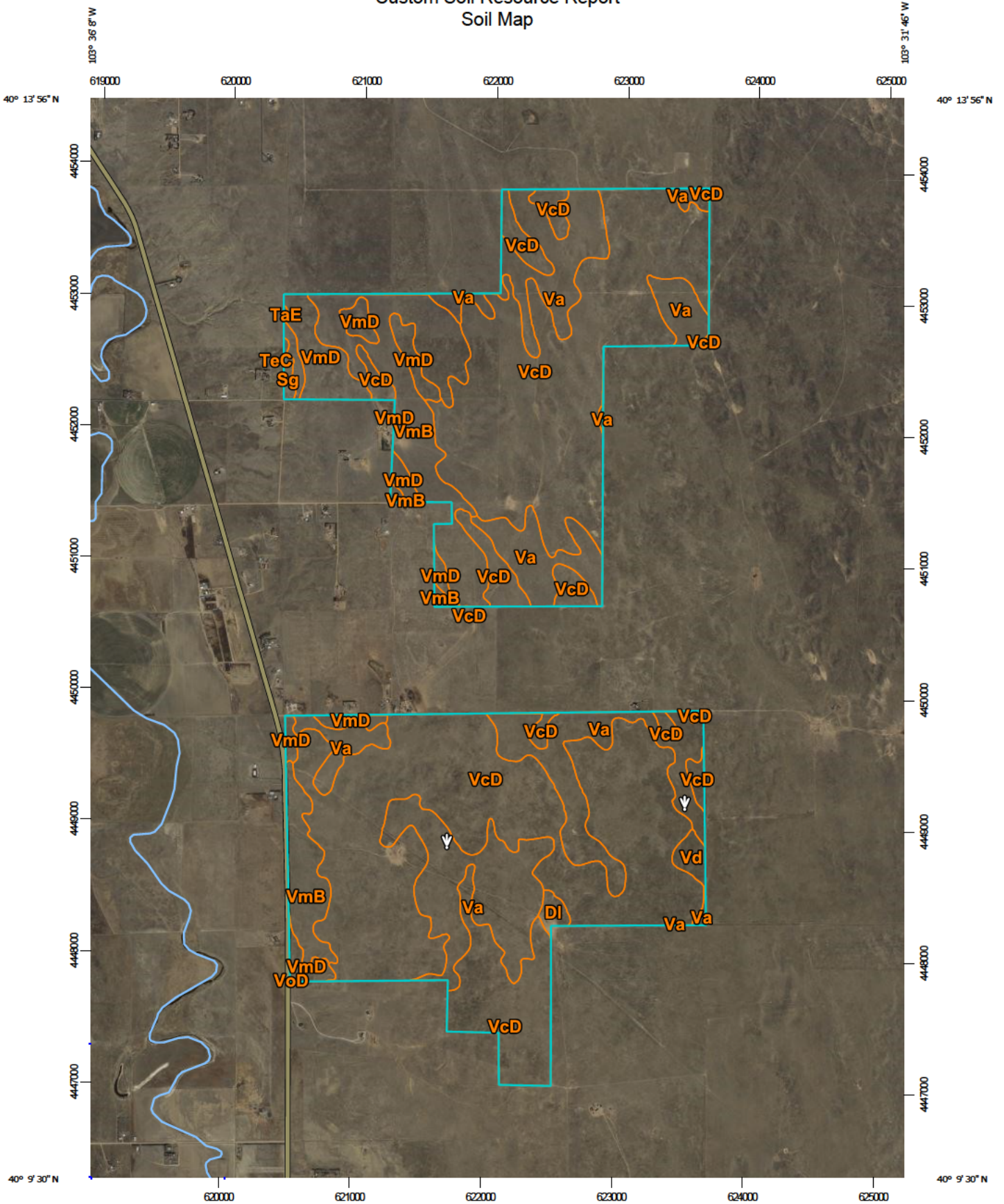
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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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: 1:40,000 if printed on A portrait (8.5" x 11") sheet.



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

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### MAP LEGEND

<b>Area of Interest (AOI)</b>		 Spoil Area
 Area of Interest (AOI)		 Stony Spot
<b>Soils</b>		 Very Stony Spot
 Soil Map Unit Polygons		 Wet Spot
 Soil Map Unit Lines		 Other
 Soil Map Unit Points		 Special Line Features
<b>Special Point Features</b>		<b>Water Features</b>
 Blowout		 Streams and Canals
 Borrow Pit		<b>Transportation</b>
 Clay Spot		 Rails
 Closed Depression		 Interstate Highways
 Gravel Pit		 US Routes
 Gravelly Spot		 Major Roads
 Landfill		 Local Roads
 Lava Flow		<b>Background</b>
 Marsh or swamp		 Aerial Photography
 Mine or Quarry		
 Miscellaneous Water		
 Perennial Water		
 Rock Outcrop		
 Saline Spot		
 Sandy Spot		
 Severely Eroded Spot		
 Sinkhole		
 Slide or Slip		
 Sodic Spot		

### MAP INFORMATION

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

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

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

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

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

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

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

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

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DI	Dune land	12.0	0.4%
Sg	Shingle soils	7.2	0.2%
TaE	Tassel-Terry fine sandy loams, 5 to 20 percent slopes	0.8	0.0%
TeC	Terry fine sandy loam, 3 to 7 percent slopes	9.9	0.3%
Va	Valent sand, 0 to 3 percent slopes	679.5	22.3%
VcD	Valent sand, 3 to 9 percent slopes	1,835.3	60.4%
Vd	Valent-Duneland complex, rolling, 9 to 24 percent slopes	16.5	0.5%
VmB	Vona loamy sand, 1 to 3 percent slopes	327.7	10.8%
VmD	Vona-Dwyer loamy sands, 5 to 9 percent slopes	148.6	4.9%
VoA	Vona sandy loam, 1 to 3 percent slopes	2.4	0.1%
VoD	Vona fine sandy loam, 5 to 9 percent slopes	0.1	0.0%
<b>Totals for Area of Interest</b>		<b>3,040.3</b>	<b>100.0%</b>

## 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

## Custom Soil Resource Report

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.

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

## Morgan County, Colorado

### DI—Dune land

#### Map Unit Composition

*Dune land: 100 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Dune Land

##### Setting

*Landform: Hills, dunes*

*Down-slope shape: Convex*

*Across-slope shape: Convex*

*Parent material: Active sand dunes of eolian sands*

##### Typical profile

*H1 - 0 to 3 inches: sand*

*H2 - 3 to 60 inches: sand*

##### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 8e*

*Hydrologic Soil Group: A*

*Ecological site: R067BY022CO - Choppy Sands*

*Hydric soil rating: No*

### Sg—Shingle soils

#### Map Unit Setting

*National map unit symbol: 3pyf*

*Elevation: 3,600 to 5,500 feet*

*Mean annual precipitation: 10 to 13 inches*

*Mean annual air temperature: 46 to 48 degrees F*

*Frost-free period: 110 to 140 days*

*Farmland classification: Not prime farmland*

#### Map Unit Composition

*Shingle and similar soils: 80 percent*

*Minor components: 20 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Shingle

##### Setting

*Down-slope shape: Convex*

*Across-slope shape: Convex*

*Parent material: Calcareous sandy shale and/or silty sandstone*

##### Typical profile

*H1 - 0 to 6 inches: clay loam*

*H2 - 6 to 10 inches: clay loam*

*H3 - 10 to 14 inches: unweathered bedrock*



## Custom Soil Resource Report

### Properties and qualities

*Slope:* 1 to 6 percent  
*Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Very low (about 1.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* D  
*Ecological site:* R067BY045CO - Shaly Plains  
*Hydric soil rating:* No

### Minor Components

#### Reno Hill

*Percent of map unit:* 10 percent  
*Hydric soil rating:* No

#### Stoneham

*Percent of map unit:* 10 percent  
*Hydric soil rating:* No

## TaE—Tassel-Terry fine sandy loams, 5 to 20 percent slopes

### Map Unit Setting

*National map unit symbol:* 3pym  
*Elevation:* 3,500 to 6,500 feet  
*Mean annual precipitation:* 12 to 19 inches  
*Mean annual air temperature:* 46 to 52 degrees F  
*Frost-free period:* 110 to 180 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Tassel and similar soils:* 70 percent  
*Terry and similar soils:* 20 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Tassel

### Setting

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Limy sandy sandstone over fine lenses of silty shale

### Typical profile

*H1 - 0 to 8 inches:* fine sandy loam

*H2 - 8 to 14 inches:* fine sandy loam

*H3 - 14 to 18 inches:* weathered bedrock

### Properties and qualities

*Slope:* 5 to 20 percent

*Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Available water supply, 0 to 60 inches:* Very low (about 1.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* D

*Ecological site:* R067BY056CO - Sandstone Breaks

*Hydric soil rating:* No

## Description of Terry

### Setting

*Landform:* Hills

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Residuum weathered from calcareous sandstone

### Typical profile

*H1 - 0 to 6 inches:* fine sandy loam

*H2 - 6 to 13 inches:* fine sandy loam

*H3 - 13 to 25 inches:* fine sandy loam

*H4 - 25 to 29 inches:* weathered bedrock

### Properties and qualities

*Slope:* 5 to 7 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.06 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:* 15 percent

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*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Low (about 3.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* B

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

#### Shingle

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

## TeC—Terry fine sandy loam, 3 to 7 percent slopes

### Map Unit Setting

*National map unit symbol:* 3pyp

*Elevation:* 4,000 to 6,500 feet

*Mean annual precipitation:* 13 to 15 inches

*Mean annual air temperature:* 46 to 48 degrees F

*Frost-free period:* 120 to 180 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Terry and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Terry

#### Setting

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Calcareous, fine-grained loamy sandstone and shale

#### Typical profile

*H1 - 0 to 5 inches:* fine sandy loam

*H2 - 5 to 11 inches:* fine sandy loam

*H3 - 11 to 16 inches:* fine sandy loam

*H4 - 16 to 24 inches:* very fine sandy loam

*H5 - 24 to 28 inches:* weathered bedrock

#### Properties and qualities

*Slope:* 3 to 7 percent

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*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high  
(0.06 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:* 15 percent  
*Maximum salinity:* Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 3.3 inches)

### Interpretive groups

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

### Minor Components

#### Vona

*Percent of map unit:* 7 percent  
*Hydric soil rating:* No

#### Tassel

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

#### Stoneham

*Percent of map unit:* 3 percent  
*Hydric soil rating:* No

## Va—Valent sand, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 2tczd  
*Elevation:* 3,000 to 5,210 feet  
*Mean annual precipitation:* 13 to 20 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 130 to 166 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

## Description of Valent

### Setting

*Landform:* Interdunes  
*Landform position (two-dimensional):* Footslope, toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Noncalcareous eolian sands

### Typical profile

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

### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Excessively drained  
*Runoff class:* Negligible  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 39.96 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 1 percent  
*Maximum salinity:* Nonsaline (0.1 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Very low (about 2.4 inches)

### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY015CO - Deep Sand, R072XA021KS - Sands (North) (PE 16-20)  
*Hydric soil rating:* No

## Minor Components

### Dailey

*Percent of map unit:* 5 percent  
*Landform:* Interdunes  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave  
*Ecological site:* R067BY015CO - Deep Sand, R072XA022KS - Sandy (North) Draft (April 2010) (PE 16-20)  
*Hydric soil rating:* No

### Julesburg

*Percent of map unit:* 5 percent  
*Landform:* Interdunes  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope

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*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* R067BY024CO - Sandy Plains, R072XA022KS - Sandy (North)  
Draft (April 2010) (PE 16-20)  
*Hydric soil rating:* No

### Vona

*Percent of map unit:* 5 percent  
*Landform:* Interdunes  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* R067BY024CO - Sandy Plains, R072XA022KS - Sandy (North)  
Draft (April 2010) (PE 16-20)  
*Hydric soil rating:* No

## VcD—Valent sand, 3 to 9 percent slopes

### Map Unit Setting

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

### Map Unit Composition

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

### Description of Valent

#### Setting

*Landform:* Dunes, hills  
*Landform position (two-dimensional):* Summit, shoulder, backslope, footslope  
*Landform position (three-dimensional):* Side slope, crest, head slope, nose slope  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Noncalcareous eolian sands

#### Typical profile

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

#### Properties and qualities

*Slope:* 3 to 9 percent  
*Depth to restrictive feature:* More than 80 inches

## Custom Soil Resource Report

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

### Interpretive groups

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

### Minor Components

#### Dailey

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

#### Vona

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

#### Haxtun

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

## **Vd—Valent-Duneland complex, rolling, 9 to 24 percent slopes**

### **Map Unit Setting**

*National map unit symbol:* 2x0jb  
*Elevation:* 4,100 to 4,800 feet  
*Mean annual precipitation:* 12 to 17 inches  
*Mean annual air temperature:* 46 to 52 degrees F  
*Frost-free period:* 130 to 155 days  
*Farmland classification:* Not prime farmland

### **Map Unit Composition**

*Valent, rolling, and similar soils:* 65 percent  
*Duneland:* 25 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### **Description of Valent, Rolling**

#### **Setting**

*Landform:* Dunes  
*Landform position (two-dimensional):* Summit, backslope  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Noncalcareous eolian sands

#### **Typical profile**

*A - 0 to 4 inches:* sand  
*C - 4 to 80 inches:* sand

#### **Properties and qualities**

*Slope:* 9 to 24 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Excessively drained  
*Runoff class:* Very low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 39.96 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 1 percent  
*Maximum salinity:* Nonsaline (0.1 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Very low (about 2.4 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* 6e  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No



## Description of Duneland

### Setting

*Landform:* Dunes

*Landform position (two-dimensional):* Summit, backslope

*Landform position (three-dimensional):* Nose slope, side slope, crest

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Noncalcareous eolian sands

### Typical profile

*A - 0 to 3 inches:* sand

*C - 3 to 80 inches:* sand

### Interpretive groups

*Land capability classification (irrigated):* 8

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* A

*Ecological site:* R067BY022CO - Choppy Sands

*Hydric soil rating:* No

## Minor Components

### Valent, eroded

*Percent of map unit:* 10 percent

*Landform:* Blowouts

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Head slope, nose slope, side slope, crest

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Ecological site:* R067BY022CO - Choppy Sands

*Hydric soil rating:* No

## VmB—Vona loamy sand, 1 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 3pyz

*Elevation:* 4,350 to 4,810 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 46 to 50 degrees F

*Frost-free period:* 140 to 170 days

*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Vona and similar soils:* 70 percent

*Minor components:* 30 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Vona

### Setting

*Landform:* Plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Parent material:* Coarse-loamy eolian sands

### Typical profile

*A - 0 to 6 inches:* loamy sand  
*BA - 6 to 12 inches:* sandy loam  
*Bt1 - 12 to 25 inches:* sandy loam  
*Bt2 - 25 to 36 inches:* sandy loam  
*Bk - 36 to 45 inches:* sandy loam  
*C - 45 to 80 inches:* loamy sand

### Properties and qualities

*Slope:* 0 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 (0.0 to 1.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 6.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No

## Minor Components

### Olnest

*Percent of map unit:* 18 percent  
*Landform:* Plains  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

### Manter

*Percent of map unit:* 5 percent  
*Landform:* Plains  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No

### Truckton

*Percent of map unit:* 4 percent  
*Landform:* Plains  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

**Valent**

*Percent of map unit:* 3 percent  
*Landform:* Dunes  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No

**VmD—Vona-Dwyer loamy sands, 5 to 9 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 3pz1  
*Elevation:* 4,370 to 4,700 feet  
*Mean annual precipitation:* 12 to 14 inches  
*Mean annual air temperature:* 46 to 50 degrees F  
*Frost-free period:* 140 to 170 days  
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Vona and similar soils:* 56 percent  
*Dwyer and similar soils:* 30 percent  
*Minor components:* 14 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Vona**

**Setting**

*Landform:* Hills  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Coarse-loamy eolian sands

**Typical profile**

*A - 0 to 6 inches:* loamy sand  
*BA - 6 to 12 inches:* sandy loam  
*Bt1 - 12 to 25 inches:* sandy loam  
*Bt2 - 25 to 36 inches:* sandy loam  
*Bk - 36 to 45 inches:* sandy loam  
*C - 45 to 80 inches:* loamy sand

**Properties and qualities**

*Slope:* 5 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

## Custom Soil Resource Report

*Maximum salinity:* Nonsaline (0.0 to 1.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 6.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

### Description of Dwyer

#### Setting

*Landform:* Hills  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Sandy eolian sands

#### Typical profile

*A1 - 0 to 3 inches:* loamy sand  
*A2 - 3 to 7 inches:* loamy sand  
*BC - 7 to 20 inches:* loamy sand  
*C1 - 20 to 49 inches:* loamy sand  
*C2 - 49 to 64 inches:* loamy sand

#### Properties and qualities

*Slope:* 5 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Excessively drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 5 percent  
*Maximum salinity:* Nonsaline (0.0 to 0.5 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No

### Minor Components

#### Manter

*Percent of map unit:* 7 percent  
*Landform:* Hills  
*Ecological site:* R067BY015CO - Deep Sand  
*Hydric soil rating:* No

#### Olnest

*Percent of map unit:* 7 percent  
*Landform:* Plains

## Custom Soil Resource Report

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

### **VoA—Vona sandy loam, 1 to 3 percent slopes**

#### **Map Unit Setting**

*National map unit symbol:* 3pz4

*Elevation:* 4,440 to 4,600 feet

*Mean annual precipitation:* 13 to 15 inches

*Mean annual air temperature:* 46 to 50 degrees F

*Frost-free period:* 135 to 151 days

*Farmland classification:* Farmland of statewide importance

#### **Map Unit Composition**

*Vona and similar soils:* 80 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### **Description of Vona**

##### **Setting**

*Landform:* Terraces

*Down-slope shape:* Linear

*Across-slope shape:* Convex

*Parent material:* Loam sandy and/or sand loamy and/or limy eolian deposits

##### **Typical profile**

*Ap - 0 to 6 inches:* sandy loam

*Bt - 6 to 21 inches:* sandy loam

*2Bk1 - 21 to 44 inches:* very fine sandy loam

*2Bk2 - 44 to 65 inches:* fine 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:* 15 percent

*Available water supply, 0 to 60 inches:* Moderate (about 8.4 inches)

##### **Interpretive groups**

*Land capability classification (irrigated):* 3e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* A

*Ecological site:* R067BY024CO - Sandy Plains

## Custom Soil Resource Report

*Hydric soil rating:* No

### Minor Components

#### Ascalon

*Percent of map unit:* 8 percent

*Hydric soil rating:* No

#### Olnest

*Percent of map unit:* 7 percent

*Hydric soil rating:* No

#### Gilcrest

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

## VoD—Vona fine sandy loam, 5 to 9 percent slopes

### Map Unit Setting

*National map unit symbol:* 3pz6

*Elevation:* 4,470 to 4,690 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 46 to 50 degrees F

*Frost-free period:* 140 to 170 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Vona and similar soils:* 75 percent

*Minor components:* 25 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Vona

#### Setting

*Landform:* Hills

*Landform position (two-dimensional):* Shoulder

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Coarse-loamy eolian sands

#### Typical profile

*A - 0 to 5 inches:* fine sandy loam

*Bt1 - 5 to 11 inches:* sandy loam

*Bt2 - 11 to 18 inches:* sandy loam

*BC - 18 to 27 inches:* sandy loam

*C1 - 27 to 49 inches:* sandy loam

*C2 - 49 to 84 inches:* sandy loam

#### Properties and qualities

*Slope:* 5 to 9 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

## Custom Soil Resource Report

*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 (0.0 to 0.5 mmhos/cm)

*Available water supply, 0 to 60 inches:* Moderate (about 6.9 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* A

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

### **Minor Components**

#### **Truckton**

*Percent of map unit:* 14 percent

*Landform:* Hills

*Landform position (two-dimensional):* Shoulder

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

#### **Olneest**

*Percent of map unit:* 11 percent

*Landform:* Hills

*Landform position (two-dimensional):* Shoulder

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

# References

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- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>



## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)



**NOAA Atlas 14, Volume 8, Version 2**  
**Location name: Brush, Colorado, USA\***  
**Latitude: 40.2175°, Longitude: -103.5824°**  
**Elevation: 4395 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 & aeriels](#)

**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b>										
<b>Duration</b>	<b>Average recurrence interval (years)</b>									
	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>200</b>	<b>500</b>	<b>1000</b>
<b>5-min</b>	<b>0.282</b> (0.223-0.364)	<b>0.343</b> (0.271-0.444)	<b>0.452</b> (0.355-0.586)	<b>0.550</b> (0.430-0.717)	<b>0.697</b> (0.531-0.952)	<b>0.820</b> (0.607-1.13)	<b>0.951</b> (0.678-1.34)	<b>1.09</b> (0.745-1.58)	<b>1.29</b> (0.846-1.92)	<b>1.45</b> (0.922-2.17)
<b>10-min</b>	<b>0.413</b> (0.326-0.533)	<b>0.502</b> (0.396-0.650)	<b>0.662</b> (0.520-0.859)	<b>0.806</b> (0.630-1.05)	<b>1.02</b> (0.777-1.40)	<b>1.20</b> (0.888-1.66)	<b>1.39</b> (0.993-1.96)	<b>1.60</b> (1.09-2.31)	<b>1.89</b> (1.24-2.81)	<b>2.13</b> (1.35-3.18)
<b>15-min</b>	<b>0.503</b> (0.397-0.650)	<b>0.613</b> (0.483-0.793)	<b>0.807</b> (0.634-1.05)	<b>0.983</b> (0.768-1.28)	<b>1.24</b> (0.947-1.70)	<b>1.46</b> (1.08-2.02)	<b>1.70</b> (1.21-2.40)	<b>1.95</b> (1.33-2.82)	<b>2.31</b> (1.51-3.42)	<b>2.59</b> (1.65-3.88)
<b>30-min</b>	<b>0.682</b> (0.539-0.882)	<b>0.829</b> (0.654-1.07)	<b>1.09</b> (0.856-1.41)	<b>1.33</b> (1.04-1.73)	<b>1.68</b> (1.28-2.30)	<b>1.98</b> (1.46-2.73)	<b>2.30</b> (1.64-3.24)	<b>2.64</b> (1.80-3.82)	<b>3.13</b> (2.05-4.64)	<b>3.52</b> (2.23-5.26)
<b>60-min</b>	<b>0.835</b> (0.660-1.08)	<b>1.02</b> (0.803-1.32)	<b>1.34</b> (1.05-1.74)	<b>1.63</b> (1.28-2.13)	<b>2.07</b> (1.58-2.83)	<b>2.44</b> (1.80-3.36)	<b>2.83</b> (2.02-3.99)	<b>3.25</b> (2.22-4.70)	<b>3.84</b> (2.52-5.70)	<b>4.32</b> (2.74-6.46)
<b>2-hr</b>	<b>0.989</b> (0.790-1.26)	<b>1.21</b> (0.963-1.54)	<b>1.59</b> (1.27-2.04)	<b>1.94</b> (1.54-2.49)	<b>2.46</b> (1.90-3.31)	<b>2.90</b> (2.17-3.94)	<b>3.36</b> (2.43-4.67)	<b>3.86</b> (2.67-5.50)	<b>4.56</b> (3.03-6.67)	<b>5.13</b> (3.30-7.55)
<b>3-hr</b>	<b>1.06</b> (0.857-1.34)	<b>1.30</b> (1.04-1.64)	<b>1.71</b> (1.37-2.17)	<b>2.09</b> (1.66-2.66)	<b>2.64</b> (2.05-3.52)	<b>3.10</b> (2.34-4.18)	<b>3.59</b> (2.62-4.95)	<b>4.12</b> (2.88-5.82)	<b>4.86</b> (3.26-7.04)	<b>5.46</b> (3.55-7.97)
<b>6-hr</b>	<b>1.22</b> (0.992-1.52)	<b>1.47</b> (1.20-1.83)	<b>1.92</b> (1.56-2.40)	<b>2.32</b> (1.87-2.91)	<b>2.91</b> (2.29-3.82)	<b>3.41</b> (2.61-4.51)	<b>3.93</b> (2.90-5.32)	<b>4.49</b> (3.18-6.24)	<b>5.28</b> (3.59-7.52)	<b>5.91</b> (3.90-8.49)
<b>12-hr</b>	<b>1.41</b> (1.16-1.73)	<b>1.68</b> (1.38-2.06)	<b>2.15</b> (1.76-2.64)	<b>2.56</b> (2.09-3.16)	<b>3.17</b> (2.52-4.08)	<b>3.67</b> (2.84-4.78)	<b>4.20</b> (3.14-5.60)	<b>4.76</b> (3.42-6.51)	<b>5.55</b> (3.83-7.78)	<b>6.18</b> (4.14-8.74)
<b>24-hr</b>	<b>1.65</b> (1.38-1.99)	<b>1.91</b> (1.60-2.31)	<b>2.38</b> (1.98-2.88)	<b>2.80</b> (2.31-3.40)	<b>3.41</b> (2.75-4.33)	<b>3.92</b> (3.08-5.03)	<b>4.46</b> (3.39-5.85)	<b>5.04</b> (3.67-6.78)	<b>5.85</b> (4.10-8.08)	<b>6.50</b> (4.43-9.06)
<b>2-day</b>	<b>1.91</b> (1.62-2.27)	<b>2.18</b> (1.84-2.59)	<b>2.65</b> (2.23-3.16)	<b>3.07</b> (2.58-3.68)	<b>3.70</b> (3.02-4.61)	<b>4.21</b> (3.36-5.31)	<b>4.76</b> (3.66-6.14)	<b>5.34</b> (3.95-7.07)	<b>6.16</b> (4.39-8.36)	<b>6.82</b> (4.72-9.34)
<b>3-day</b>	<b>2.09</b> (1.79-2.47)	<b>2.36</b> (2.01-2.79)	<b>2.83</b> (2.40-3.35)	<b>3.25</b> (2.75-3.86)	<b>3.88</b> (3.19-4.79)	<b>4.40</b> (3.53-5.49)	<b>4.94</b> (3.84-6.32)	<b>5.53</b> (4.13-7.25)	<b>6.36</b> (4.57-8.56)	<b>7.03</b> (4.91-9.54)
<b>4-day</b>	<b>2.24</b> (1.92-2.62)	<b>2.51</b> (2.15-2.94)	<b>2.99</b> (2.55-3.51)	<b>3.41</b> (2.90-4.03)	<b>4.04</b> (3.35-4.95)	<b>4.56</b> (3.69-5.66)	<b>5.11</b> (4.00-6.49)	<b>5.70</b> (4.28-7.42)	<b>6.53</b> (4.72-8.72)	<b>7.19</b> (5.06-9.70)
<b>7-day</b>	<b>2.55</b> (2.21-2.95)	<b>2.87</b> (2.49-3.32)	<b>3.41</b> (2.94-3.96)	<b>3.88</b> (3.33-4.52)	<b>4.54</b> (3.79-5.47)	<b>5.08</b> (4.14-6.19)	<b>5.63</b> (4.44-7.02)	<b>6.21</b> (4.71-7.94)	<b>7.00</b> (5.12-9.19)	<b>7.62</b> (5.43-10.1)
<b>10-day</b>	<b>2.84</b> (2.48-3.26)	<b>3.20</b> (2.79-3.68)	<b>3.81</b> (3.31-4.38)	<b>4.32</b> (3.73-4.99)	<b>5.03</b> (4.22-5.98)	<b>5.59</b> (4.59-6.74)	<b>6.16</b> (4.89-7.60)	<b>6.74</b> (5.15-8.53)	<b>7.53</b> (5.55-9.78)	<b>8.13</b> (5.85-10.7)
<b>20-day</b>	<b>3.71</b> (3.29-4.19)	<b>4.20</b> (3.71-4.74)	<b>4.97</b> (4.38-5.63)	<b>5.62</b> (4.92-6.38)	<b>6.49</b> (5.51-7.57)	<b>7.16</b> (5.95-8.46)	<b>7.82</b> (6.30-9.46)	<b>8.48</b> (6.58-10.5)	<b>9.35</b> (7.00-11.9)	<b>10.0</b> (7.31-13.0)
<b>30-day</b>	<b>4.46</b> (3.98-4.99)	<b>5.04</b> (4.49-5.64)	<b>5.97</b> (5.30-6.69)	<b>6.72</b> (5.94-7.56)	<b>7.73</b> (6.60-8.90)	<b>8.48</b> (7.11-9.92)	<b>9.22</b> (7.49-11.0)	<b>9.96</b> (7.78-12.2)	<b>10.9</b> (8.22-13.7)	<b>11.6</b> (8.56-14.9)
<b>45-day</b>	<b>5.41</b> (4.86-5.98)	<b>6.12</b> (5.49-6.77)	<b>7.24</b> (6.48-8.03)	<b>8.13</b> (7.24-9.06)	<b>9.30</b> (8.00-10.6)	<b>10.2</b> (8.57-11.7)	<b>11.0</b> (8.99-13.0)	<b>11.8</b> (9.29-14.3)	<b>12.8</b> (9.72-15.9)	<b>13.5</b> (10.1-17.1)
<b>60-day</b>	<b>6.20</b> (5.61-6.82)	<b>7.03</b> (6.35-7.74)	<b>8.32</b> (7.50-9.18)	<b>9.34</b> (8.37-10.3)	<b>10.6</b> (9.20-12.0)	<b>11.6</b> (9.82-13.3)	<b>12.5</b> (10.3-14.6)	<b>13.3</b> (10.5-16.0)	<b>14.3</b> (10.9-17.6)	<b>15.0</b> (11.2-18.9)

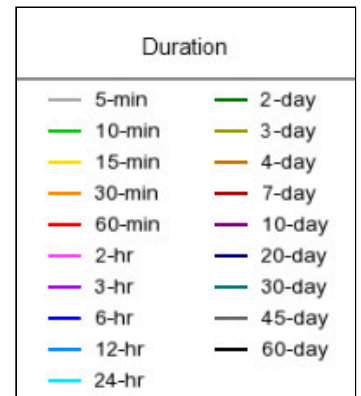
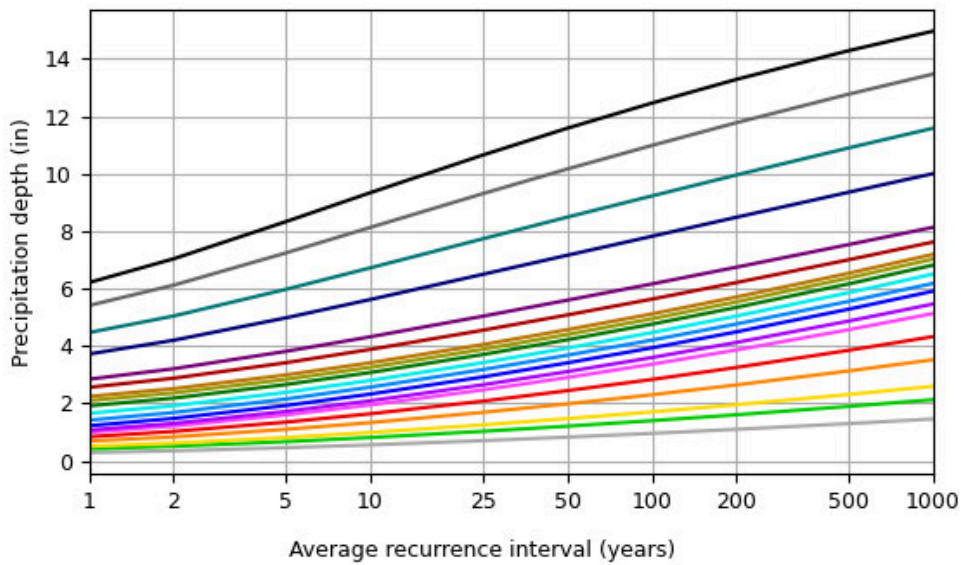
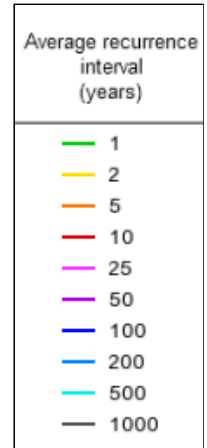
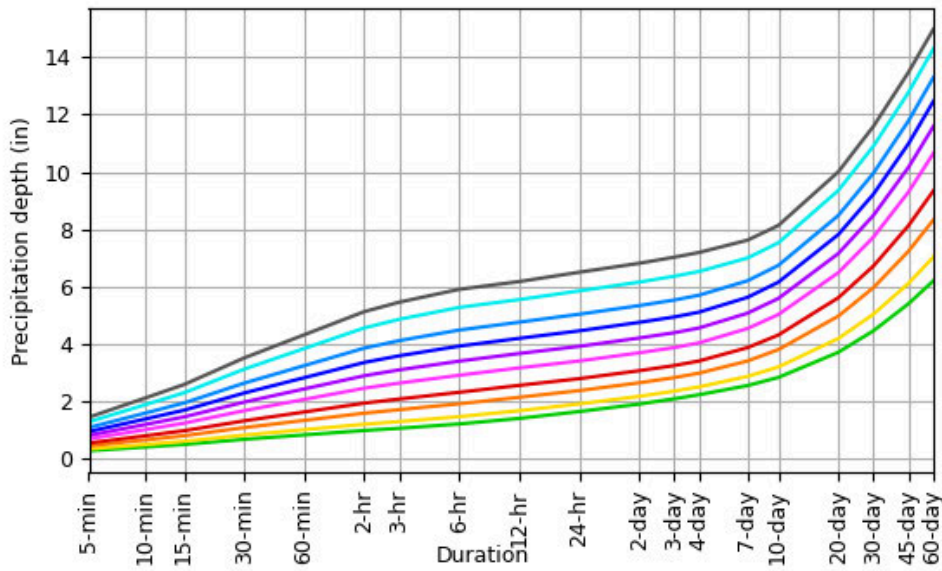
<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration 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**

PDS-based depth-duration-frequency (DDF) curves

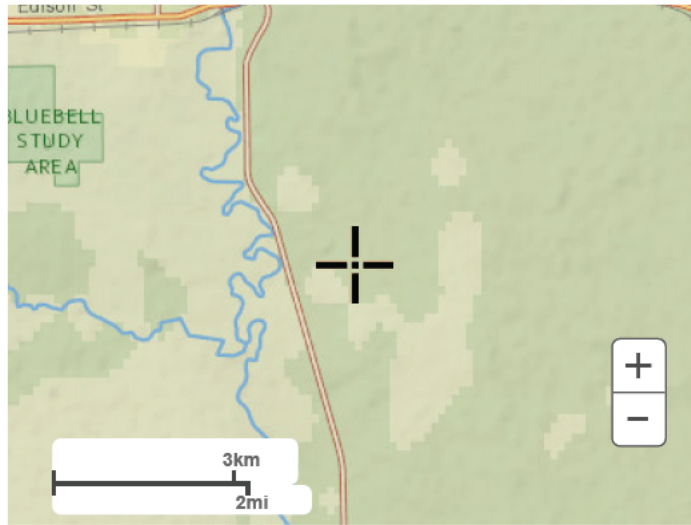
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**Maps & aerials**

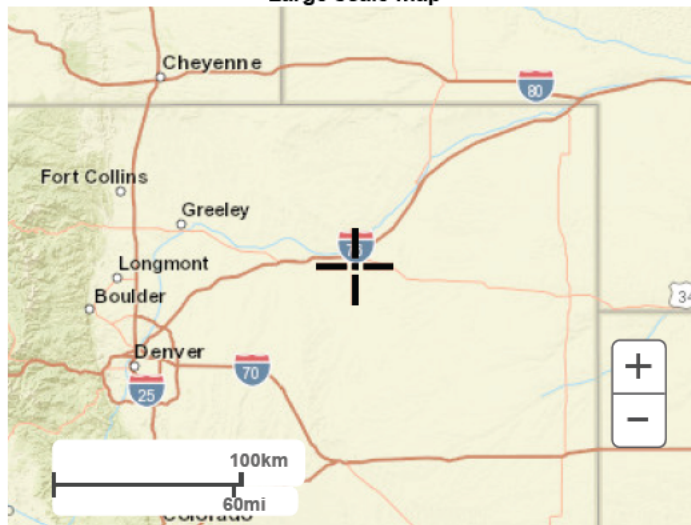
**Small scale terrain**



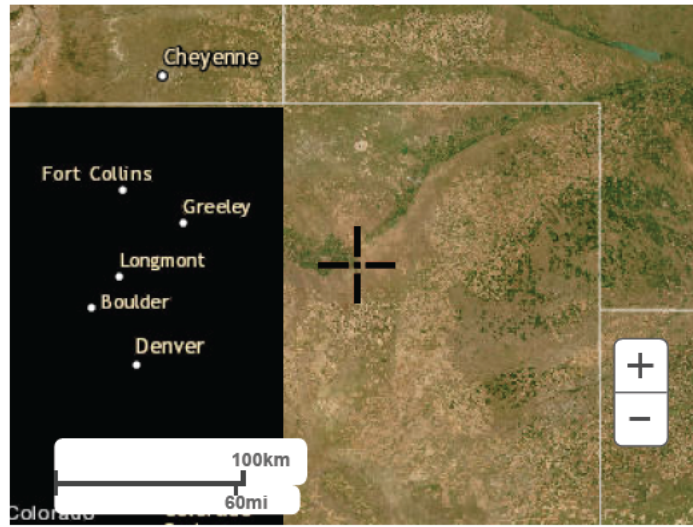
Large scale terrain



Large scale map



Large scale aerial



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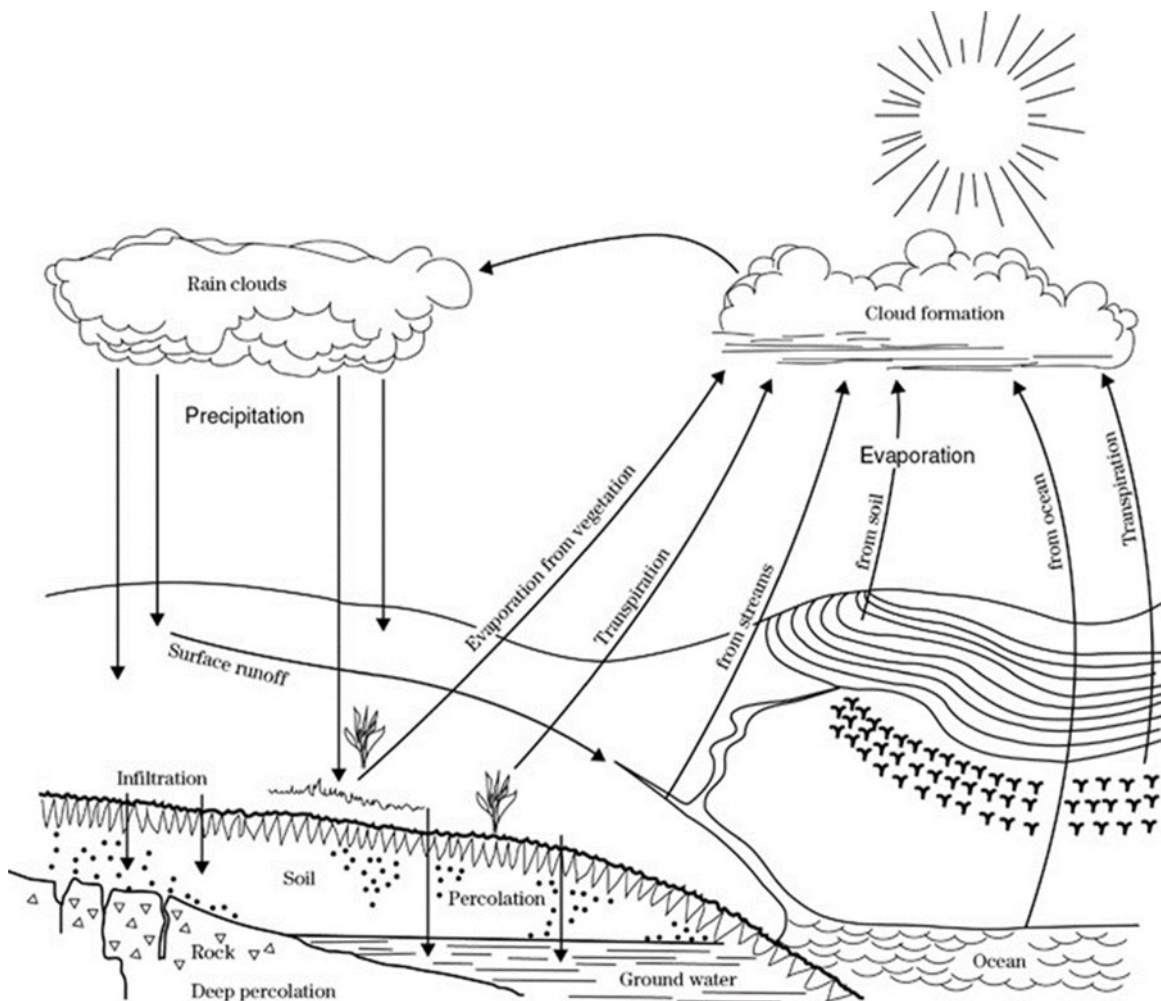


United States  
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## Part 650 Engineering Field Handbook National Engineering Handbook

# Chapter 2 Estimating Runoff Volume and Peak Discharge



Issued February 2021

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## Part 650 – Engineering Field Handbook

### Chapter 2 – Estimating Runoff Volume and Peak Discharge

#### 650.0200 Introduction

A. This chapter presents procedures for estimating runoff volume and peak discharge from rainfall on small rural watersheds used in designing soil and water conservation measures, using the NRCS Runoff Curve Number (CN) Method. These procedures apply to drainage areas ranging in size from 1 to 2,000 acres in the United States, Puerto Rico, the U.S. Virgin Islands, and selected Pacific Islands.

B. This chapter includes figures and worksheets to estimate runoff volume and peak discharge using manual methods for a range of rainfall amounts, soil types, land use, and cover conditions.

C. The USDA NRCS developed the EFH-2 computer program to automate the computation procedures presented in this chapter. Past versions of EFH-2 utilized only the manual methods discussed in this chapter. Newer versions of EFH-2 utilize the computation procedures outlined in the NRCS Title 210- National Engineering Handbook (NEH), Part 630, “Hydrology” (210-NEH-630, “Hydrology”), and the TR-20 computational engine. The EFH-2 User’s Manual contains full instruction for the use of the EFH-2 computer program. The EFH-2 User’s Manual is included with the program download and install package, or as a stand-alone download through the EHF-2 web page hosted by the NRCS West National Technology Support Center (WNTSC):

<https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/hydrology/?cid=stelprdb1042921>

D. This chapter does not cover modeling runoff from snowmelt or rain on snow events. Modeling runoff from snow requires the use of special processes and procedures beyond the scope of this chapter. Nor does it cover methods used in a limited number of States for specific types of areas, such as the Cypress Creek Equations used for very flat coastal areas. For conditions beyond the limits of this chapter and for special situations and areas where procedures of this chapter may be considered too general to provide good estimates, use the procedures found in 210-NEH-630, the WinTR–55 computer program, “Small Watershed Hydrology”, or the WinTR–20 computer program “Project Formulation-Hydrology”, to estimate runoff volume and peak discharge, or consult State Supplements to this chapter for guidance on regions not covered by this chapter.

#### 650.0201 Basic Hydrologic Concepts

A. Surface runoff is the volume of excess water that leaves a watershed, also referred to as runoff volume. The watershed retains some rainfall in the form of initial abstraction, interception, infiltration, and storage.

B. The runoff from a watershed is a volume, but often expressed as the average depth of water that would cover the entire watershed, usually expressed in inches. To convert inches of runoff to volume, multiply the inches of runoff by the drainage area. This volume is typically expressed in terms of acre-feet.

C. Initial abstraction is the amount of rain that falls before runoff begins. It consists mainly of interception, infiltration, and depression storage.

D. Interception is that portion of rainfall captured on plant and other surfaces in the watershed and does not run off. Interception occurs primarily during initial abstraction but does continue throughout the rainfall event. Most intercepted water evaporates back into the atmosphere following the rainfall event.

E. Infiltration is that part of the rainfall that soaks into the ground and does not run off. Some infiltration recharges groundwater. Plants take up some infiltration and transpire it back into the atmosphere. Infiltration occurs during initial abstraction and continues throughout the rainfall event.

F. Storage, or depression storage, is that part of the rainfall captured in depressions and does not run off. Depression storage starts during initial abstraction and continues throughout the rainfall event, until the depressions are full. Depressions that overflow contribute to runoff. Water held in depressions infiltrates or remains on the surface and evaporates back into the atmosphere. Frequently, interception is considered a part of storage.

G. Peak discharge is the peak rate of runoff (volume per unit time, typically cubic feet per second, cfs), from a drainage area for a given rainfall.

### **650.0202 Factors Affecting Runoff Volume**

#### **A. General**

- (1) Rainfall is the primary source of water that runs off the surface of small rural watersheds. The main factors affecting the volume of rainfall that runs off are soil type and land cover, including the type of vegetation, in the watershed. Factors that affect the rate at which water runs off are watershed topography and shape, along with land use and conservation practices on a watershed.
- (2) Rainfall intensity affects peak discharge such that the greater the intensity, the higher the peak discharge. For small rural watersheds, the intensity of rainfall affects the peak discharge more than it does the volume of runoff. Intense rainfall that produces high peak discharges on small watersheds usually does not extend over a large area. Therefore, the same intense rainfall that causes flooding in a small tributary is unlikely to cause major flooding along a main stream that drains 100 or more square miles.
- (3) In the intermountain and northern tier of the United States, in some years, the annual peak discharge results from rain falling on snow or from rapid snowmelt on frozen or saturated soils. This chapter considers only rainfall-generated runoff and not runoff generated from snowmelt. 210-NEH-630, Chapter 11, "Snowmelt" (210-NEH-630-11), presents procedures to use for estimating runoff from snow melt.

#### **B. Rainfall Amount**

- (1) Originally, the Soil Conservation Service (SCS), now NRCS, primarily used precipitation-frequency data (rainfall amount by return period) as published in 1961 by the U.S. Department of Commerce, Weather Bureau, later the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), in Technical Paper No. 40 (TP-40). SCS used Other publications for specific areas of the United States.

- (2) In the early 2000s, the NWS started updating precipitation-frequency data to take advantage of a denser network of rain gages, to bring an additional 40 to 60 years of rainfall data into the precipitation-frequency estimates, and to use updated statistical methodologies. AS NWS updates regions of the country they publish these data as NOAA Atlas 14, with separate volumes covering specific regions of the United States. As of the publication of this document, the NWS has not published updated NOAA Atlas 14 precipitation-frequency estimates for Washington, Oregon, Idaho, Montana, and Wyoming.
- (3) As the updated precipitation-frequency data come available, NRCS adopts the data for use in analysis and design for NRCS projects by policy as described in the NRCS Title 210 - National Engineering Manual (NEM), Part 530, Subpart A, 530.1. This policy requires use of the most current hydrometeorological data for planning, design, and operation of water-related structures and systems. The precipitation-frequency data found in NOAA Atlas 14, and the rainfall distributions derived from that data, represent the most current data.
- (4) NRCS developed a rainfall database with rainfall values representative of individual counties (or portions thereof) for each county in the nation and incorporated these data into the NRCS hydrology computer programs. These data are also available in NRCS State Supplements to this chapter.

### C. Rainfall Distribution

- (1) General
  - (i) A rainfall distribution describes the amount of rainfall that falls in successive time increments over the duration of a storm event. The intensity of rainfall varies considerably during the storm period.
  - (ii) To avoid the use of a separate set of rainfall intensities for each drainage area, NRCS uses a set of synthetic rainfall distributions having nested rainfall intensities. This set of distributions maximizes the rainfall intensities by including short-duration intensities within those needed for longer duration.
  - (iii) The synthetic rainfall distributions do not represent individual actual storm events, but instead provide a time-tested representation of a rainfall event that is suitable for use in analysis and design of soil and water conservation practices.
  - (iv) NRCS chose a storm duration of 24 hours for the synthetic rainfall distributions, based on the watershed size for which NRCS typically provides assistance. The 24-hour storm, while longer than that needed to determine peak discharges, is suitable for determining runoff volumes. Thus, NRCS uses a single storm duration and associated synthetic rainfall distribution to estimate peak discharges for a wide range of watershed areas.
- (2) NRCS Standard Rainfall Distributions
  - (i) Using the Weather Bureau's TP-40 and other reference data, SCS, now NRCS, in the 1960s and 1970s developed four 24-hour synthetic storm distributions Type I, Type IA, Type II, and Type III, associated with four broad climatic regions across the United States. NRCS refers these distributions as the NRCS Standard Rainfall Distributions. The term NRCS Standard Rainfall Distributions refers specifically to this set of four distributions. The updated rainfall distributions derived using the NOAA Atlas 14 data are generally referred to as the NRCS Updated Rainfall Distributions.

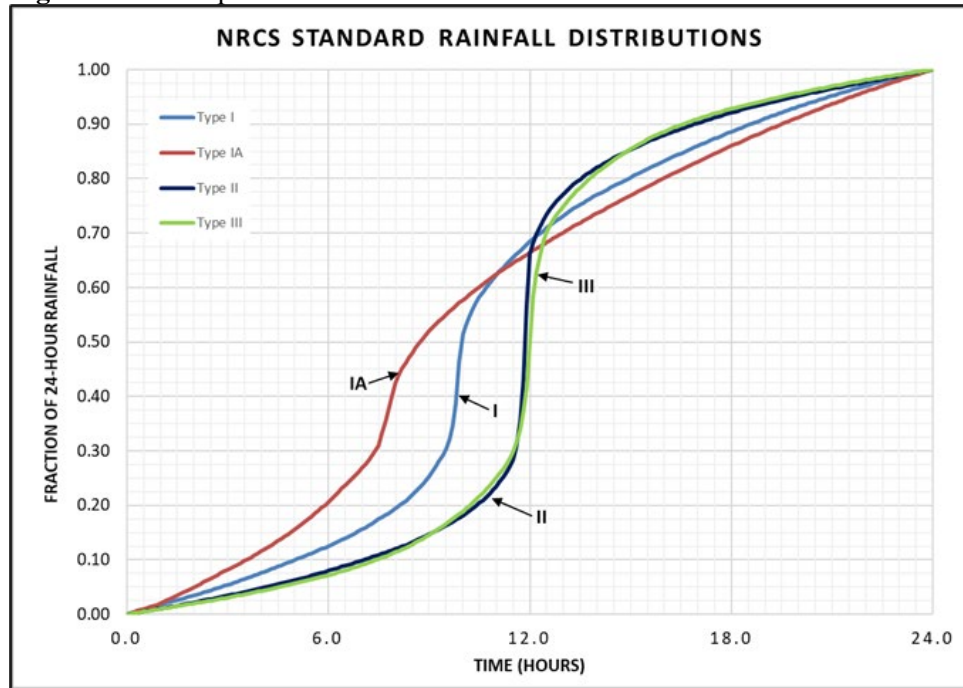
- (ii) Figure 2-1 shows the approximate geographic boundaries for the four NRCS Standard Rainfall Distributions. State Supplement to this chapter may have more detailed guidance for selecting distributions.

**Figure 2-1:** Approximate Geographic Boundaries for NRCS Standard Rainfall Distributions



- (iii) Types IA and I storm distributions are typical of maritime climates in the Western United States where winters are wet, and summers are dry. The Type IA storm distribution is characteristic of the coastal side of the Cascade and Sierra Nevada Mountains in Oregon, Washington, and northern California. The Type I storm distribution is the characteristic storm distribution of the coastal side of the Sierra Nevada Mountains in southern California and for Hawaii and Alaska. The Type III storm distribution represents the Gulf of Mexico and the Atlantic coastal areas where tropical storms bring large 24-hour rainfalls. The Type II storm distribution is typical of the more intense storms that occur over the remainder of the United States, Puerto Rico, and the Virgin Islands.
- (iv) Type IA maximum intensities are less than Type I; Type I intensities are less than Type III; and Type III intensities are less than Type II intensities.
- (v) Figure 2-2 shows temporal plots of the of the NRCS Standard Rainfall Distribution illustrating the concepts described.

**Figure 2-2:** Temporal Plots of NRCS Standard Rainfall Distributions

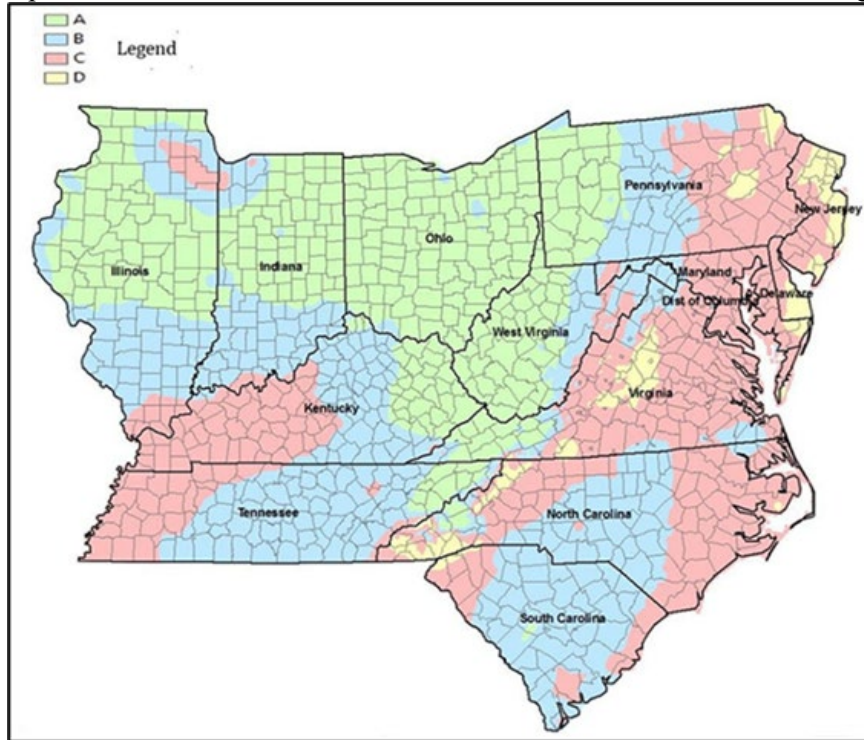


(3) NRCS Updated Rainfall Distributions

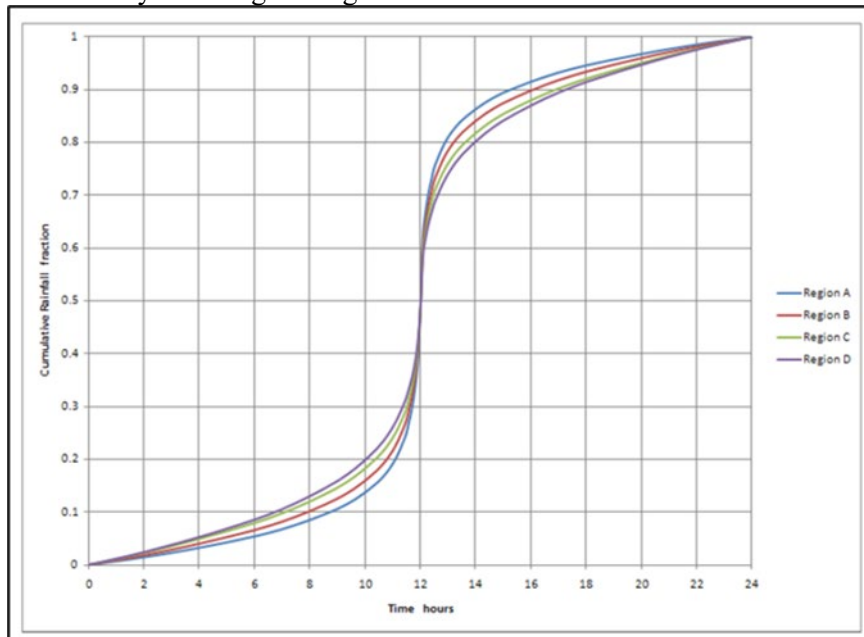
- (i) As the NWS updated precipitation-frequency data in NOAA Atlas 14, they published these data in volumes covering specific regions of the nation. NRCS developed updated rainfall distributions using these higher in quantity and quality NOAA Atlas 14 data for all the volumes currently available. By taking advantage of advancements in computer technology, NRCS developed many distributions to cover the nation.
- (ii) The NRCS Updated Rainfall Distributions provide better definition, particularly in what was the Type II rainfall distribution geographic area, accounting for climatic conditions and orographic influences.
- (iii) As an example, figure 2-3 shows the approximate geographic boundaries for NRCS-derived rainfall distributions from the NOAA Atlas 14, Volume 2, “Precipitation-Frequency Atlas of the United States, Ohio River Basin and Surrounding States”. A single map for the entire United States is not available. Due to the increased number of distributions, it is difficult to show all of them on a single map.
- (iv) Figure 2-4 shows temporal plots of the NRCS Updated Rainfall Distributions for the Ohio River Basin and surrounding States. Distributions are available for all regions of the country currently covered by updated NOAA Atlas 14 volumes. Refer to the appropriate State Supplement to this chapter for more information.
- (v) For those States not yet covered by updated NOAA Atlas 14 rainfall data, NRCS typically uses data from NOAA Atlas 2, “Precipitation-Frequency Atlas of the Western United States”, Volume 1, Montana (1973), Volume 2, Wyoming (1973, updated 2006), Volume 5, Idaho (1973), Volume 9, Washington (1973), and Volume 10, Oregon (1973). As NWS develops and publishes updated precipitation-frequency data, NRCS is developing updated rainfall distributions.

- (vi) In those regions where NOAA Atlas 14 precipitation-frequency data are available, NRCS incorporated them and the NRCS Updated Rainfall Distributions into NRCS computer programs for estimating peak discharge.

**Figure 2-3:** NOAA Atlas 14, Volume 2 – Geographic Boundaries of NRCS Updated Rainfall Distributions for the Ohio River Basin and Surrounding States



**Figure 2-4:** Temporal plots of the NRCS Updated Rainfall Distributions for the Ohio Valley and Neighboring States





D. Hydrologic Soil Groups

- (1) The NRCS defines four hydrologic soil groups (HSGs) that, along with land use, management practices, and hydrologic conditions, determine a soil's associated runoff curve number (210-NEH-630-9, "Hydrologic Soil-Cover Complexes").
- (2) In general, the definitions for the four HSGs are as follows:
  - (i) Group A—Soils in this group have low runoff potential when thoroughly wet. Water transmits freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam, or silt loam textures may be in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.
  - (ii) Group B—Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.
  - (iii) Group C—Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.
  - (iv) Group D—Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential.
  - (v) Some wet soils are in group D based on the presence of a water table and are classed A/D, B/D, or C/D if not adequately drained where the first letter applies to the drained condition and the second to the undrained condition. If the soil is adequately drained the soil is no longer in the D class and reverts to base soil group class A, B, or C. Careful field investigation is necessary to determine the appropriate HSG for dual classed soils.
- (3) 210-NEH-630-7, "Hydrologic Soil Groups", provides complete definitions for each of the soil groups including the limits on the diagnostic physical characteristics of each group and assignment of soils to HSGs.
- (4) The assigned groups can be found by consulting NRCS Web Soil Survey at <https://websoilsurvey.sc.egov.usda.gov/>.

#### E. Land Use and Cover Type

- (1) NRCS' Title 180, National Planning Procedures Handbook (NPPH), Part 600, Subpart A, 600.2, "Definitions", defines land use as follows. Land Use - A term that includes categories of land cover and categories of land use. Land use is the purpose of human activity on the land; it is usually, but not always, related to land cover. NRCS developed the following land use designations to be used primarily by planners and modelers at the field and landscape level: crop, forest, range, pasture, farmstead, developed land, water, associated agricultural lands, and other. Further, NPPH 600.2 provides descriptions of the following land use modifiers to provide additional specificity and help denote what the land is managed for: irrigated, wildlife, grazed, drained, organic, water feature, protected, and hayed.
- (2) According to 180-NPPH-600-A-600.2, land cover is the vegetation or other kind of material that covers the land surface. Cover type affects runoff in several ways. Foliage and its litter (ground cover) help to maintain the soil's infiltration potential by preventing the impact of the raindrops from sealing the soil surface. The foliage surface retains some raindrops, increasing their chance of evaporation back into the atmosphere. Some of the intercepted moisture never makes it to the soil or takes so long to drain to the soil that it is withheld from the initial period of runoff. Ground cover also allows soil moisture from previous rains to infiltrate where living vegetation takes it up. Depending upon the amount of soil moisture left from previous rains, there may be either a greater or lesser void in the soil to be filled the next time rain falls.
- (3) Vegetation, including its ground litter, forms numerous barriers along the path of the water flowing over the surface of the land. This is often referred to as surface roughness. Surface roughness causes water to flow more slowly, increasing the time it takes water to reach the point of interest (time of concentration,  $T_c$ , described in section 650.0205) and reducing peak discharge.
- (4) Watershed land use changes over time. This frequently occurs as the result of development in the watershed, but also occurs as a result of changes in management, vegetative type, or other factors. It is important to consider potential changes when making hydrologic analyses.

#### F. Land Treatment

- (1) Land treatment, sometimes referred to as conservation practices, applies mainly to agricultural land uses and includes structural practices, such as contouring or terracing, and vegetative measures, or management practices, such as grazing control or crop rotation. Land treatment helps to maintain soil structure at the surface, which increases water infiltration and reduces runoff. However, this effect diminishes rapidly with increases in storm magnitude.
- (2) Contouring and terracing decrease the amount of runoff by forming small reservoirs. Closed-end level terraces function as storage reservoirs without spillways. Areas with level terraces may be excluded from the drainage area above downstream measures if the terrace system has enough capacity to store the volume of runoff commensurate with the frequency of the runoff event under analysis. Gradient terraces with grassed waterway outlets increase the distance water must travel and thereby increase the  $T_c$ . Gradient terraces with underground outlets act as storage reservoirs with small spillways that prevent overland flow between the terrace and outlet, and slowly release the runoff reducing the peak flow.

### G. Hydrologic Conditions

- (1) Hydrologic condition of the site can affect runoff significantly. Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface, and (e) degree of surface roughness. Good hydrologic condition indicates that these factors encourage average and better than average infiltration and tend to decrease runoff (site has a lower runoff potential). For example, crop residue tilled into the soil and the residual root system from grasses included in crop rotations produce a good hydrologic condition. Poor hydrologic condition indicates that these factors impair infiltration and tend to increase runoff. For example, such things as a lack of vegetative cover causing raindrop impact to seal the soil surface, or compaction of the soil surface by animal hooves, often result in a poor hydrologic condition.
- (2) Hydrologic condition varies over time based on management, vegetative condition, or events, such as wildfire. It is important to document the date of hydrologic condition assessment. Independently assess hydrologic condition for runoff estimates rather than use historic assessments.

### H. Topography

- (1) Watershed slopes have a major effect on peak discharge at downstream points but little effect on runoff volume. As watershed slope increases, velocity increases,  $T_c$  decreases, and peak discharge increases.
- (2) Watershed shape also affects peak discharge. An average small watershed is fan shaped (wide). As the watershed becomes elongated (long), the flow length increases and the peak discharge decreases.
- (3) Potholes, small depressional wetland areas, may trap a small amount of rain, thus reducing the amount of expected runoff. If potholes and other wetland areas make up a third or less of the total watershed and do not intercept the drainage from the remaining two-thirds they may be excluded from the drainage area for estimating peak discharge. A careful assessment of the potholes is necessary before deciding to exclude them since they could potentially fill and overflow contributing to runoff, particularly for large rainfalls. If potholes make up than a third of the total drainage or if they intercept the drainage, use the procedures in 210-NEH-630 to estimate the peak discharge.

## 650.0203. Hydrographs

### A. General

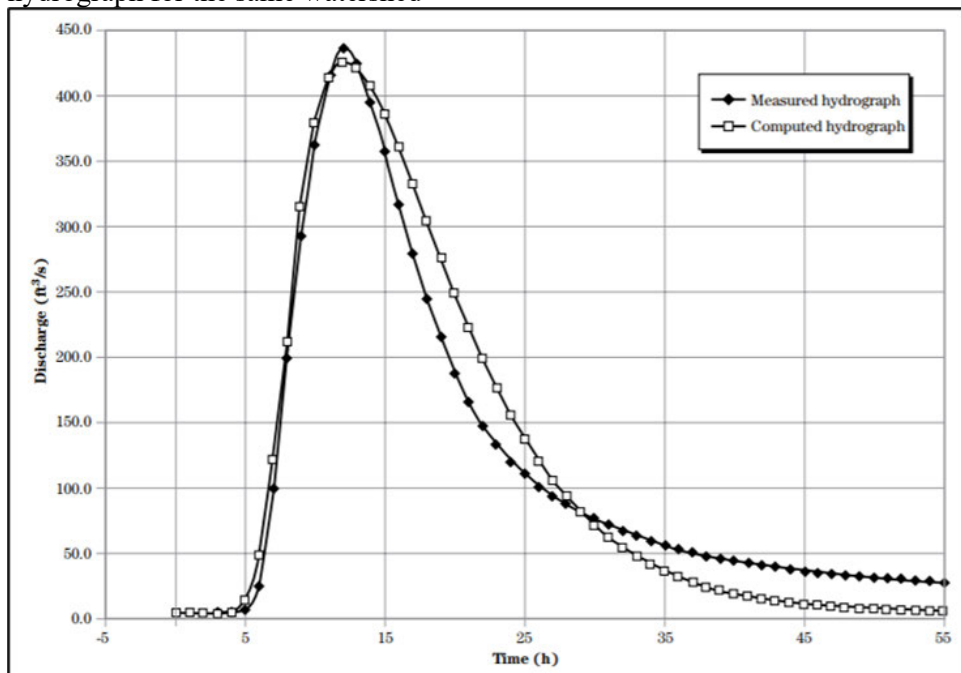
- (1) A hydrograph is a graph of flow (rate versus time) at a point of interest in the path of concentrated flow, often a waterway or stream. The hydrograph shape is a function of watershed conditions and all the factors previously discussed.
- (2) For most NRCS on-farm conservation work, it is necessary to know only the peak rate of runoff, or the peak of the hydrograph. Determining the peak rate of runoff requires developing a hydrograph

## B. Types of Hydrographs

There are several useful types of hydrographs:

- (i) Natural hydrographs, or measured hydrographs, obtained directly from the flow records of a gaged stream resulting from an actual rainfall event.
- (ii) Synthetic (modeled) hydrographs computed using watershed parameters and storm characteristics to simulate a natural hydrograph. Figure 2-5 illustrates a natural hydrograph and a synthetic hydrograph for a small watershed.
- (iii) Unit hydrographs, which represent 1 inch of direct runoff distributed uniformly over a watershed resulting from a rainfall of a specified duration. In the case of typical NRCS work, the storm duration is 24-hours.
- (iv) Dimensionless unit hydrographs (DUHs), which represent several unit hydrographs plotted using the ratio of the basic units of time to peak and peak rate of discharge. DUHs describe the response rate or the rate at which water flows off the watershed to the point of interest.

**Figure 2-5:** Hydrograph plot illustrating a natural hydrograph and a synthetic hydrograph for the same watershed

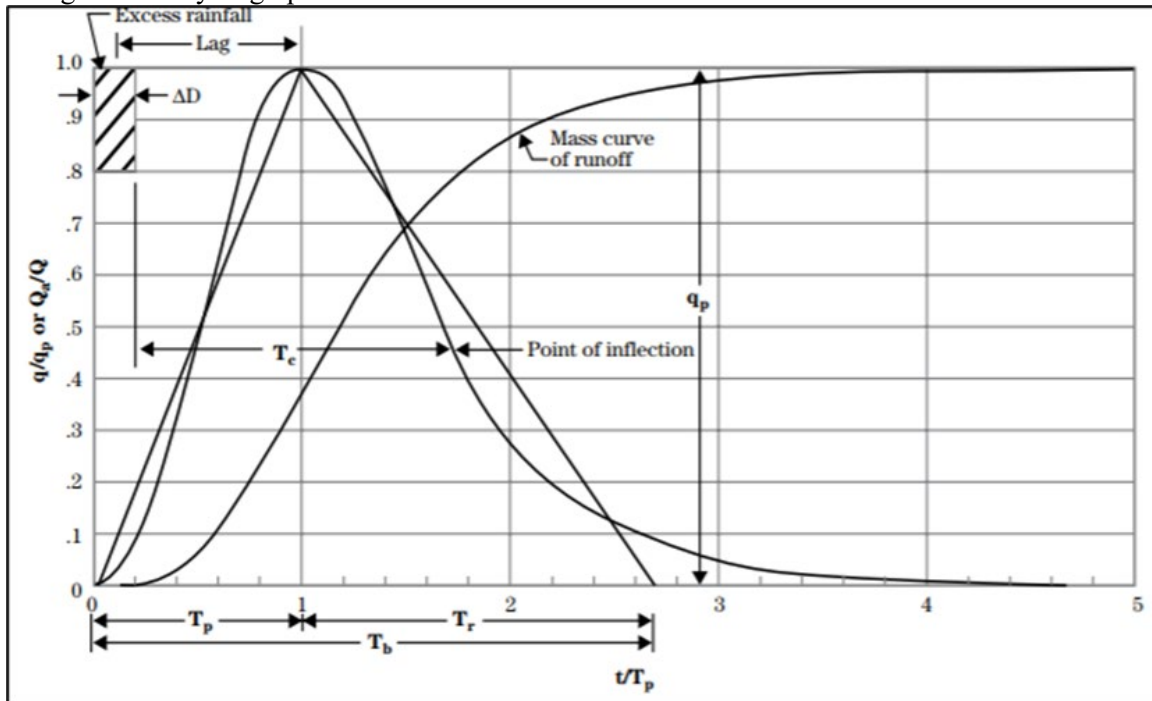


## C. Dimensionless unit hydrograph peak rate factors

- (1) DUHs define the shape of the synthetic hydrograph based on the proportion of runoff in the rising limb and receding limb of the hydrograph.
- (2) The peak rate factor (PRF) describes the shape of a DUH since it is a measure of the percentages of runoff volume in the rising versus receding limbs of the hydrograph and are a function of watershed topography. The shape of the DUH affects peak discharge estimates. A high PRF corresponds to a high peak rate of runoff, while a low PRF corresponds to a low peak rate of runoff.

- (3) NRCS typically uses a standard DUH with a PRF equal to 484, often referred to as a 484 DUH or a standard DUH, for the design of on-farm conservation practices. The 484 represents the type of runoff response seen throughout most of the United States and is typical of locations where the landscape is rolling and not very flat. The 484 DUH has 37.5% of the runoff volume in the rising limb of the hydrograph and 62.5% of the runoff volume in the receding limb of the hydrograph. Figure 2-6 illustrates the 484 DUH.

**Figure 2-6:** Dimensionless curvilinear unit hydrograph (PRF=484) and equivalent dimensionless triangular unit hydrograph



where:  $T_p$  = time from the beginning of the triangular hydrograph to its peak (see NEH Part 630, Chapter 16)  
 $T_r$  = time from the peak to the end of the triangular hydrograph (see NEH Part 630, Chapter 16)  
 $T_b$  = time from beginning to end of the triangular hydrograph =  $T_p + T_r$  (see NEH Part 630, Chapter 16)  
 $\Delta D$  = duration of unit excess rainfall, hours =  $0.133 T_c$  (see NEH Part 630, Chapter 16)  
 Lag = watershed lag, hours (see NEH Part 630, Chapter 15)  
 $T_c$  = watershed time of concentration, hours (see section 650.0205)  
 $q$  = discharge at time  $t$ , cfs (see NEH Part 630, Chapter 16)  
 $q_p$  = peak discharge, cfs (see Section 650.0206)  
 $Q_a$  = accumulated runoff volume at time  $t$ , inches (represented by mass curve of runoff)  
 $Q$  = total runoff volume, inches (see Section 650.0204)  
 $t$  = selected time  
 Excess rainfall = rainfall that results in runoff, in

- (4) Another frequently used DUH within NRCS work is the 286 DUH, derived through observations of runoff data on the Delaware-Maryland-Virginia peninsula. Thus it is often referred to as the DelMarVa unit hydrograph. The DelMarVa peninsula is in the Coastal Plain region along the East Coast of the United States, where land slopes are generally flat and peak rates of runoff are not as high as elsewhere in the nation. Consult State Supplements to this chapter for guidance regarding selection of appropriate DUHs.
- (5) 210-NEH-630-16, “Hydrographs”, contains many other NRCS-developed DUHs with a range of PRFs.

## 650.0204 Runoff Volume

### A. General

- (1) As stated previously, runoff is the volume of excess water that leaves a drainage area.
- (2) On a hydrograph plot, the area under the hydrograph represents the runoff volume.

### B. NRCS Runoff Equation

- (1) The NRCS runoff equation, also referred to as the NRCS CN Method, is a tool used to estimate runoff volume resulting from a storm event. For more information on the development and derivation of the runoff equation, see 210-NEH-630-9 and 210-NEH-630-10, “Estimation of Direct Runoff from Storm Rainfall”.
- (2) The NRCS runoff equation is:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \quad \text{for } P > I_a \quad (\text{eq. 2-1a})$$

$$Q = 0 \quad \text{for } P \leq I_a \quad (\text{eq. 2-1b})$$

where:  $Q$  = runoff, in  
 $P$  = rainfall, in  
 $I_a$  = initial abstraction, in  
 $S$  = potential maximum retention after runoff begins, in

- (3) Initial abstraction ( $I_a$ ) includes all losses (water retained on the landscape) before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation and other cover, and water lost to evaporation and infiltration.  $I_a$  is highly variable but is generally correlated with soil and cover parameters. Through studies of many small agricultural watersheds, researchers found  $I_a$  to be approximated by:

$$I_a = 0.2S \quad (\text{eq. 2-2})$$

- (4) Removing  $I_a$  as an independent parameter allows use of a combination of  $S$  and  $P$  to produce unique runoff volumes. Substituting equation 2-2 into equation 2-1 gives:

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)} \quad \text{for } P > I_a \quad (\text{eq. 2-3a})$$

$$Q = 0 \quad \text{for } P \leq I_a \quad (\text{eq. 2-3b})$$

### C. Runoff Curve Numbers

- (1) The potential maximum retention,  $S$ , can range from zero on a smooth, impervious surface to infinity in deep gravel. Converting an  $S$  value to a CN using the following transformation provides for greater convenience:

$$CN = \frac{1,000}{10+S} \quad (\text{eq. 2-4})$$

- (2) According to equation 2-4, the runoff curve number is 100 when  $S$  is zero, and approaches zero as  $S$  approaches infinity. Runoff curve numbers can be any value from zero to 100, but for practical applications fall within a limited range of about 40 to 98
- (3) Researchers developed the runoff curve numbers in the tables in figures 2-7a through 2-7d by examining rainfall runoff data from small agricultural watersheds. The runoff curve number for a given soil-cover type is not a constant but varies from storm to storm, and even within the storm. The NRCS CN method assigns a representative runoff curve number for a given soil and cover type for design purposes.

- (4) The index of runoff potential for a given storm is the antecedent runoff condition (ARC). ARC is an attempt to account for the variation in runoff curve number at a site from storm to storm. The runoff curve numbers in the tables in figures 2-7a through 2-7d are for an average antecedent condition (ARC=II) and represent runoff curve number values used for design. Because ARC in one location of the country may not reflect ARC in other locations some States developed tables to adjust runoff curve number values for their specific locations. It is important to consult State Supplements to this chapters for full information on any runoff curve number adjustments for those States.
- (5) The Runoff Curve Number worksheet (see section 650.0211, Exhibit A) is available for use in estimating a representative runoff curve number for a watershed as illustrated in the Example – Estimating Weighted Runoff Curve Number (section 650.0208A).

D. Estimating Runoff Volume using the NRCS CN Method

- (1) Use equation 2-1a to estimate runoff volume for a storm event using the watershed runoff curve number value and the rainfall amount for the storm.
- (2) Alternatively, use figure 2-8 to estimate storm runoff volume by entering the figure from the bottom axis, Rainfall (P); reading up to the appropriate runoff curve number (CN) value; and then reading across to the left to the direct runoff volume (Q).
- (3) Another alternative is to use a table as shown in figure 2-9 that summarizes runoff volume by runoff curve number for various rainfall amounts.

**Figure 2-7: Runoff Curve Numbers**  
 (a) Cultivated Agricultural Lands <sup>1/</sup>

Cover Description		Hydrologic Condition <sup>3/</sup>	Runoff Curve Numbers for Hydrologic Soil Group			
Cover Ttype	Treatment <sup>2/</sup>		A	B	C	D
Fallow	Bare soil	-----	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row	Poor	72	81	88	91
		Good	67	78	85	89
	Straight row + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	Contoured + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Straight row + CR	Poor	64	75	83	86
		Good	60	72	80	84
	Contoured (C)	Poor	63	74	82	85
		Good	61	73	81	84
	Contoured + CR	Poor	62	73	81	84
		Good	60	72	80	83
	Contoured & terraced (C&T)	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast	Straight row	Poor	66	77	85	89
		Good	58	72	81	85
legumes or rotation	Contoured (C)	Poor	64	75	83	85
		Good	55	69	78	83
meadow	Contoured & terraced (C&T)	Poor	63	73	80	83
		Good	51	67	76	80

<sup>1/</sup> Average runoff condition and  $I_a=0.2S$

<sup>2/</sup> CR applies only if residue is on at least 5% of the surface throughout the year

<sup>3/</sup> Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good > 20%), and (e) degree of surface roughness  
 Poor: Factors impair infiltration and tend to increase runoff

Good: Factors encourage average and better than average infiltration and tend to decrease runoff

For conservation tillage, poor hydrologic condition, 5 to 20 percent of the surface is covered with residue (less than 750 lb/acre for small grain)

For conservation tillage, good hydrologic condition, more than 20 percent of the surface is covered with residue (greater than 750 lb/acre for row crops or 300 lb/acre for small grains)



**Figure 2-7: Runoff Curve Numbers - continued**  
**(b) Other Agricultural Lands <sup>1/</sup>**

Cover Description Cover Type	Hydrologic Condition	Runoff Curve Numbers for Hydrologic Soil Group			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing <sup>2/</sup>	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay	-----	30	58	71	78
Brush—brush-forbs-grass mixture with brush the major element <sup>3/</sup>	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 <sup>4/</sup>	48	65	73
Woods-grass combination (orchard or tree farm) <sup>5/</sup>	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods <sup>6/</sup>	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 <sup>4/</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots	-----	59	74	82	86

<sup>1/</sup> Average runoff condition and Ia=0.2S

<sup>2/</sup> Poor: < 50% ground cover or heavily grazed with no mulch

Fair: 50% to 75% ground cover or not heavily grazed

Good: >75% ground cover and lightly or only occasionally grazed

<sup>3/</sup> Poor: <50% ground cover

Fair: 50 to 75% ground cover

Good: >75% ground cover

<sup>4/</sup> Actual curve number is less than 30; use CN = 30 for runoff computations

<sup>5/</sup> CNs shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture

<sup>6/</sup> Poor: Forest litter, small trees, and brush have been destroyed by heavy grazing or regular burning

Fair: Woods are grazed but not burned, and some forest litter covers the soil

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

**Figure 2-7:** Runoff Curve Numbers – continued  
(c) Arid and Semiarid Rangelands <sup>1/</sup>

Cover Description	Hydrologic Condition <sup>2/</sup>	Runoff Curve Numbers for Hydrologic Soil Group			
		A <sup>3/</sup>	B	C	D
Herbaceous – mixture of grass, weeds, and low-growing brush, with brush the minor element	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen – mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper – pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub – major plants, include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

<sup>1/</sup> Average runoff condition and  $I_a=0.2S$ . or rangelands in humid regions, use table 2-1(b).

<sup>2/</sup> Poor: <30% ground cover (litter, grass, and brush overstory)

Fair: 30% to 70% ground cover

Good: >70% ground cover

<sup>3/</sup> Curve numbers for group A have been developed only for desert shrub.

**Figure 2-7: Runoff Curve Numbers – continued**

(d) Urban Areas <sup>1/</sup>

Cover Description	Average Percent Impervious Area <sup>2/</sup>	Runoff Curve Numbers for Hydrologic Soil Group			
		A	B	C	D
Fully developed urban areas (vegetation established):					
Open space (lawns, parks, golf courses, cemeteries, etc.): <sup>3/</sup>					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) <sup>4/</sup>		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2- inch sand or gravel mulch and basin borders)		96	96	96	96
Urban district:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas:					
Newly graded areas (pervious areas only, no vegetation) <sup>5/</sup>		77	86	91	94

<sup>1/</sup> Average runoff condition and I<sub>a</sub>=0.2S

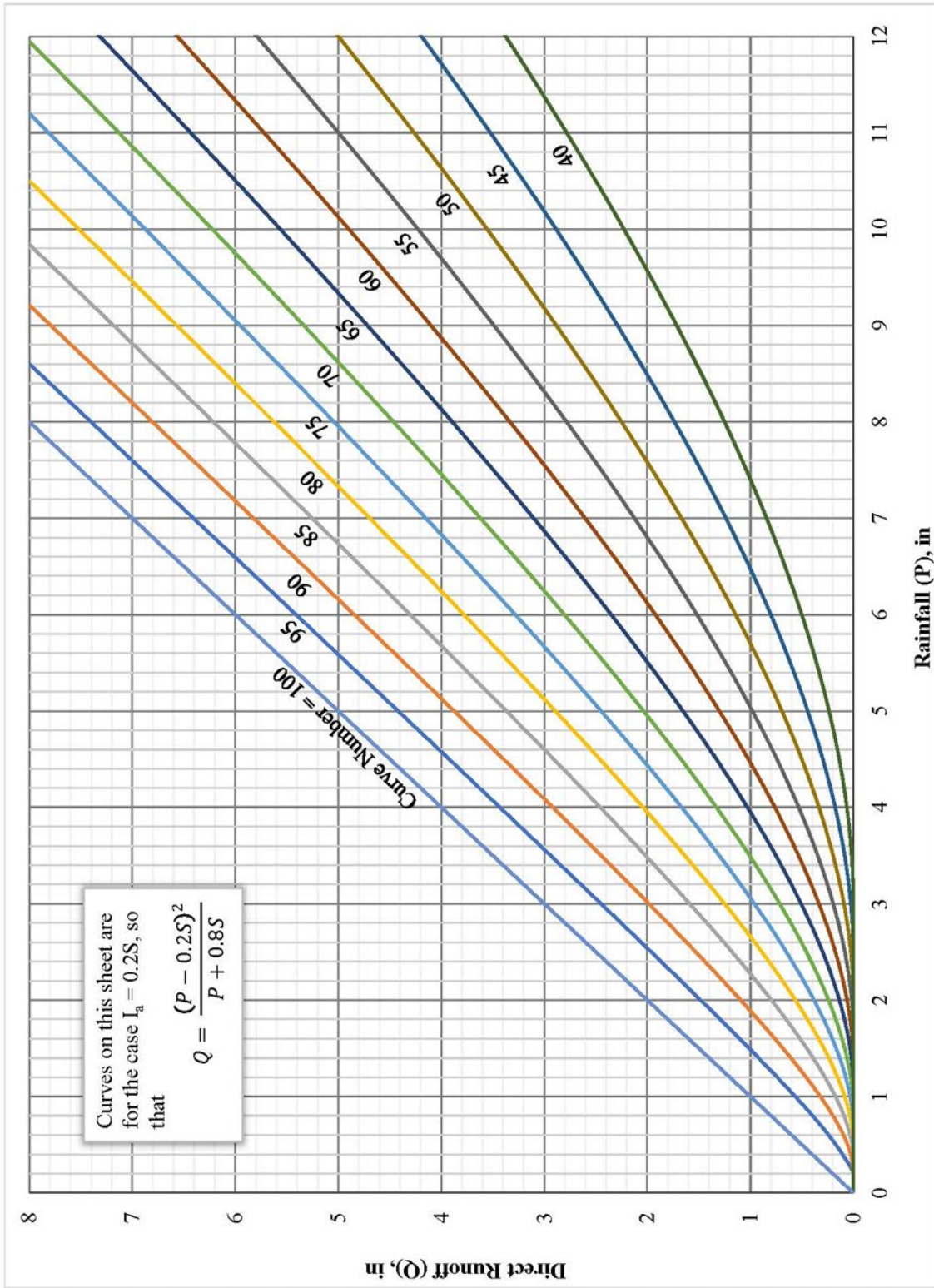
<sup>2/</sup> The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

<sup>3/</sup> CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.

<sup>4/</sup> Composite CNs for natural desert landscaping should be computed based on the impervious area (CN=98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

<sup>5/</sup> Composite CNs to use for the design of temporary measures during grading and construction should be computed using the degree of development (impervious area percentage) and the CNs for the newly graded pervious areas.

Figure 2-8: Solution to the NRCS Runoff Equation



**Figure 2-9: Runoff Depth for Selected CNs And Rainfall Amounts<sup>1/</sup>**

Rainfall (in)	-----Runoff (Q) in inches for Runoff Curve Number of -----											
	40	45	50	55	60	65	70	75	80	85	90	95
1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.17	0.32	0.56
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.15	0.27	0.46	0.74
1.4	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.13	0.24	0.39	0.61	0.92
1.6	0.00	0.00	0.00	0.00	0.01	0.05	0.11	0.20	0.34	0.52	0.76	1.11
1.8	0.00	0.00	0.00	0.00	0.03	0.09	0.17	0.29	0.44	0.65	0.93	1.29
2.0	0.00	0.00	0.00	0.02	0.06	0.14	0.24	0.38	0.56	0.80	1.09	1.48
2.5	0.00	0.00	0.02	0.08	0.17	0.30	0.46	0.65	0.89	1.18	1.53	1.96
3.0	0.00	0.02	0.09	0.19	0.33	0.51	0.71	0.96	1.25	1.59	1.98	2.45
3.5	0.02	0.08	0.20	0.35	0.53	0.75	1.01	1.30	1.64	2.02	2.45	2.94
4.0	0.06	0.18	0.33	0.53	0.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43
4.5	0.14	0.30	0.50	0.74	1.02	1.33	1.67	2.05	2.46	2.91	3.40	3.92
5.0	0.24	0.44	0.69	0.98	1.30	1.65	2.04	2.45	2.89	3.37	3.88	4.42
6.0	0.50	0.80	1.14	1.52	1.92	2.35	2.81	3.28	3.78	4.30	4.85	5.41
7.0	0.84	1.24	1.67	2.12	2.60	3.10	3.62	4.15	4.69	5.25	5.82	6.41
8.0	1.25	1.74	2.25	2.78	3.33	3.89	4.46	5.04	5.63	6.21	6.81	7.40
9.0	1.71	2.29	2.88	3.49	4.10	4.72	5.33	5.95	6.57	7.18	7.79	8.40
10.0	2.23	2.89	3.56	4.23	4.90	5.56	6.22	6.88	7.52	8.16	8.78	9.40
11.0	2.78	3.52	4.26	5.00	5.72	6.43	7.13	7.81	8.48	9.13	9.77	10.39
12.0	3.38	4.19	5.00	5.79	6.56	7.32	8.05	8.76	9.45	10.11	10.76	11.39
13.0	4.00	4.89	5.76	6.61	7.42	8.21	8.98	9.71	10.42	11.10	11.76	12.39
14.0	4.65	5.62	6.55	7.44	8.30	9.12	9.91	10.67	11.39	12.08	12.75	13.39
15.0	5.33	6.36	7.35	8.29	9.19	10.04	10.85	11.63	12.37	13.07	13.74	14.39

<sup>1/</sup> Interpolate the values shown to obtain runoff depths for CNs or rainfall amounts not shown.

## 650.0205 Time of Concentration

### A. General

- (1) Time of concentration,  $T_c$ , is the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the outlet.  $T_c$  influences the peak discharge. For the same size watershed, the shorter the  $T_c$ , the larger the peak discharge. This means that peak discharge has an inverse relationship with  $T_c$ .
- (2) On a hydrograph,  $T_c$  is the time from the end of the excess rainfall (when the storm event ends) to the point of inflection on the receding limb of the hydrograph. Figure 2-6 shows this relationship between the end of the excess rainfall and  $T_c$ .
- (3) An estimate of the  $T_c$  is necessary for developing a hydrograph to estimate the peak discharge from a watershed.
- (4) There are numerous methods for computing  $T_c$ . This chapter contains information on using the NRCS Lag Equation.

B. The NRCS Lag Equation and Inputs

(1) NRCS Lag Equation

Estimate  $T_c$  for small rural watersheds using the following empirical relationship referred to as the lag equation:

$$T_c = \frac{l^{0.8} \left[ \left( \frac{1,000}{CN} \right) - 9 \right]^{0.7}}{1140Y^{0.5}} \quad (\text{eq. 2-5})$$

where:  $T_c$  = time of concentration, hr  
 $l$  = flow length, ft  
 $CN$  = runoff curve number  
 $Y$  = average watershed slope, %

(2) Average Watershed Slope

- (i) The average watershed slope ( $Y$ ) is the slope of the land and not the watercourse.  
 (ii)  $Y$  can be determined using several different methods:
- Measuring hillside slopes with a hand level, Locke level, or clinometer in the direction of overland flow; and averaging the individual land slope measurements.
  - Measuring the lengths of the contours in the watershed, summing the contour lengths, multiplying by the contour intervals, and dividing by the drainage area as described in the following relationship:

$$Y = \frac{100CI}{A} \quad (\text{eq. 2-6})$$

where:  $Y$  = average watershed slope, %  
 $C$  = total length of contours measured, ft  
 $I$  = contour interval, ft  
 $A$  = drainage area, ft<sup>2</sup>

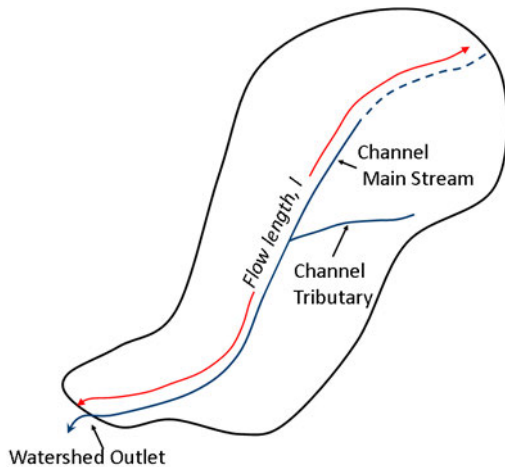
- Drawing a minimum of three random lines across the contour lines on a topographic map, determining the slope for each of the lines and averaging those slopes.
- Another process for determining  $Y$  is to transfer delineation of the watershed boundary to a soils map, tally the acres of each soil type, look up the average slopes for each soil type, and then average those slopes to determine  $Y$  for the entire watershed.
- GIS applications are also frequently used. Methodologies may vary among GIS applications.
- For small watersheds, using an average of the slopes may be sufficient, in other cases it may be desirable to weight the slopes based upon the percentage of area for each slope.

(3) Flow Length

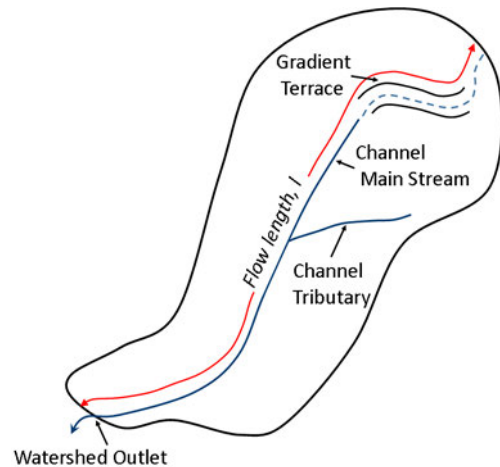
- (i) Flow length ( $l$ ) is the hydraulically most distant flow path in the watershed from the watershed divide to the outlet. Generally, it is considered the longest flow path. But if it takes water a longer time to flow from the divide to the outlet along a shorter flow path than it takes water to flow along the longest flow path, the shorter flow path should be used. It is the total path water travels overland and in small channels on the way to the outlet. The flow length can be determined using a topographic maps, aerial photos, or field measurements.

- (ii) Figures 2-10 and 2-11 provide a conceptual illustration of how flow lengths can differ between a natural watershed and the same watershed with a gradient terrace.
- In the case of the natural watershed, water flows overland and through a small channel (dashed blue line) from the watershed divide to the main stream (solid blue line) and from there to the watershed outlet.
  - In the case of the watershed with a gradient terrace, water flows from the watershed divide to and along the terrace (dashed blue line) to the terrace outlet, or in this case, the main stream (solid blue line) and then along the main stream to the watershed outlet.
  - The red line illustrates the total flow length along the flow path for each scenario.
- (iii) For situations where a small detention structure lies within the flow path, the general assumption is that the length of the detention pool is zero.

**Figure 2-10:** Natural watershed



**Figure 2-11:** Watershed with Gradient Terrace



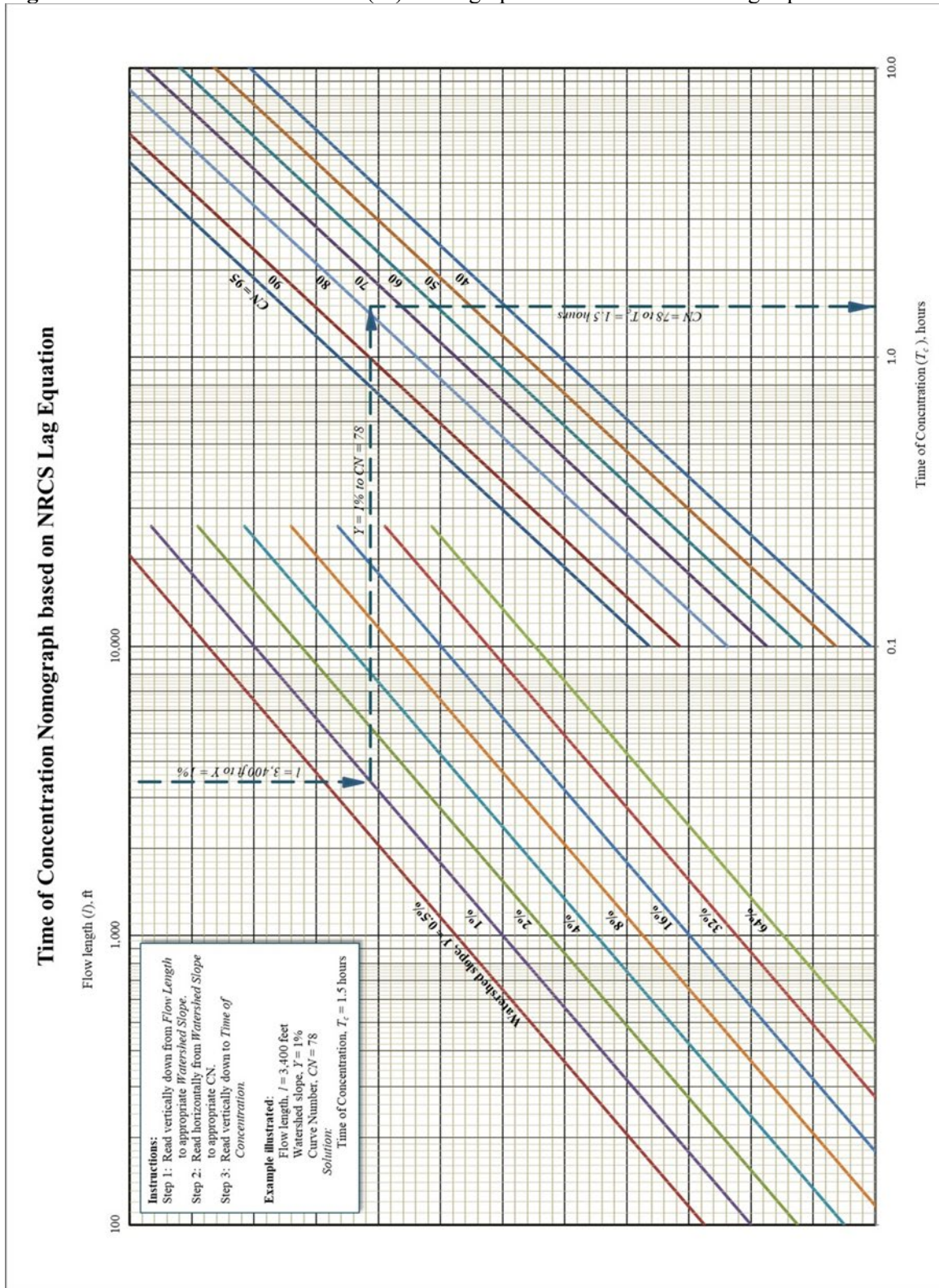
#### C. Estimating $T_c$ Using the NRCS Lag Equation

Figure 2-12 is a nomograph for solving equation 2-5. Section 650.0211, Exhibit B is a worksheet for computing  $T_c$ . Example – Estimating Time of Concentration and Peak Discharge (section 650.0208) demonstrates this procedure.

#### D. Use of other $T_c$ Methods

For watersheds where hydraulic conditions make it necessary to use velocities of water flow in different  $T_c$  flow path segments, for example watersheds where urban areas exceed approximately 10% of the total watershed area, estimate  $T_c$  using the velocity method or other methods described in 210-NEH-630-15, “Time of Concentration”.

Figure 2-12: Time of Concentration ( $T_c$ ) Nomograph based on the NRCS Lag Equation





## 650.0206 Peak Discharge

### A. General

- (1) For many NRCS on-farm conservation practice analyses and designs, the modeler only needs to know peak discharge. However, to compute the peak discharge requires estimation of the runoff volume.
- (2) Estimating peak discharge can be done manually provided unit peak discharge curves are available. Software tools, such as the NRCS EFH-2 computer program, may also be used.

### B. Estimating Peak Discharge Manually

- (1) Unit peak discharge curves
  - (i) Unit peak discharge curves represent a combination of rainfall distribution and dimensionless unit hydrograph for use in specific locations. NRCS developed these curves as part of a generalized and simplified method of computing peak discharge for on-farm conservation practices. The long-hand computations for developing peak discharge detailed in 210-NEH-630-16, are complex requiring development of hydrographs manually for each individual practice. This is a long and tedious process unnecessary for common on-farm practices.
  - (ii) Unit peak discharge curves are sometimes referred to as rainfall type curves but combine a rainfall distribution and a dimensionless unit hydrograph.
  - (iii) Equations for the unit peak discharge curves are available for users to develop their own software tools. These equations are typically published in State Supplements to this chapter.
  - (iv) For locations where unit peak discharge ( $q_u$ ) curves are available, peak discharge ( $q_p$ ) can be estimated manually as the product of the  $q_u$ , drainage area ( $A$ ), and runoff volume ( $Q$ ):

$$q_p = q_u A Q \quad (\text{eq. 2-7})$$

where:  $q_p$  = peak discharge (cfs)  
 $q_u$  = unit peak discharge (cfs/ac/in)  
 $A$  = watershed drainage area (ac)  
 $Q$  = runoff volume (in)

- (v) Time of concentration and the ratio of initial abstraction to precipitation ( $I_a/P$ ) values are needed to obtain a value for  $q_u$  from the unit peak discharge curves (figures 2-14 through 2-17 or from the appropriate NRCS State supplement to this chapter).
- (2)  $I_a/P$  ratio
  - (i) The  $I_a/P$  ratio is a parameter that indicates how much of the total rainfall is needed to satisfy the initial abstraction. The larger the  $I_a/P$  ratio, the lower the  $q_u$  for a given time of concentration. This indicates that if initial abstraction is a high portion of rainfall, the peak discharge will be lower. Thus, the  $I_a/P$  ratio is greater for small storms.
  - (ii) Use equations 2-4 and 2-2, or the table in figure 2-13, with the watershed runoff curve number to determine the initial abstraction.
  - (iii) If the computed  $I_a/P$  ratio is outside the range shown (0.1 to 0.50) in figures 2-14 through 2-17, then the limiting values should be used; i.e., use 0.1 if less than 0.1 and use 0.5 if greater than 0.5. If the ratio falls between the limiting values, use linear interpolation.

- (3) Estimating Peak Discharge
- (i) For the NRCS standard rainfall distributions (old distributions), obtain the unit peak discharge using the  $q_u$  curves illustrated in figures 2-14 through 2-17 for the appropriate rainfall type. Figure 2-1 shows the approximate geographic boundaries for the four NRCS Standard Rainfall Distributions.
  - (ii) For States with Updated NRCS Rainfall Distributions obtain unit peak discharge from the  $q_u$  curves available in the appropriate State Supplement to this chapter.
  - (iii) Section 650.0211, Exhibit B is a worksheet for use in determining peak discharge as illustrated in the example in section 650.0208 B.

**Figure 2 13:** Initial Abstraction Values for Runoff Curve Numbers

Runoff Curve Number (CN)	Initial Abstraction, $I_a$ (in)	Runoff Curve Number (CN)	Initial Abstraction, $I_a$ (in)	Runoff Curve Number (CN)	Initial Abstraction, $I_a$ (in)
40	3.000	60	1.333	80	0.500
41	2.878	61	1.279	81	0.469
42	2.762	62	1.226	82	0.439
43	2.651	63	1.175	83	0.410
44	2.545	64	1.125	84	0.381
45	2.444	65	1.077	85	0.353
46	2.348	66	1.030	86	0.326
47	2.255	67	0.985	87	0.299
48	2.167	68	0.941	88	0.273
49	2.082	69	0.899	89	0.247
50	2.000	70	0.857	90	0.222
51	1.922	71	0.817	91	0.198
52	1.846	72	0.778	92	0.174
53	1.774	73	0.740	93	0.151
54	1.704	74	0.703	94	0.128
55	1.636	75	0.667	95	0.105
56	1.571	76	0.632	96	0.083
57	1.509	77	0.597	97	0.062
58	1.448	78	0.564	98	0.041
59	1.390	79	0.532		

Figure 2-14: Unit Peak Discharge ( $q_u$ ) for NRCS Rainfall Type I Rainfall Distribution

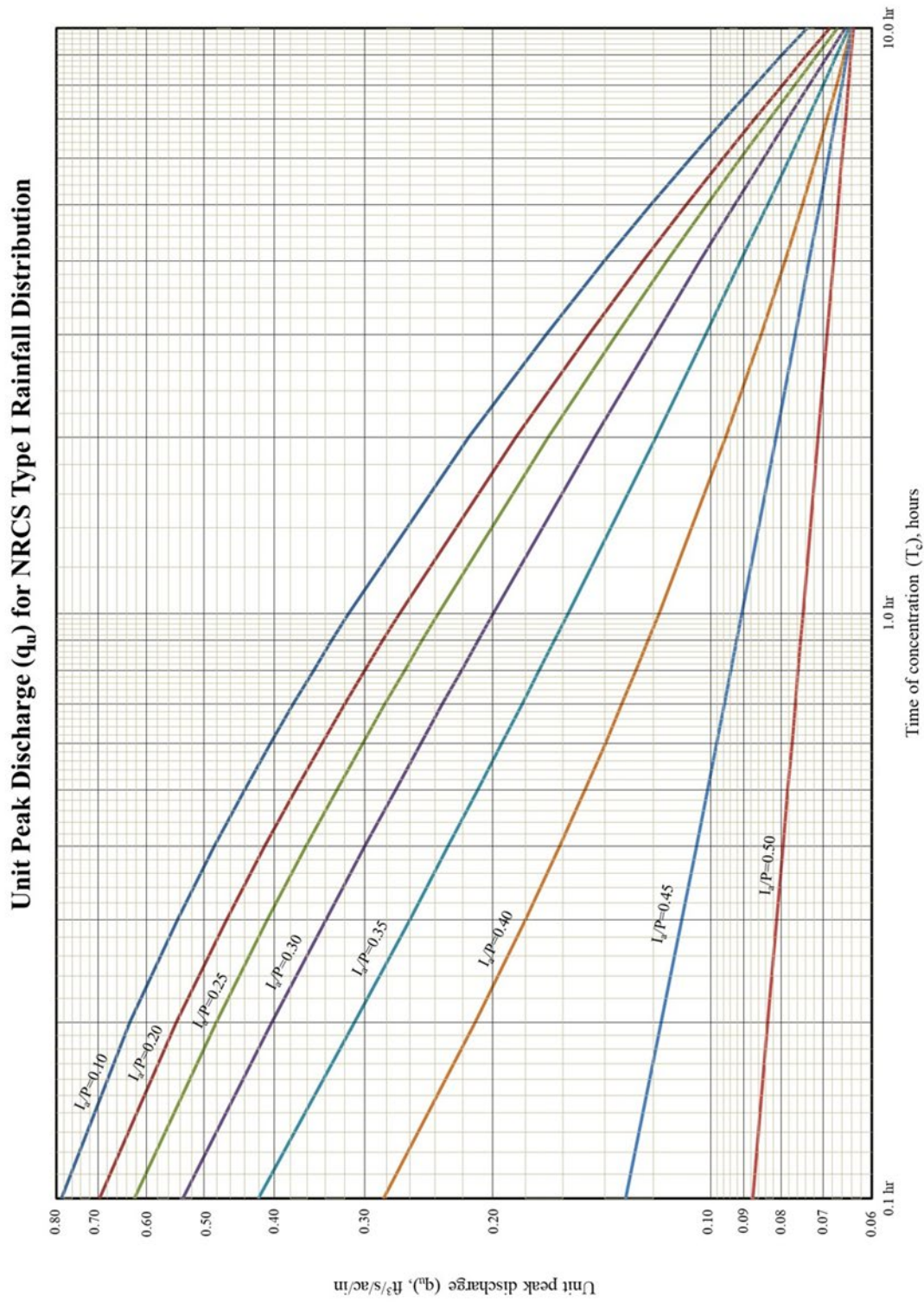


Figure 2-15: Unit Peak Discharge ( $q_u$ ) for NRCS Rainfall Type IA Rainfall Distribution

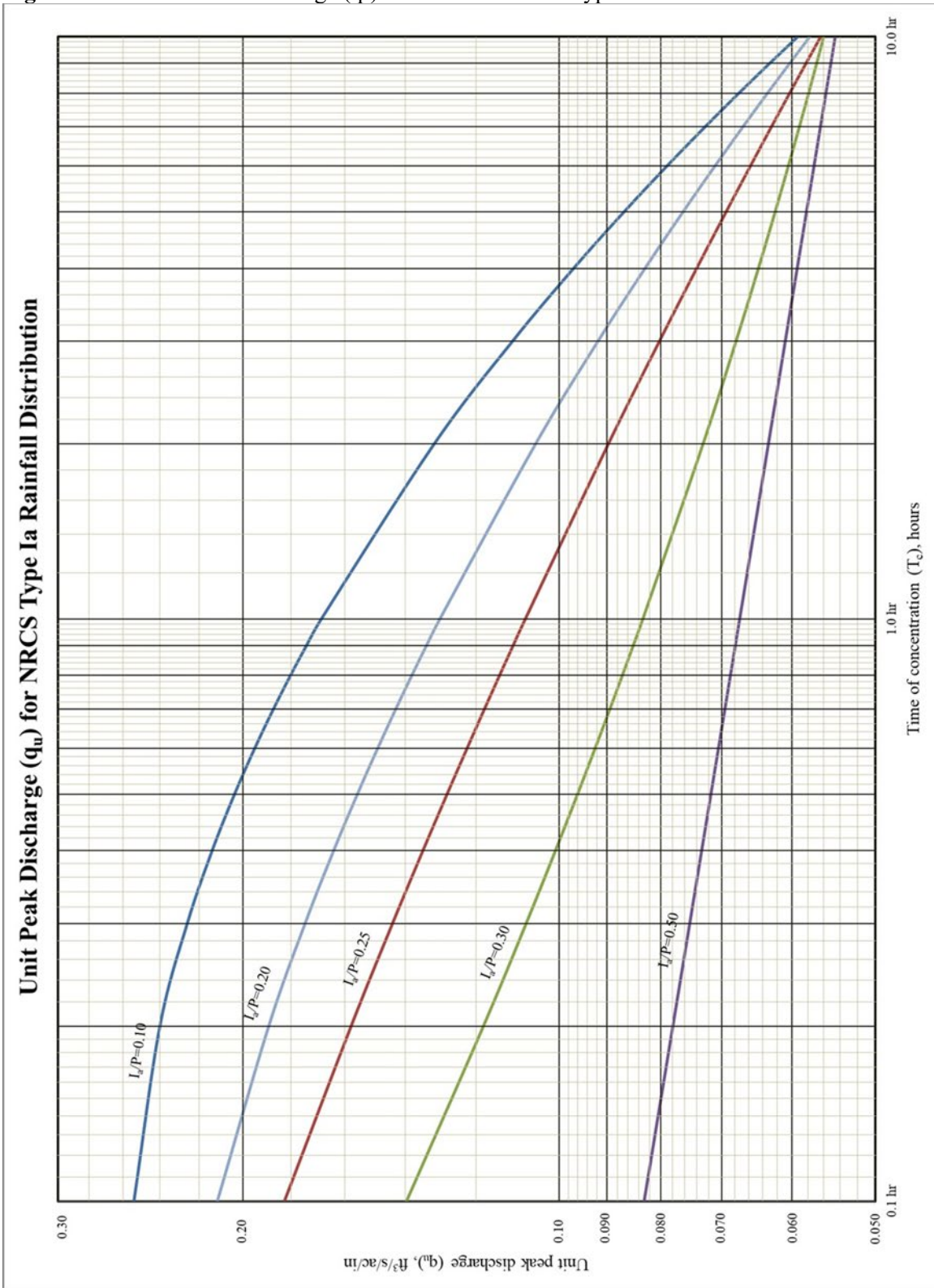


Figure 2-16: Unit Peak Discharge ( $q_u$ ) for NRCS Rainfall Type II Rainfall Distribution

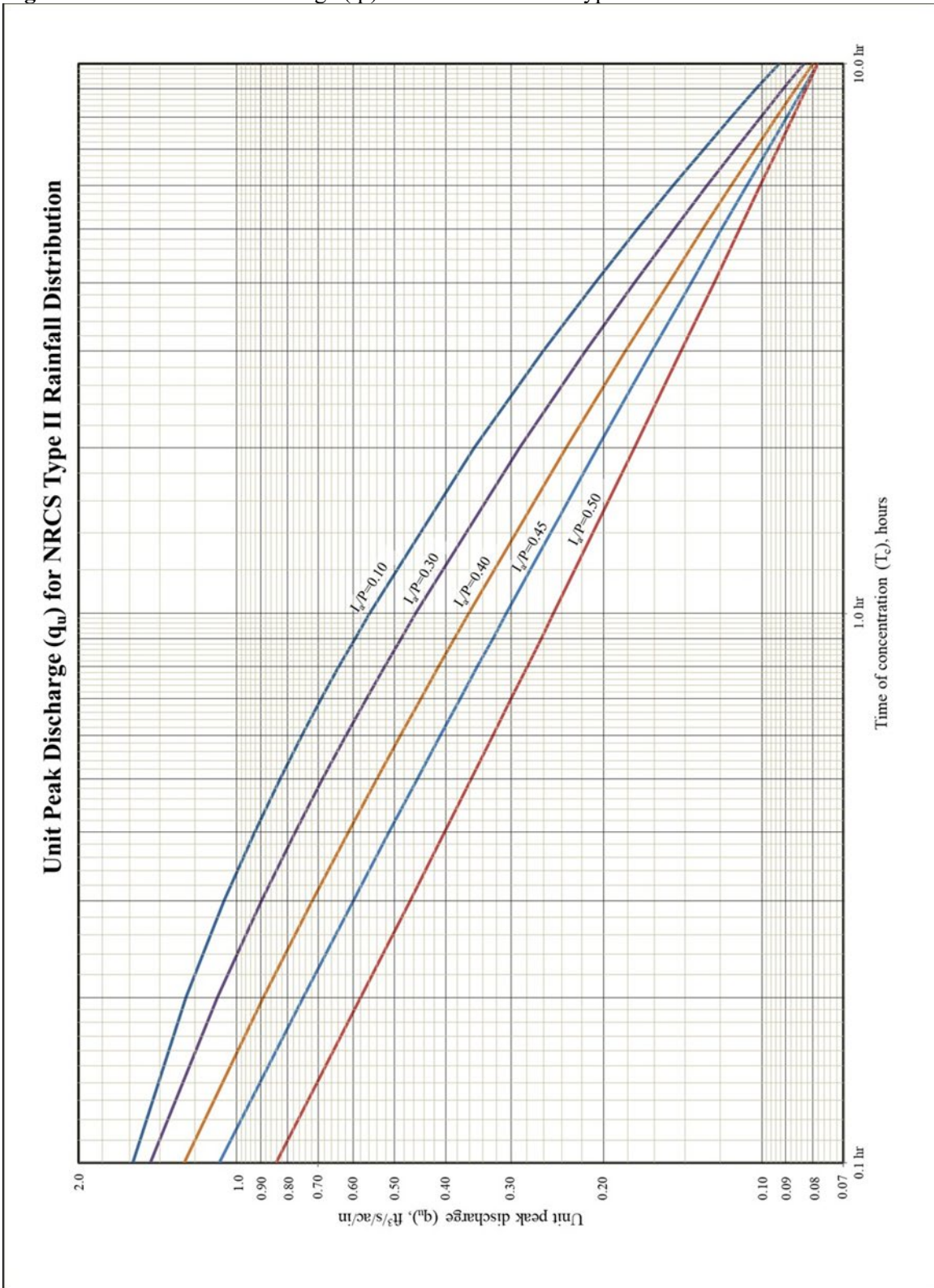
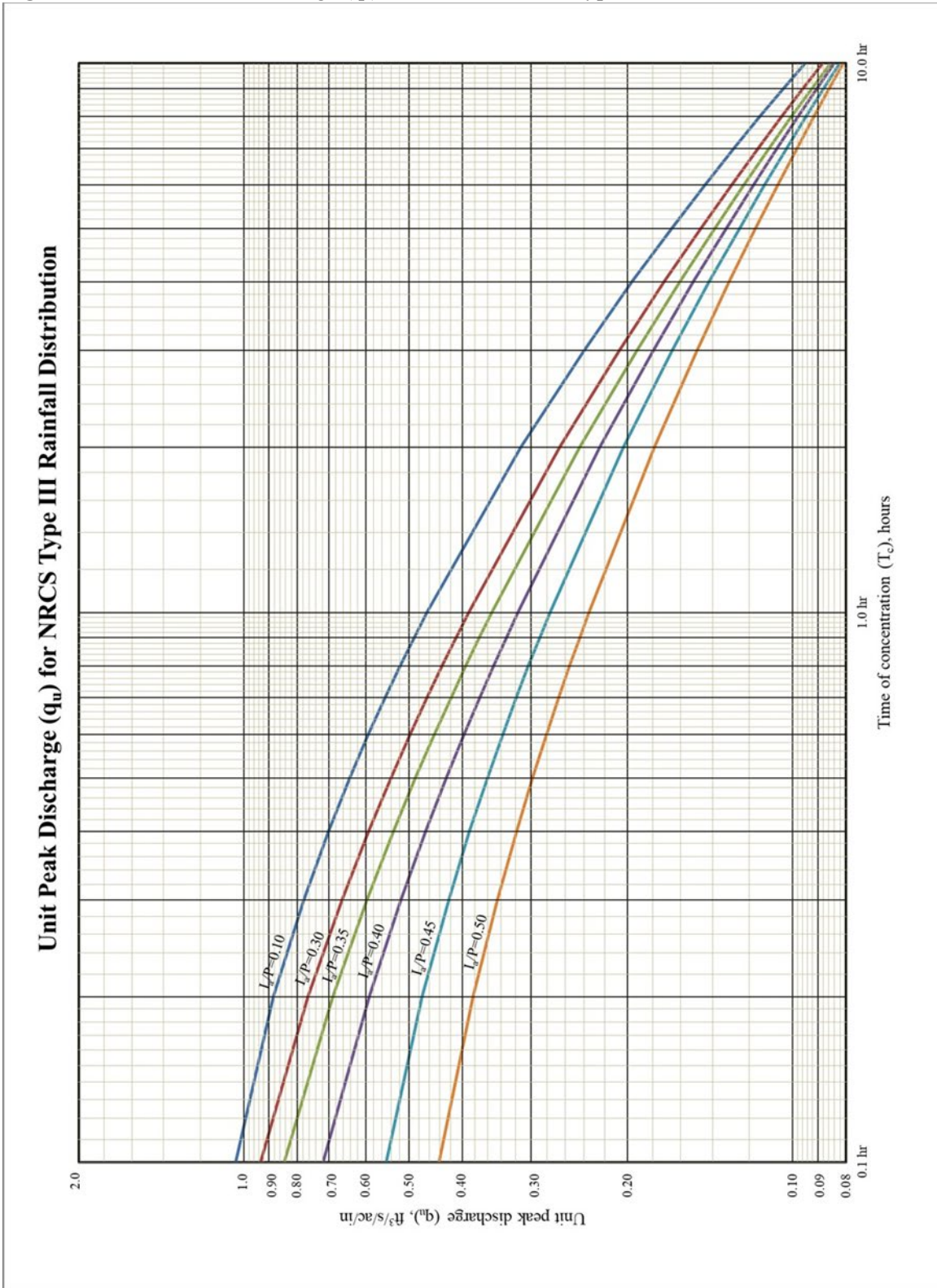


Figure 2-17: Unit Peak Discharge ( $q_u$ ) for NRCS Rainfall Type III Rainfall Distribution



C. Estimating Peak Discharge Using the Computer Programs

- (1) Several software packages and spreadsheets are available, both commercially and through NRCS, that automate estimation of runoff volume and peak discharge.
- (2) Some of these tools utilize methods other than the NRCS CN Method to give just a peak discharge; some use the NRCS CN Method with the unit peak discharge methodology described in this chapter to give a runoff volume and a peak discharge, and others use the NRCS CN Method and procedures described in 210-NEH-630-16, to develop full hydrographs for the location of interest and provide an estimate of peak discharge.
- (3) Regardless of which software is used, the user must typically identify watershed drainage area, land use within the watershed,  $T_c$ , and appropriate rainfall amounts. Depending upon the software used, the user may also need to identify an appropriate rainfall distribution and dimensionless unit hydrograph.
- (4) The nationally supported EFH-2 computer program is most often used by NRCS for estimating runoff volume and peak discharge for small on-farm conservation practices.

**650.0207 Limitations**

- A. The watershed drainage area must be greater than 1.0 acre and less than 2,000 acres. Use another procedure, such as those described in 210-NEH-630, to estimate peak discharge if the drainage area is outside these limits. The WinTR-55 and WinTR-20 computer programs automate these procedures.
- B. The watershed should have only one main stream. If more than one exists, the branches must have nearly equal times of concentration.
- C. The watershed must be hydrologically similar; i.e., represented by a single weighted runoff curve number. Land use, soils, and cover are distributed uniformly throughout the watershed. The land use must be primarily rural. If urban conditions are present and not uniformly distributed throughout the watershed, or if they represent more than 10 percent of the watershed, use other procedures such as those found in 210-NEH-630.
- D. If using the unit peak discharge curves, the accuracy of peak discharge estimated by the method described in this chapter is reduced if  $I_a/P$  ratio used is outside the range of 0.1 to 0.5 as shown in figures 2-14 through 2-17.
- E. When the average watershed slope is less than 0.5 percent, a different unit hydrograph shape, such as the DelMarVa (PRF=286), can be used.
- F. If the computed  $T_c$  is less than 0.1 hour, use 0.1 hour. If the computed  $T_c$  is greater than 10 hours, estimate peak discharge using the procedures documented in 210-NEH-630.
- G. When the flow length is less than 200 feet or greater than 26,000 feet, use another procedure, such as those documented in 210-NEH-630-15 to estimate  $T_c$ .
- H. Do not estimate runoff and peak discharge from snowmelt or rain on frozen ground using these procedures. A procedure for estimating peak discharge in these situations is in 210-NEH-630-11, “Snowmelt”.
- I. If potholes make up more than a third of the total drainage area or if they intercept the drainage, use the procedures in 210-NEH-630.

J. When the average watershed slope is greater than 64 percent or less than 0.5 percent, use another procedure to estimate  $T_c$ . 210-NEH-630-15 presents several other methods for computing  $T_c$ .

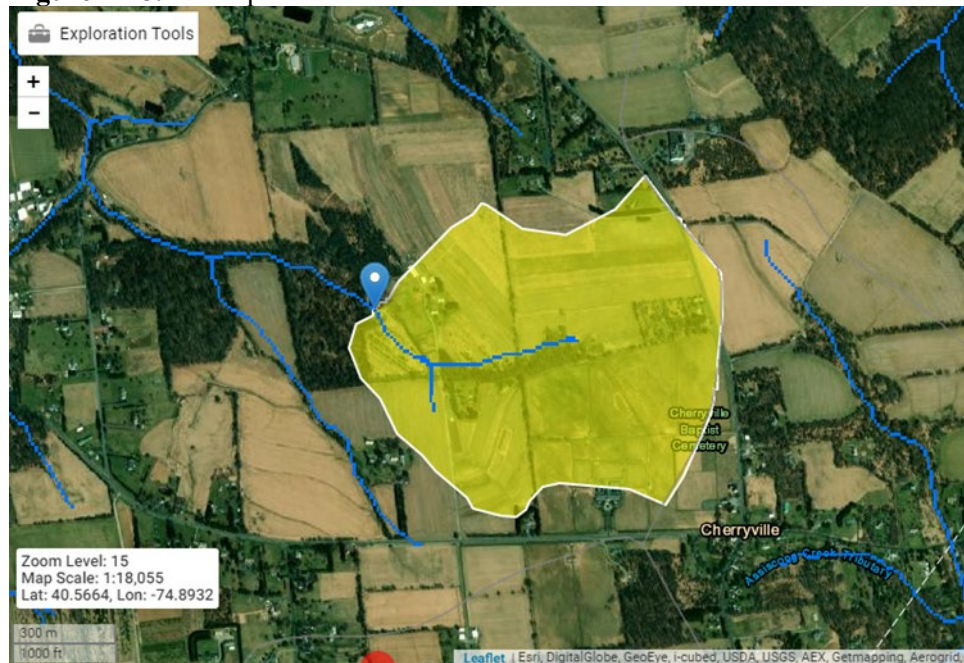
K. When the weighted runoff curve number is less than 40 or more than 98, use another procedure to estimate peak discharge.

## 650.0208 Examples

### A. Example - Estimating Weighted Runoff Curve Number

- (1) For the 192-acre watershed in Hunterdon County, New Jersey, as shown in figure 2-18, determine the weighted curve number for the drainage area above a proposed waterway.

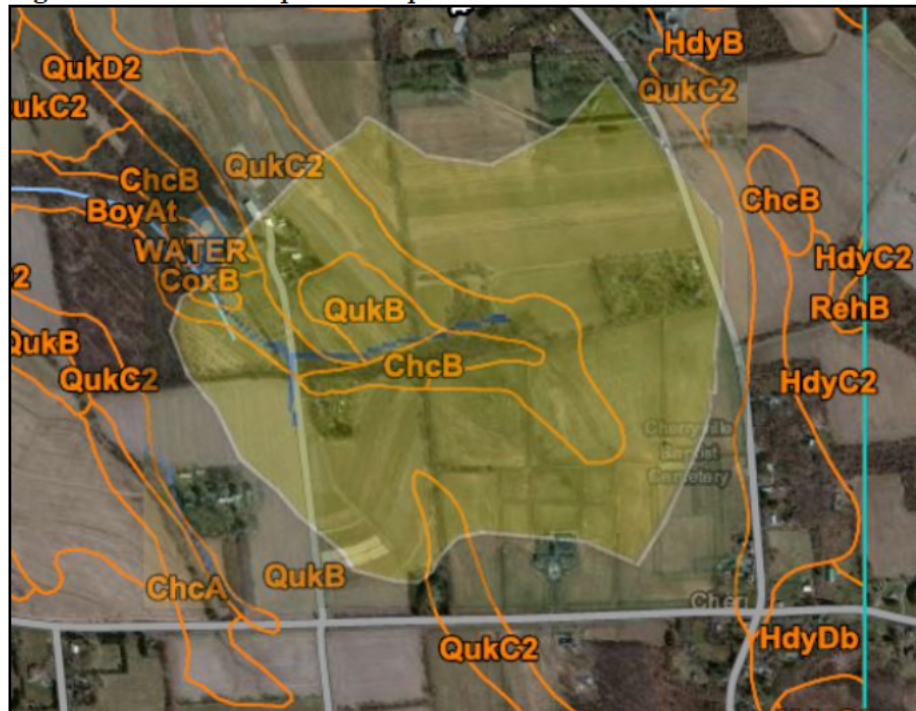
**Figure 2-18:** Example Watershed



- (i) The soils map obtained through NRCS' Web Soil Survey, shown in figure 2-19, shows that the soils and their associated HSG in the watershed are:
  - BoyAT: Bowmansville silt loam, 0 to 2% slopes, frequently flooded: HSG B/D
  - ChC: Chalfont silt loam, 2-6% slopes. HSG C
  - CoxB: Croton silt loam, 2-6% slopes. HSG D
  - QukB: Quakertown silt loam, 2-6% slopes. HSG C
  - QukC2: Quakertown silt loam, 6-12% slopes, eroded. HSG C
  - QukD: Quakertown silt loam, 12-18% slopes, eroded. HSG C



**Figure 2-19:** Soils Map for example watershed



(ii) Land use by HSG breaks down as shown in figure 2-20.

**Figure 2-20:** Land Use for Example Watershed

Land Use Description	HSG	Area (acres)
Woods – Good Condition	C	6
Pasture- Good Condition	C	28
Pasture- Fair Condition	C	10
Small Grain, Straight Row +CR- Good Condition	C	45
Farmstead	C	3
Row Crops, Straight Row + CR- Good Condition	C	42
Row Crops, Contoured + CR- Good Condition	C	50
Woods- Good Condition	D	2
Pasture- Good Condition	D	6

(2) Solution: Figure 2-21 shows the completed computations for estimating the weighted runoff curve number for this example. Section 650.0211, Exhibit A, at the end of this document is a blank worksheet for estimating weighted runoff curve number.

**B. Example - Estimating Time of Concentration**

- (1) For the watershed in the Example – Estimating Weighted Runoff Curve Number, determine the time of concentration. The average watershed slope is 2.8%, and the flow length is 4,000 feet.
- (2) Figure 2-22 shows the completed computation for estimating the time of concentration. The time of concentration computation in this example uses the weighted runoff curve number estimated in the previous example. Section 650.0211, Exhibit B at the end of this document is a blank worksheet for estimating time of concentration and peak discharge.

C. Example - Manual Estimation of Peak Discharge

- (1) For the watershed in examples A and B, determine the peak discharges for the 2-, 5-, and 10-year events. The 2-year, 24-hour precipitation is 3.38 inches; the 5-year, 24-hour precipitation is 4.26 inches; and the 10-year, 24-hour precipitation is 5.0 inches. (Design of a grassed waterway requires the use of the 10-year, 24-hour precipitation).
- (2) Figure 2-22 shows the completed computations for the peak discharge for this example. Section 650.0211, Exhibit B at the end of this document is a blank worksheet for estimating time of concentration and peak discharge.
- (3) This example for the State of New Jersey is based on using updated NOAA Atlas 14 rainfall data, but still using the NRCS Standard Type III Rainfall Distribution within the unit peak discharge curves. The State of New Jersey has updated NOAA Atlas-14 rainfall data and distributions available and is using them. Results obtained using the New Jersey updated rainfall data and distributions will be different than those illustrated in this example. Consult appropriate State Supplements for updated rainfall data, distributions, unit peak discharge curves.

**Figure 2-21:** Solution to Example – Estimating Weighted Runoff Curve Number

### Runoff Curve Number (CN)

Client: Example A By: cch Date: 12/07/2020  
 County: Hunterdon State: NJ Checked: \_\_\_\_\_ Date: \_\_\_\_\_  
 Practice: Grassed Waterway

Soil name and hydrologic soil group	Cover description (cover type, treatment, and hydrologic condition)	CN (figure 2-7)	Area (acres or %)	Product of CN x Area
<i>C</i>	<i>Woods – Good Condition</i>	<i>70</i>	<i>6</i>	<i>420</i>
<i>C</i>	<i>Pasture – Good Condition</i>	<i>74</i>	<i>28</i>	<i>2,072</i>
<i>C</i>	<i>Pasture – Fair Condition</i>	<i>79</i>	<i>10</i>	<i>790</i>
<i>C</i>	<i>Small Grain, SR+CR, Good Condition</i>	<i>80</i>	<i>45</i>	<i>3,600</i>
<i>C</i>	<i>Farmstead</i>	<i>82</i>	<i>3</i>	<i>246</i>
<i>C</i>	<i>Row Crops, SR+CR, Good Condition</i>	<i>81</i>	<i>50</i>	<i>4,050</i>
<i>C</i>	<i>Row Crops, Contoured+CR, Good Condition</i>	<i>81</i>	<i>50</i>	<i>4,050</i>
<i>D</i>	<i>Woods – Good Condition</i>	<i>77</i>	<i>2</i>	<i>154</i>
<i>D</i>	<i>Pasture – Good Condition</i>	<i>80</i>	<i>6</i>	<i>480</i>
<b>TOTALS:</b>			<b>200</b>	<b>15,862</b>

$$\text{CN (weighted)} = \frac{\text{Product of CN} \times \text{Area}}{\text{Total Area}} = \frac{15,862}{200} = 79.3$$
 USE CN = **79**

Figure 2-22: Solution to Example – Estimating Time of Concentration and Peak Discharge

## Time of Concentration and Peak Discharge

Client: Examples B and C By: cch Date: 12/07/2020

County: Hunterdon State: NJ Checked: \_\_\_\_\_ Date: \_\_\_\_\_

Practice: Grassed Waterway

**Estimating time of concentration:**

1. Data:

Rainfall distribution type..... III  
*From NRCS standard distribution type (I, IA, II, or III) OR Updated NRCS rainfall distribution type (from State Supplement to 210-NEH-650-2)*

Drainage area.....A = 192 acres

Runoff curve number.....CN = 79  
*From Runoff Curve Number worksheet.*

Watershed slope.....Y = 2.8 %

Flow length.....  $l$  = 4,000 ft

2.  $T_c$  using  $l$ , Y, CN, and figure 2-12..... $T_c$  = \_\_\_\_\_ hrs

OR using equation 2-5:

$$T_c = \frac{l^{0.8} \left( \frac{1,000}{CN} - 9 \right)^{0.7}}{1,140Y^{0.5}} = \frac{(4,000)^{0.8} \left( \frac{1,000}{79} - 9 \right)^{0.7}}{1,140(2.8)^{0.5}} = \underline{\underline{0.99}} \text{ hrs}$$

**Estimating peak discharge:**

	Storm #1	Storm #2	Storm #3
1. Frequency .....	2	5	10
2. Rainfall, P (24-hour).....	3.38	4.26	5.0
3. Initial abstraction, $I_a$ ..... <i>(use CN with figure 2-13)</i>	0.532	0.532	0.532
4. Compute $I_a/P$ ratio .....	0.16	0.12	0.11
5. Unit peak discharge, $q_u^*$ .....	0.44	0.45	0.46
6. Runoff, Q .....	1.47	2.18	2.80
7. Peak discharge, $q_p$ ..... <i>(where <math>q_p = q_u A Q</math>)</i>	124	188	248

\*(use  $T_c$  and  $I_a/P$  with figures 2-14 through 2-17 OR with appropriate unit peak discharge figures for updated NRCS rainfall distributions from State Supplements to 210-NEH-650-2)

## 650.0209 References

A. United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). Title 210-National Engineering Handbook (NEH), Part 630, “Hydrology”.

- (1) Chapter 7, “Hydrologic Soil Groups”, 2009.
- (2) Chapter 9, “Hydrologic Soil-Cover Complexes”, 2004.
- (3) Chapter 10, “Estimation of Direct Runoff from Storm Rainfall”, 2004.
- (4) Chapter 11, “Snowmelt”, 2004.
- (5) Chapter 15, “Time of Concentration”, 2010.
- (6) Chapter 16, “Hydrographs”, 2007.

B. USDA-NRCS. Title 180 – Conservation Planning and Application, Part 600, “National Planning Procedures Handbook”, Amendment 7, Subpart A – General, 600.2 Definitions. 2020.

C. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service (NOAA-NWS). NOAA Atlas 14, “Precipitation-Frequency Atlas of the United States”. [https://www.weather.gov/owp/hdsc\\_publications](https://www.weather.gov/owp/hdsc_publications)

- (1) Volume 1: Semiarid Southwest Arizona, Southeast California, Nevada, New Mexico, Utah, 2004, rev. 2011. (SE California superseded by NOAA Atlas 14, Volume 6).
- (2) Volume 2: Ohio River Basin and Surrounding States (Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia), 2004, rev. 2006.
- (3) Volume 3: Puerto Rico and the U.S. Virgin Islands, 2006, rev. 2008.
- (4) Volume 4: Hawaiian Islands, 2009, rev. 2011.
- (5) Volume 5: Selected Pacific Islands, 2009, ver. 2011.
- (6) Volume 6: California, 2011, rev. 2014.
- (7) Volume 7: Alaska, 2012.
- (8) Volume 8: Midwestern States (Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin), 2013.
- (9) Volume 9: Southeastern States (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi), 2013.
- (10) Volume 10: Northeastern States (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont), 2015, rev. 2018.
- (11) Volume 11: Texas, 2018.

D. United States Department of Commerce, NOAA-NWS. NOAA Atlas 2, “Precipitation-Frequency Atlas of the Western United States”, volumes 1 - XI, 1973.

[https://www.weather.gov/owp/hdsc\\_publications](https://www.weather.gov/owp/hdsc_publications)

- (1) Volume I: Montana, 1973.
- (2) Volume II: Wyoming, 1973.
- (3) Volume III: Colorado, 1973. (Superseded by NOAA Atlas 14, Volume 8.)
- (4) Volume IV: New Mexico, 1973. (Superseded by NOAA Atlas 14, Volume 1.)
- (5) Volume V: Idaho, 1973.
- (6) Volume VI: Utah, 1973. (Superseded by NOAA Atlas 14, Volume 1.)
- (7) Volume VII: Nevada, 1973. (Superseded by NOAA Atlas 14, Volume 1.)
- (8) Volume VIII: Arizona, 1973. (Superseded by NOAA Atlas 14, Volume 1.)
- (9) Volume IX: Washington, 1973.
- (10) Volume X: Oregon, 1973.
- (11) Volume XI: California, 1973. (Superseded by NOAA Atlas 14, Volume 6.)

E. United States Department of Commerce, Weather Bureau. Technical Paper No. 40, “Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years”. 1961, repaginated and reprinted 1963. (Superseded by NOAA Atlas 2 and NOAA Atlas 14.) [https://www.weather.gov/owp/hdsc\\_publications](https://www.weather.gov/owp/hdsc_publications)

### 650.0210 Acknowledgements

A. **Kenneth M. Kent** (retired) and **Wendell A. Styner** (retired) originally prepared Chapter 2, “Estimating Runoff”, which appeared in the Soil Conservation Service (SCS, now Natural Resources Conservation Service, NRCS) in the SCS “Engineering Field Manual”, in 1971.

B. **Donald E. Woodward** (retired) directed updates to Chapter 2 in 1989 and 1990 and retitled the chapter “Estimating Runoff and Peak Discharge”. SCS published the 1990 version as Chapter 2, 210-NEH-650, “Engineering Field Handbook”.

C. This edition incorporates the following revisions to the 1990 edition:

- (1) Updated Soil Conservation Service to the Natural Resources Conservation Service.
- (2) Retitled the chapter “Estimating Runoff Volume and Peak Discharge” and published it as Chapter 2 in 210-NEH-650, “Engineering Field Handbook”, 2<sup>nd</sup> edition.
- (3) Updated the chapter to the current required format for NRCS handbooks.
- (4) Added a brief discussion on estimating peak discharge using computer programs.
- (5) Added information on the use of updated precipitation-frequency data and rainfall distributions.
- (6) Added a discussion of dual classification of hydrologic soil groups.
- (7) Added a section on hydrographs, dimensionless unit hydrographs, and peak rate factors.

C. **Claudia Hoeft**, National Hydraulic Engineer, Conservation Engineering Division, NRCS, Washington, D.C. prepared the majority of the revisions with reviews and recommendations from **William Merkel** (retired), **Helen Fox Moody** (deceased), **Quan Quan**, Hydraulic Engineer, West National Technology Support Center, Beltsville, Maryland, and **Geoff Cerrelli** (retired).

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- (2) **Yasmin Bennett**, State Water Management Engineer, NRCS, Waterboro, South Carolina
- (3) **Ronald Gardner**, Civil Engineer, NRCS, Temple, Texas
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- (5) **David Lamm**, State Conservation Engineer, NRCS, Somerset, New Jersey
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### 650.0211 Exhibits

A, Runoff Curve Number Worksheet

B. Time of Concentration and Peak Discharge Worksheet

# Runoff Curve Number (CN)

Client: \_\_\_\_\_ By: \_\_\_\_\_ Date: \_\_\_\_\_

County: \_\_\_\_\_ State: \_\_\_\_\_ Checked: \_\_\_\_\_ Date: \_\_\_\_\_

Practice: \_\_\_\_\_

Soil name and hydrologic soil group	Cover description (cover type, treatment, and hydrologic condition)	CN (figure 2-7)	Area (acres or %)	Product of CN x Area
TOTALS:				

$$\text{CN (weighted)} = \frac{\text{Product of CN} \times \text{Area}}{\text{Total Area}} = \text{_____} =$$

USE CN =

# Time of Concentration and Peak Discharge

Client: \_\_\_\_\_ By: \_\_\_\_\_ Date: \_\_\_\_\_  
 County: \_\_\_\_\_ State: \_\_\_\_\_ Checked: \_\_\_\_\_ Date: \_\_\_\_\_  
 Practice: \_\_\_\_\_

## Estimating time of concentration:

1. Data:

Rainfall distribution type.....

*From NRCS standard distribution type (I, IA, II, or III) OR Updated NRCS rainfall distribution type (from State Supplement to 210-NEH-650-2)*

Drainage area.....A = \_\_\_\_\_ acres

Runoff curve number.....CN = \_\_\_\_\_

*From Runoff Curve Number worksheet.*

Watershed slope.....Y = \_\_\_\_\_ %

Flow length.....ℓ = \_\_\_\_\_ ft

2.  $T_c$  using ℓ, Y, CN, and figure 2-12..... $T_c$  = \_\_\_\_\_ hrs

OR using equation 2-5:

$$T_c = \frac{\ell^{0.8} \left( \frac{1,000}{CN} - 9 \right)^{0.7}}{1,140Y^{0.5}} = \frac{(\text{_____})^{0.8} \left( \frac{1,000}{\text{_____}} - 9 \right)^{0.7}}{1,140(\text{_____})^{0.5}} = \text{_____ hrs}$$

## Estimating peak discharge:

1. Frequency ..... yr
2. Rainfall, P (24-hour). .... in
3. Initial abstraction,  $I_a$  ..... in  
*(use CN with figure 2-13)*
4. Compute  $I_a/P$  ratio .....
5. Unit peak discharge,  $q_u^*$  ..... cfs/ac/in
6. Runoff, Q ..... in
7. Peak discharge,  $q_p$  ..... cfs  
*(where  $q_p = q_u A Q$ )*

Storm #1	Storm #2	Storm #3

*\*(use  $T_c$  and  $I_a/P$  with figures 2-14 through 2-17 OR with appropriate unit peak discharge figures for updated NRCS rainfall distributions from State Supplements to 210-NEH-650-2)*



Table 2-2a Runoff curve numbers for urban areas <sup>1/</sup>

Cover description	Average percent impervious area <sup>2/</sup>	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) <sup>3/</sup> :					
Poor condition (grass cover < 50%) .....		68	79	86	89
Fair condition (grass cover 50% to 75%) .....		49	69	79	84
Good condition (grass cover > 75%) .....		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way) .....		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way) .....		98	98	98	98
Paved; open ditches (including right-of-way) .....		83	89	92	93
Gravel (including right-of-way) .....		76	85	89	91
Dirt (including right-of-way) .....		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) <sup>4/</sup> .....		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) .....		96	96	96	96
Urban districts:					
Commercial and business .....	85	89	92	94	95
Industrial .....	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses) .....	65	77	85	90	92
1/4 acre .....	38	61	75	83	87
1/3 acre .....	30	57	72	81	86
1/2 acre .....	25	54	70	80	85
1 acre .....	20	51	68	79	84
2 acres .....	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas					
(pervious areas only, no vegetation) <sup>5/</sup> .....		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .<sup>2</sup> The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.<sup>3</sup> CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.<sup>4</sup> Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.<sup>5</sup> Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

**Table 2-2b** Runoff curve numbers for cultivated agricultural lands <sup>1/</sup>

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment <sup>2/</sup>	Hydrologic condition <sup>3/</sup>	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
C&T+ CR	Poor	65	73	79	81	
	Good	61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

<sup>1</sup> Average runoff condition, and  $I_a=0.2S$

<sup>2</sup> Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

<sup>3</sup> Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good  $\geq 20\%$ ), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands <sup>1/</sup>

Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. <sup>2/</sup>	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. <sup>3/</sup>	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 <sup>4/</sup>	48	65	73
Woods—grass combination (orchard or tree farm). <sup>5/</sup>	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. <sup>6/</sup>	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 <sup>4/</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .

<sup>2</sup> *Poor*: <50% ground cover or heavily grazed with no mulch.

*Fair*: 50 to 75% ground cover and not heavily grazed.

*Good*: > 75% ground cover and lightly or only occasionally grazed.

<sup>3</sup> *Poor*: <50% ground cover.

*Fair*: 50 to 75% ground cover.

*Good*: >75% ground cover.

<sup>4</sup> Actual curve number is less than 30; use CN = 30 for runoff computations.

<sup>5</sup> CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

<sup>6</sup> *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

*Fair*: Woods are grazed but not burned, and some forest litter covers the soil.

*Good*: Woods are protected from grazing, and litter and brush adequately cover the soil.

**Table 2-2d** Runoff curve numbers for arid and semiarid rangelands <sup>1/</sup>

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition <sup>2/</sup>	A <sup>3/</sup>	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

<sup>1</sup> Average runoff condition, and  $I_{ar} = 0.2S$ . For range in humid regions, use table 2-2c.

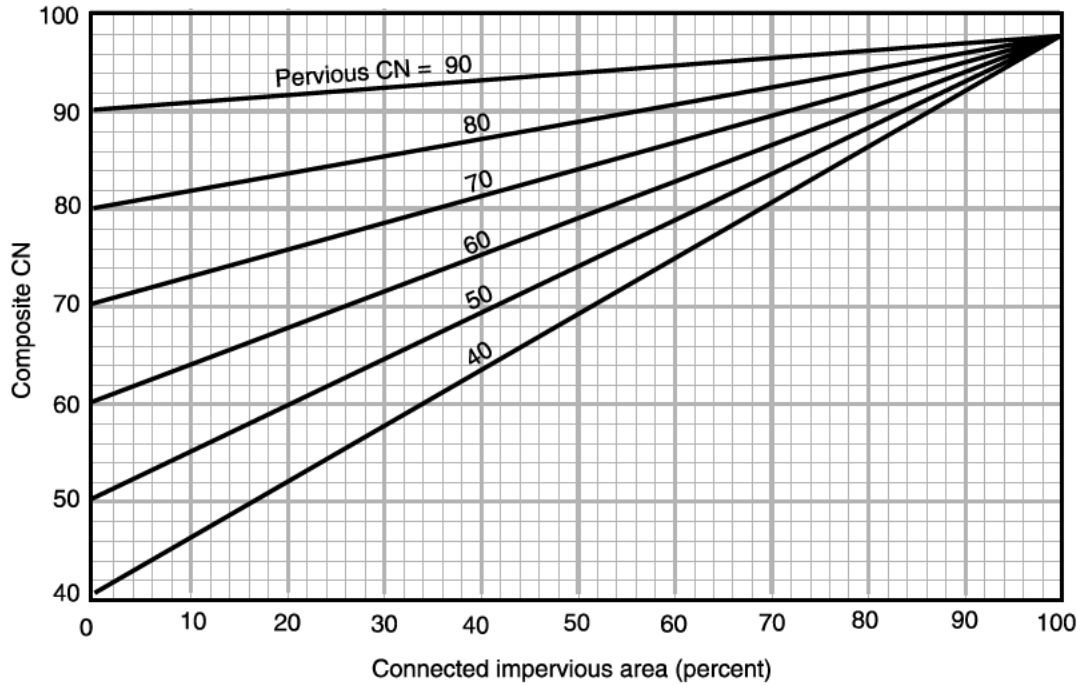
<sup>2</sup> Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

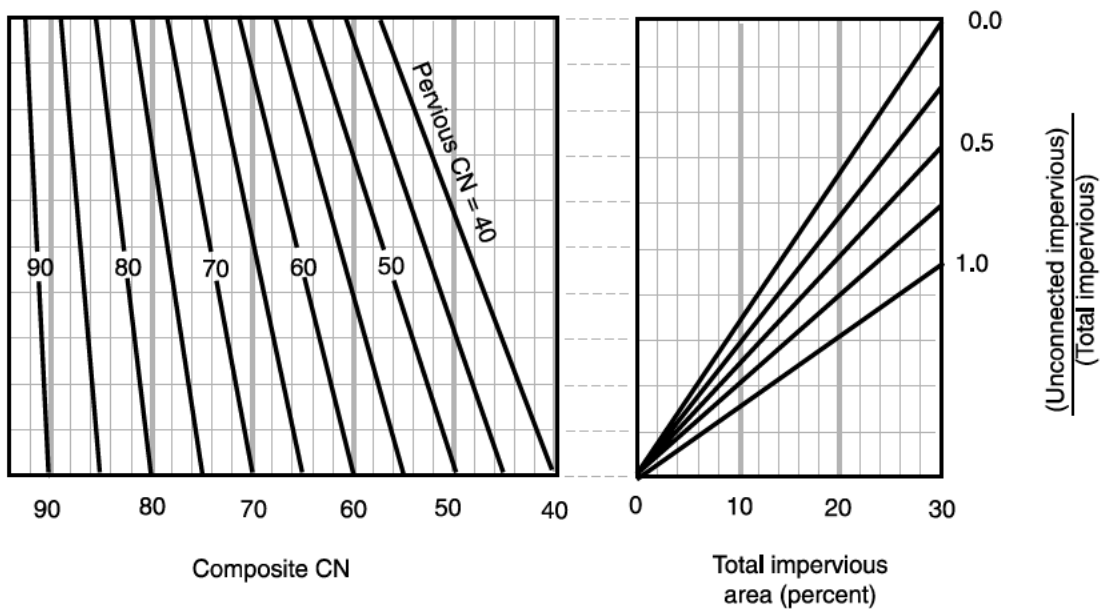
Good: > 70% ground cover.

<sup>3</sup> Curve numbers for group A have been developed only for desert shrub.

**Figure 2-3** Composite CN with connected impervious area.



**Figure 2-4** Composite CN with unconnected impervious areas and total impervious area less than 30%.



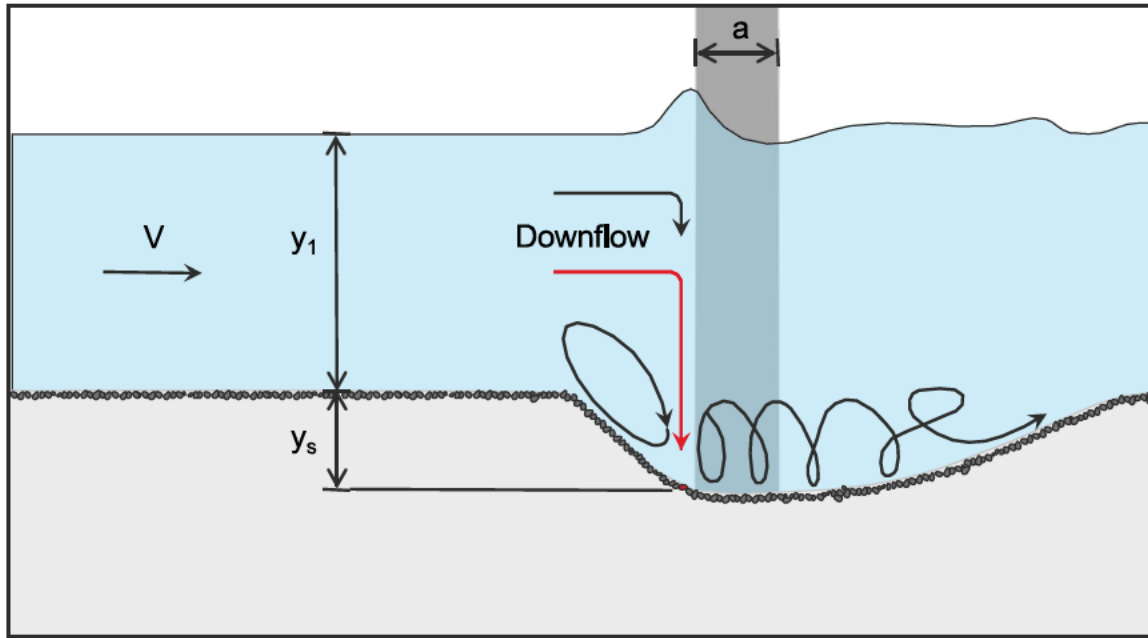


Figure 7.2. Definition sketch for pier scour.

The HEC-18 equation is:

$$\frac{y_s}{y_1} = 2.0 K_1 K_2 K_3 \left( \frac{a}{y_1} \right)^{0.65} Fr_1^{0.43} \quad (7.1)$$

As a Rule of Thumb, the maximum scour depth for round nose piers aligned with the flow is:

$$\begin{aligned} y_s &\leq 2.4 \text{ times the pier width (a) for } Fr \leq 0.8 \\ y_s &\leq 3.0 \text{ times the pier width (a) for } Fr > 0.8 \end{aligned} \quad (7.2)$$

In terms of  $y_s/a$ , Equation 7.1 is:

$$\frac{y_s}{a} = 2.0 K_1 K_2 K_3 \left( \frac{y_1}{a} \right)^{0.35} Fr_1^{0.43} \quad (7.3)$$

where:

- $y_s$  = Scour depth, ft (m)
- $y_1$  = Flow depth directly upstream of the pier, ft (m)
- $K_1$  = Correction factor for pier nose shape from Figure 7.3 and Table 7.1
- $K_2$  = Correction factor for angle of attack of flow from Table 7.2 or Equation 7.4
- $K_3$  = Correction factor for bed condition from Table 7.3
- $a$  = Pier width, ft (m)
- $L$  = Length of pier, ft (m)
- $Fr_1$  = Froude Number directly upstream of the pier =  $V_1/(gy_1)^{1/2}$
- $V_1$  = Mean velocity of flow directly upstream of the pier, ft/s (m/s)
- $g$  = Acceleration of gravity (32.2 ft/s<sup>2</sup>) (9.81 m/s<sup>2</sup>)

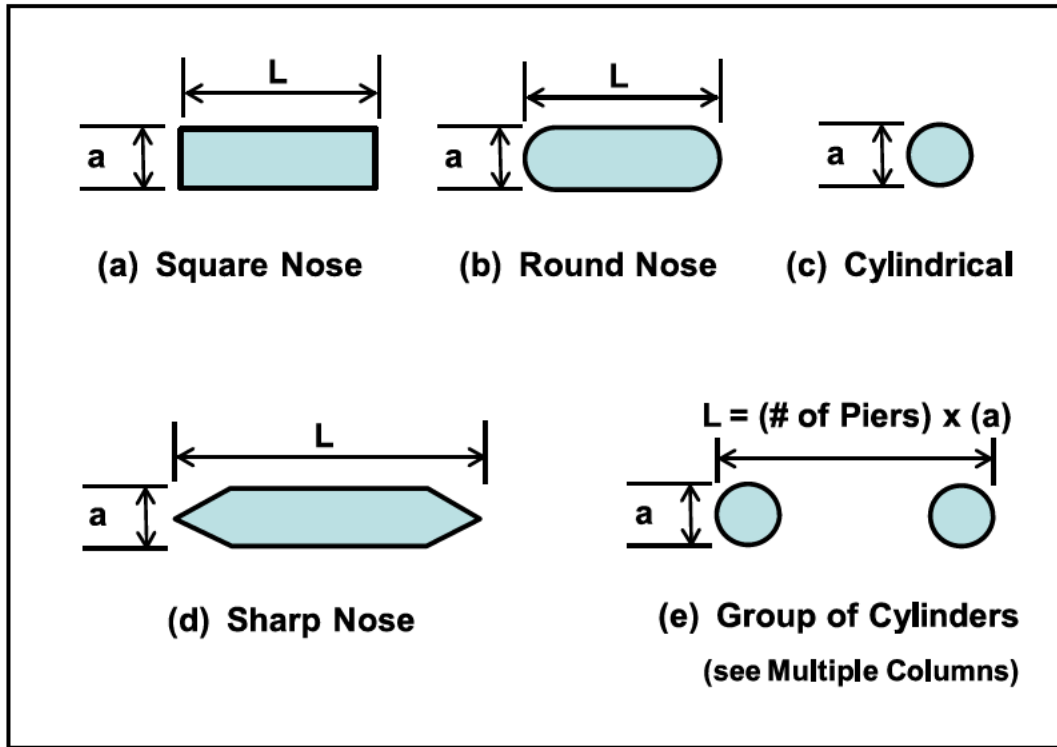


Figure 7.3. Common pier shapes.

The correction factor,  $K_2$ , for angle of attack of the flow,  $\theta$ , is calculated using the following equation:

$$K_2 = \left( \cos \theta + \frac{L}{a} \sin \theta \right)^{0.65} \quad (7.4)$$

If  $L/a$  is larger than 12, use  $L/a = 12$  as a maximum in Equation 7.4 and Table 7.2. Table 7.2 illustrates the magnitude of the effect of the angle of attack on local pier scour.

Shape of Pier Nose	$K_1$
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose	0.9

Angle	$L/a=4$	$L/a=8$	$L/a=12$
0	1.0	1.0	1.0
15	1.5	2.0	2.5
30	2.0	2.75	3.5
45	2.3	3.3	4.3
90	2.5	3.9	5.0

Angle = skew angle of flow  
L = length of pier

Table 7.3. Increase in Equilibrium Pier Scour Depths, $K_3$ , for Bed Condition.		
Bed Condition	Dune Height ft	$K_3$
Clear-Water Scour	N/A	1.1
Plane bed and Antidune flow	N/A	1.1
Small Dunes	$10 > H \geq 2$	1.1
Medium Dunes	$30 > H \geq 10$	1.2 to 1.1
Large Dunes	$H \geq 30$	1.3

**Notes:**

1. The correction factor  $K_1$  for pier nose shape should be determined using Table 7.1 for angles of attack up to 5 degrees. **For greater angles,  $K_2$  dominates and  $K_1$  should be considered as 1.0.** If  $L/a$  is larger than 12, use the values for  $L/a = 12$  as a maximum in Table 7.2 and Equation 7.4.
2. The values of the correction factor  $K_2$  should be applied only when the field conditions are such that the entire length of the pier is subjected to the angle of attack of the flow. Use of this factor will result in a significant over-prediction of scour if (1) a portion of the pier is shielded from the direct impingement of the flow by an abutment or another pier; or (2) an abutment or another pier redirects the flow in a direction parallel to the pier. For such cases, judgment must be exercised to reduce the value of the  $K_2$  factor by selecting the effective length of the pier actually subjected to the angle of attack of the flow. **Equation 7.4 should be used for evaluation and design.** Table 7.2 is intended to illustrate the importance of angle of attack in pier scour computations and to establish a cutoff point for  $K_2$  (i.e., a maximum value of 5.0).
3. The correction factor  $K_3$  results from the fact that for plane-bed conditions, which is typical of most bridge sites for the flood frequencies employed in scour design, the maximum scour may be 10 percent greater than computed with Equation 7.1. In the **unusual** situation where a dune bed configuration **with large dunes** exists at a site during flood flow, the maximum pier scour may be 30 percent greater than the predicted equation value. This may occur on very large rivers, such as the Mississippi. For smaller streams that have a dune bed configuration at flood flow, the dunes will be smaller and the maximum scour may be only 10 to 20 percent larger than equilibrium scour. For antidune bed configuration the maximum scour depth may be 10 percent greater than the computed equilibrium pier scour depth.
4. Piers set close to abutments (for example at the toe of a spill through abutment) must be carefully evaluated for the angle of attack and velocity of the flow coming around the abutment.



**Appendix K: Preliminary Decommissioning Plan**

A DECOMMISSIONING PLAN FOR

# Roadrunner Energy Farm Project

Morgan County, Colorado

APRIL 24, 2024

PREPARED FOR:



PREPARED BY:

**Westwood**

# Decommissioning Plan

Roadrunner Energy Farm Project

Morgan County, Colorado

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Project Number: 0046541.00

Date: April 24, 2024

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## Attachments

Attachment A: Decommissioning Cost Estimate

## 1.0 Introduction / Project Description

This Decommissioning Plan (Plan) has been prepared for the Roadrunner Energy Farm Project in accordance with Morgan County Resolution No. 2022 BCC 017. The purpose of the Plan is to describe the means and methods that can be used to remove all structures, foundations, underground cables, and equipment and to reclaim and restore the land altered during the construction and operation of the solar project to its predevelopment condition to the extent feasible.

The Roadrunner Energy Farm Project (Facility) is a 501-Megawatt (MW) alternating current (AC), 598-MW direct current (DC), solar power generation project and 2,000-MW hour battery energy storage systems (BESS) proposed by the Roadrunner Energy Farm, LLC (Applicant) in Morgan County, Colorado. Upon completion, the Facility will comprise a solar array consisting of ground-mounted photovoltaic panels and electrical support equipment, underground and overhead collection lines, a substation, switchyard, BESS facility, access roads, and fencing. The Facility is located on approximately 2,886 acres.

## 2.0 Proposed Future Land Use

Prior to the development of the Facility, the land use of the project area was primarily for livestock grazing. After all equipment and infrastructure is removed during decommissioning, any holes or voids created by poles, concrete pads, and other equipment will be filled in with native soil to the surrounding grade, and the site will be restored to pre-construction conditions to the extent practicable. All access roads and other areas compacted by equipment will be decompacted to a depth necessary to ensure drainage of the soil and root penetration prior to fine grading and revegetation to match preconstruction conditions. Please refer to Section 3.2 for a detailed description of reclamation activities.

## 3.0 Decommissioning Activities

Decommissioning of the Facility will include removing the solar panels, solar panel racking, steel foundation posts and beams, inverters, transformers, overhead and underground cables and lines, equipment pads and foundations, equipment cabinets, and ancillary equipment. The civil facilities, access road, security fence, and drainage structures and sedimentation basins are included in the scope. Standard decommissioning practices will be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements.

During decommissioning, the landowners will be consulted to identify the extent and type of work to be completed. Some Facility infrastructure, such as the access roads, may be left in place at the landowners' requests. Underground utility lines, if deeper than a depth agreed to in landowner agreements or 24 inches below ground surface elevation, may be left in place to minimize land disturbance and associated impacts to future land use.

Decommissioning will include the removal and transportation of all project components from the Facility site. All dismantling, removal, recycling, and disposal of materials generated during decommissioning will comply with rules, regulations, and prevailing Federal, State, and local

laws at the time decommissioning is initiated and will use approved local or regional disposal or recycling sites as available. Recyclable materials will be recycled to the furthest extent practicable. Non-recyclable materials will be disposed of in accordance with State and Federal law.

### **3.1 Decommissioning of Project Components**

#### **3.1.1 Modules**

Modules will be inspected for physical damage, tested for functionality, and disconnected and removed from racking. Functioning modules will be packed, palletized, and shipped to an offsite facility for reuse or resale. Non-functioning modules will be shipped to the manufacturer or a third party for recycling or disposal. The decommissioning estimate has been prepared to show the costs for the current year. At the end of life, the modules will have negligible resale value.

#### **3.1.2 Racking**

Racking and racking components will be disassembled and removed from the steel foundation posts, processed to appropriate size, and sent to a metal recycling facility.

#### **3.1.3 Steel Foundation Posts**

All structural foundation steel posts will be pulled out to full depth, removed, processed to appropriate size, and shipped to a recycling facility. The posts can be removed using back hoes or similar equipment. During decommissioning, the area around the foundation posts may be compacted by equipment and, if compacted, the area will be decompacting in a manner to adequately restore the topsoil and sub-grade material to a density consistent for vegetation.

#### **3.1.4 Overhead and Underground Cables and Lines**

All underground cables and conduits will be removed to a depth agreed to in landowner agreements or down 24 inches. As a result, the cost estimate assumes that underground cables installed below 24 inches will be abandoned in place and those running to surface equipment will be removed. Topsoil will be segregated and stockpiled for later use prior to any excavation and the subsurface soils will be staged next to the excavation. The subgrade will be compacted per standards. Topsoil will be redistributed across the disturbed area. Overhead lines, support poles, and attachments will be removed from the project and taken to a recycling facility.

#### **3.1.5 Inverters, Transformers, and Ancillary Equipment**

All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Applicant's sole discretion, consistent with applicable regulations and industry standards.

#### **3.1.6 Equipment Foundations and Ancillary Foundations**

The ancillary foundations are pile foundations for the equipment pads. As with the solar array steel foundation posts, the foundation piles will be pulled out completely. Duct banks will be excavated to full depth. All unexcavated areas compacted by equipment used in decommissioning will be decompacting in a manner to adequately restore the topsoil and sub-grade material to a density similar to the surrounding soils. All materials will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the owner's sole discretion, consistent with applicable regulations and industry standards.

### 3.1.7 Fence

All fence parts and foundations will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards. The surrounding areas will be restored to pre-solar farm conditions to the extent feasible.

### 3.1.8 Access Roads

Facility access roads will be used for decommissioning purposes, after which removal of roads will be discussed with the Landowner and one of the following options will be pursued:

1. After final clean-up, roads may be left intact through mutual agreement of the landowner and the owner unless otherwise restricted by federal, state, or local regulations.
2. If a road is to be removed, aggregate will be removed and shipped from the site to be reused, sold, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards. Clean aggregate can often be used as "daily cover" at landfills for no disposal cost. All internal service roads are constructed with geotextile fabric and eight inches of aggregate over compacted subgrade. Any ditch crossing connecting access roads to public roads will be removed unless the landowner requests it remains. The subgrade will be decompact in a manner to adequately restore the topsoil and sub-grade material to a density consistent for vegetation. Topsoil that was stockpiled during the original construction will be distributed across the open area. Finally, the access road corridors will be revegetated with an approved seed mix.

### 3.1.9 Substation

Decommissioning of the project substation will be performed with the rest of the Facility. All steel, conductors, switches, transformers, and other components of the substation will be disassembled and taken off site to be recycled or reused. Foundations and underground components will be removed to a depth of four feet. The rock base will be removed using bulldozers and backhoes or front loaders. The material will be hauled from the site using dump trucks to be recycled or disposed at an off-site facility. Additionally, any permanent stormwater treatment facilities (e.g., infiltration ponds and engineered drainage swales) will be removed. Topsoil will be reapplied to match surrounding grade to preserve existing drainage patterns. Topsoil and subsoil will be decompact in a manner to adequately restore the topsoil and sub-grade material to a density consistent for vegetation.

### 3.1.10 Batteries and Battery Containers

#### Regulatory Considerations Regarding the Batteries:

The Applicants cannot provide the regulatory requirements applicable to BESS decommissioning at the time of decommissioning (i.e., 30 years in the future). However, with respect to BESS decommissioning, the Project Owner will comply with the then current applicable rules and regulations.

Lithium-ion battery cells are typically constructed with non-hazardous materials such as cobalt, aluminum, nickel, copper and graphite. However, currently the United States Environmental Protection Agency ("EPA") has guidelines for responsible disposal and recycling of lithium-ion batteries that have reached end of life (Title 40 Code of Federal Regulations Part 273: Standards for Universal Waste Management) These Universal Waste Regulations ensure that, among other

requirements, the battery cells will not be disposed of in a municipal landfill.

As the “generator” of such Universal Waste, the Applicant will adhere to both applicable Universal Waste Regulations provided by the EPA as well as any applicable United States Department of Transportation requirements associated with shipping the battery modules to the recycling facility. The Applicant will engage a licensed battery recycling location to arrange for disposal of the batteries in accordance with applicable state and federal regulations.

#### Permits, Certifications, and Training Required for Personnel Involved in the Decommissioning:

The Applicants cannot provide the regulatory requirements applicable to BESS decommissioning at the time of decommissioning (i.e., 30 years in the future). However, prior to commencing decommissioning, the Applicant and/or or their designee/subcontractor will ensure that all personal on-site during the decommissioning process have received a site-specific safety briefing and are aware of all electrical shock and arc flash risks, particularly when working within the battery containers. Hazmat training will be conducted for all personnel handling lithium-ion batteries during the process, subject to their job function per Code of Federal Regulations (CFR) section 172.704 or then applicable regulation. Only qualified electricians will be utilized for the disconnection and removal of battery modules from individual battery racks. As a handler (and storage) of universal waste, Applicant and/or or their designee/subcontractor shall have an EPA Identification Number as required by 40 CFR 273.32 or then applicable regulation. Additionally, Lithium-ion batteries are classified by the US Department of Transportation (DOT) as Class 9 hazardous materials. All requirements related to the packaging, labelling and transportation contained in the Code of Federal Regulations, Title 49, Subchapter C, Parts 171-180, will be followed.

#### State of Charge at Decommissioning:

The battery facility will be fully discharged to the minimum state of charge required for removal and safe transportation as per battery manufacturer specifications. Such state of charge will be validated via remote telemetry from the facility battery management system (BMS). Following this validation, the DC disconnect switch for each battery container will be opened and locked out for the remainder of the decommissioning process to ensure no additional charging occurs. If the batteries will be reused, the Project will follow manufacturer’s instructions regarding depth of discharge to prevent cell damage.

#### Individual Battery Removal Process:

It is anticipated that battery modules will be removed from their racks, repackaged on site, and shipped in-tact to a regional recycling hub within 500 miles from the Facility site. No disassembly of battery modules will be required on-site, and the battery terminals will be protected to avoid any potential for a short to occur during packaging and shipping. Project Owner or their subcontractor shall also ensure 49 CFR section 173.185 addressing the transportation of lithium cells or batteries for disposal or recycling, or then applicable regulations, are adhered to, including applicable packaging requirements and hazard communication. In the event of any breakage or damage to individual battery modules, such modules will be placed in individual, non-metallic inner packaging that completely encloses the cell, and will utilize inner packaging that is surrounded by cushioning material that is non-combustible, electrically non-conductive and absorbent. Such inner packaging shall be placed in outer packaging that meet applicable requirements of CFR part 178, subparts L, M, P and Q, or



then applicable regulations, with proper marking denoting package contains damaged/defective lithium ion battery. In all cases, the Applicant, or their subcontractor as applicable, shall ensure all applicable OSHA, security, safety and health requirements are complied with during the removal and decommissioning.

BESS HVAC and fire suppression system equipment:

The refrigerant/coolant from HVAC units will be collected into separate containers on site as per the code and industry standard practice. The coolant can be reused after processing. The HVAC units will be sent to the metal recyclers along with other recycling material. Similarly, if installed, all fire suppression units will be cleared of the suppression fluids and sent to the suppliers for reuse following the industry standard practice.

Inverters, Transformers, and Ancillary Equipment:

All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Applicant's sole discretion, consistent with applicable regulations and industry standards.

### 3.2 Reclamation

The Applicant will restore and reclaim the site to the pre-solar farm condition consistent with the site lease agreement. The Applicant assumes that most of the site will be returned to farmland and/or pasture after decommissioning through implementation of appropriate measures to facilitate such uses. If no specific use is identified, the Applicant will vegetate the site with a seed mix approved by the local soil and water conservation district or similar agency. The goal of restoration will be to restore natural hydrology and plant communities to the greatest extent practicable while minimizing new disturbance and removal of native vegetation. In addition to the reclamation activities described above for each decommissioning activity, all unexcavated areas compacted by equipment and activity during the decommissioning will be decompacted to a depth of 18 inches, or to a different depth as needed, to ensure proper density of topsoil consistent and compatible with the surrounding area and associated land use. All materials and debris associated with the Facility decommissioning will be removed and properly recycled or disposed of at off-site facilities.

## 4.0 Best Management Practices (BMPs)

During decommissioning, erosion and sediment control BMPs will be implemented to minimize potential for erosion of site soils and sedimentation of surface waters and waters of the state. Because decommissioning will entail disturbance of more than one acre of soil, the Applicant will prepare a Stormwater Pollution Prevention Plan (SWPPP) and obtain coverage through the Colorado Department of Public Health & Environment (CDPHE) under the Colorado National Pollutant Discharge Elimination System (NPDES) permit prior to initiating soil disturbing activities. Potential BMPs to be implemented during decommissioning activities are described below and will be subject to refinement in the SWPPP. The decommissioning team will review the permitting requirements at the time of decommissioning and obtain any other necessary permits, which may include a US Army Corps of Engineers (USACE) Section 404 Permit to Discharge Dredged or Fill Material.

## 4.1 Erosion Control

All disturbed areas without permanent impermeable or gravel surfaces, or planned for use as crop land, will be vegetated for final stabilization. All slopes steeper than 4:1 should be protected with erosion control blankets. Restoration should include seed application prior to application of the blanket. All slopes 4:1 or flatter should be restored with seed and mulch, which will be disc anchored.

## 4.2 Sediment Control

Sediment controls, such as silt fence, fiber logs, dewatering practices, construction entrances, and sedimentation traps and/or basins will be implemented during construction to prevent the transport of sediment off-site during decommissioning activities. Street sweeping/scraping will also be implemented to mitigate potential tracking of sediment onto public roadways.

## 4.3 Controlling Stormwater Flowing onto and Through the Project

Given the low gradient of the slopes in the project area, controlling stormwater flow that enters the project area will likely require minimal effort during decommissioning activities. Only newly disturbed areas may require new, temporary stormwater control. If necessary, water may be diverted around the project site using diversion berms.

## 4.4 Permitting

All decommissioning and reclamation activities will comply with Federal and State permit requirements. In Colorado, decommissioning activities that will disturb more than one acre of soil will require submittal of a Notice of Intent for coverage under the CDPHE Construction Stormwater Discharge Permit. The permits will be applied for and received prior to decommissioning construction activities commencing. As part of the NOI requirements, a SWPPP will be developed prior to filing for construction stormwater permit coverage.

If necessary for decommissioning activities, wetlands and waters permits will be obtained from the USACE. A Spill Prevention, Control, and Countermeasure (SPCC) Plan for decommissioning will likely also be required for decommissioning work.

## 4.5 Health and Safety Standards

Work will be conducted in strict accordance with the Applicant's health and safety plan. The construction contractor hired to perform the decommissioning will also be required to prepare a site-specific health and safety plan. All site workers, including subcontractors, will be required to read, understand, and abide by the plans. A site safety office will be designated by the construction contractor to ensure compliance. This official will have stop-work authority over all activities on the site should unsafe conditions or lapses in the safety plan be observed.

# 5.0 Timeline and Contacts

Decommissioning will be initiated if the Facility ceases to perform its originally intended function for more than 12 consecutive months. It is anticipated that the decommissioning activities for the Facility can be completed within the 180-day period granted by Morgan County

Resolution No. 2022 BCC 017. The estimated costs for decommissioning are tied to assumptions about the amount of equipment mobilized, the crew sizes, weather and climate conditions, and the productivity of the equipment and crews.

At this time, the Facility contacts for the project are still being determined. This information will be provided in the table below as it becomes available.

<b>Role</b>	<b>Name</b>	<b>Company</b>	<b>Contact Information</b>
Project Developer Point of Contact			
Facility Operator Point of Contact			
Morgan County Point of Contact			
Landowner			
Landowner			
Landowner			
Landowner			
Landowner			
Landowner			
Landowner			
Landowner			
Landowner			

## 6.0 Decommissioning Costs

There are currently active markets for scrap steel, aluminum, and copper, used transformers and electrical equipment, and used solar panels. Scrap metal prices have been discounted from posted spot prices found on [www.scrapmonster.com](http://www.scrapmonster.com). Pricing for used panels has been discounted from the published price for used solar panels, as published in EnergyBin's "2023 Module Price Index."

The total estimated cost of decommissioning the Roadrunner Energy Farm Project is approximately \$40,037,358 (\$66,894 per MW). Estimated salvage/scrap value of the modules, racking, transformers, and other materials is approximately \$73,007,316. Because the estimated salvage value exceeds the estimated costs, the net decommissioning value is a surplus of \$32,970,000, or \$55,207 per MW.

The background of the page is a dark red topographic map with intricate contour lines. A dashed red line runs vertically down the center, ending in a solid red dot near the bottom.

# **Attachment A**

## **Decommissioning Cost Estimate**

## Roadrunner Solar Project

	Quantity	Unit	Unit Cost	Total Cost
<b>Mobilization/Demobilization</b>	1	Lump Sum	\$2,588,500.00	\$2,588,500
<i>Mobilization was estimated to be approximately 7% of total cost of other items.</i>				
<b>Permitting</b>				
County Permits	1	Lump Sum	\$10,000.00	\$10,000
State Permits	1	Lump Sum	\$20,000.00	\$20,000
<b>Subtotal Permitting</b>				<b>\$30,000</b>

*Decommissioning will require SWPPP and SPCC Plans. Cost is an estimate of the permit preparation cost.*

### Civil Infrastructure

Remove Gravel Surfacing from Road	39,633	Cubic Yards (BV)	\$2.70	\$107,009
Haul Gravel Removed from Road to Landfill (Fort Morgan, CO)	49,541	Cubic Yards (LV)	\$6.96	\$344,805
Dispose of Gravel Removed from Road (Landfill uses as Daily Cover)	64,205	Tons	\$0.00	\$0
Remove Geotextile Fabric from Beneath Access Roads	222,933	Square Yards	\$1.40	\$312,106
Haul Geotech Fabric to Landfill (Fort Morgan, CO)	61.0	Tons	\$7.89	\$481
Dispose of Geotech Fabric	61.0	Tons	\$81.00	\$4,941
Remove and Load Culvert from Beneath Access Roads	5	Each	\$420.00	\$2,100
Haul Culvert Removed from Access Roads to Landfill (Fort Morgan, CO)	1.5	Tons	\$7.89	\$12
Dispose of Culvert	1.5	Tons	\$81.00	\$122
Remove Low Water Crossing from Access Road	15	Each	\$3,400.00	\$51,000
Haul Low Water Crossing Materials to Landfill (Fort Morgan, CO)	600.0	Ton	\$7.89	\$4,732
Dispose of Low Water Crossing Materials	600.0	Ton	\$30.00	\$18,000
Grade Road Corridor (Re-spread Topsoil)	100,320	Linear Feet	\$1.52	\$152,486
Decompact Road Area	46.1	Acres	\$222.97	\$10,279
Remove Chainlink Fence (Substation, BESS, etc.)	5,561	Linear Feet	\$6.55	\$36,425
Haul Chainlink Fence to Metal Recycling (Atwood, CO)	30	Tons	\$9.86	\$296
Remove Agricultural Fence	84,480	Linear Feet	\$2.28	\$192,614
Haul Agricultural Fence to Metal Recycling (Atwood, CO)	131	Tons	\$9.86	\$1,291
<b>Subtotal Civil Infrastructure</b>				<b>\$1,238,700</b>

*Civil removal costs are a combination of MNDOT unit costs where applicable, RSMeans cost for Fort Morgan, CO, and industry standards provided to Westwood.*

### Structural Infrastructure

Remove Steel Foundation Posts (Arrays)	184,544	Each	\$16.60	\$3,063,430
Remove Drive Motor Posts	11,822	Each	\$16.60	\$196,245
Remove Steel Foundation Posts (Equipment Skids)	1,168	Each	\$16.60	\$19,389
Haul Steel Post to Metal Recycling (Atwood, CO)	14,138	Tons	\$9.23	\$130,494
Remove Tracker Racking per String	184,544	Each	\$32.98	\$6,086,261
Haul Tracker Racking to Metal Recycling (Atwood, CO)	34,929	Tons	\$9.23	\$322,395
Haul Drive Motor Posts to Metal Recycling (Atwood, CO)	851	Tons	\$9.23	\$7,855
<b>Subtotal Structural Infrastructure</b>				<b>\$9,826,069</b>

*Steel removal costs were calculated by using RSMeans information for demolition of steel members.*

*Hauling calculations are based on the locations of metals recyclers.*

### Electrical Collection System

Remove PV Panels	1,107,264	Each	\$6.54	\$7,241,507
Haul PV 95% of Panels to Reseller (Phoenix, AZ)	46,033	Tons	\$129.19	\$5,947,003
Haul 5% of PV Panels to Landfill (Fort Morgan, CO)	2,423	Tons	\$4.95	\$11,994
Dispose of PV Panels	2,423	Tons	\$81.00	\$196,263
Remove Combiner Boxes	146	Each	\$60.00	\$8,760
Remove Equipment Skids	146	Each	\$1,167.48	\$170,452
Remove Equipment Pad Frames and Foundations	146	Each	\$1,834.03	\$267,768
Haul Equipment to Transformer Disposal (Grand Junction, CO)	146	Each	\$1,640.92	\$239,574
Remove SCADA Equipment	1	Each	\$2,000.00	\$2,000
Remove DC Collector System Cables (copper)	597.92	Per MW	\$2,000.00	\$1,195,840
Remove Underground (AC) Collector System Stub-Ups	146	Locations	\$400.00	\$58,400
Load and Haul Cables for Recycling	65.0	Tons	\$9.23	\$600
<b>Subtotal Electrical Collection</b>				<b>\$15,341,472</b>

*Electrical removal costs of PV Panels and Combiner Boxes were based industry standard installation rates. Equipment pads, MV Equipment, and SCADA Equipment removal cost are based on removal of equipment, concrete pads, and conduits using a truck mounted crane and RSMeans information on crew production rates.*

**Transmission System**

Remove Overhead Cables	85,045	Feet	\$32.50	\$2,763,963
Loadout Overhead Cables	85.0	Tons	\$37.00	\$3,145
Haul Overhead Cables	85.0	Tons	\$9.23	\$785
Remove Insulators and Gangs	26	Each	\$534.31	\$13,632
Remove and Load Steel Transmission Poles	9	Each	\$1,731.39	\$14,725
Haul Steel Poles to Metal Recycling (Atwood, CO)	34	Tons	\$9.86	\$335
Remove and Load Concrete Piles	115	Cubic Yards	\$101.55	\$11,678
Haul Concrete Piles to Landfill (Laughlin, NV)	233	Tons	\$20.95	\$4,881
Dispose of Concrete Piles	233	Tons	\$20.00	\$4,660
Backfill Pile Locations	115	Cubic Yards	\$42.59	\$4,898
Haul Hardware, Bracing, and Attachments to Landfill (Fort Morgan, CO)	5	Cubic Yards	\$10.75	\$54
Dispose of Transmission Pole Components	9	Each	\$81.00	\$689
Topsoil and Revegetation at Removed Poles	9	Each	\$737.26	\$6,270

**Subtotal Transmission System****\$2,829,714****Substation & Switchyard**

Disassemble and Remove Main Power Transformer(s)	2	Each	\$4,500.00	\$9,000
Haul Transformer(s) Offsite	275	Tons	\$65.64	\$18,051
Haul Transformer Oil Offsite	25,660	Gallons	\$0.09	\$2,309
Dispose of Transformer (Including Oil) (Salvage Value)	2	Each	\$0.00	\$0
Excavate Around Transformer Foundation(s)	2	Each	\$1,734.17	\$3,468
Remove Complete Transformer Foundation(s)	167	Cubic Yards	\$101.55	\$16,959
Backfill Excavation Area from Transformer Foundation Removal	169	Cubic Yards	\$42.59	\$7,198
Haul Concrete (Foundations Transformer, Switch Gear, etc.)	339	Tons	\$20.95	\$7,102
Dispose of Concrete from Transformer Foundation	339	Tons	\$20.00	\$6,780
Demolish Substation Site Improvements (fences, etc)	1	LS	\$3,500.00	\$3,500
Demolish Control Building and Foundation	1	LS	\$12,000.00	\$12,000
Remove Medium/High Voltage Equipment	1	LS	\$3,500.00	\$3,500
Remove Structural Steel Substation Frame	1	LS	\$3,500.00	\$3,500
Remove Copper Ground Grid	1	LS	\$10,574.70	\$10,575
Load Copper Wire	20,000	Feet	\$0.53	\$10,600
Haul Copper Wire to Recycling	6.5	Tons	\$9.23	\$60
Haul - Demolition Materials, Removed Equipment & Structural Steel	20	Tons	\$9.23	\$185
Dispose of Demolition Materials & Removed Equipment	20	Tons	\$81.00	\$1,620
Remove and Load Gravel Surfacing from Substation/Switchyard Site	6,702	Cubic Yards (BV)	\$2.70	\$18,095
Haul Gravel Removed from Substation/Switchyard Site	8,378	Cubic Yards (LV)	\$10.75	\$90,102
Dispose of Gravel from Substation/Switchyard Site (Use as Daily Cover)	10,858	Tons	\$0.00	\$0
Grade Substation/Switchyard Site	176,245	SF	\$0.06	\$10,575
Erosion and Sediment Control at Substation/Switchyard Site	1,487	LF	\$4.02	\$5,978
Decompact Substation/Switchyard Site (Subsoiling)	6.2	Acres	\$222.97	\$1,382
Permanent Seeding at Substation/Switchyard Site	6.2	Acres	\$4,339.87	\$26,907

**Subtotal Substation****\$269,446****Battery Energy Storage System (BESS)**

Train Crew in Safety and Hazmat	1	LS	\$5,000.00	\$5,000
Disconnect Battery Storage Containers	524	Each	\$1,530.40	\$801,930
Remove Equipment Skids	131	Each	\$1,167.48	\$152,940
Haul Transformers to Transformer Disposal	131	Each	\$3,271.01	\$428,502
Remove Steel Foundation Posts (Storage Containers and Skids)	5,240	Each	\$16.60	\$86,984
Haul Steel Posts to Metal Recycler (Atwood, CO)	377	Tons	\$9.23	\$3,480
Removal of DC Collector System Cables (copper)	0	LF	\$1.86	\$0
Removal of Underground AC Collector Cables (aluminum)	131	Locations	\$400.00	\$52,400
Load and Haul Cables for Recycling	98	Tons	\$10.61	\$1,040
Remove and Load Gravel Surfacing from BESS Site (Including Roads)	9,845	Cubic Yard (BV)	\$2.70	\$26,582
Haul Gravel Removed from BESS Site	12,306	Cubic Yard (LV)	\$6.96	\$85,650
Dispose of Gravel from BESS Site (Use as Daily Cover)	15,949	Tons	\$0.00	\$0
Remove Fencing	2,588	LF	\$6.55	\$16,951
Haul Fencing to Recycling	14	Tons	\$9.86	\$138
Stabilized Construction Entrance	1	Each	\$2,000.00	\$2,000
Erosion and Sediment Controls at BESS Site	1,294	LF	\$4.02	\$5,202
Decompact BESS Site	9	Acres	\$222.97	\$2,007
Grade BESS Site	398,728	SF	\$0.06	\$23,924
Permanent Seeding at BESS Site	9	Acres	\$4,339.87	\$39,059

**Subtotal BESS****\$1,733,787**

**Site Restoration**

Stabilized Construction Entrance	4	Each	\$2,000.00	\$8,000
Perimeter Controls (Erosion and Sediment Control)	45,021	Linear Feet	\$4.02	\$180,984
Permanent Seeding on Roadway Areas	46.1	Acres	\$4,339.87	\$200,068
Permanent Seeding on Array Area	1,233	Acres	\$4,339.87	\$5,350,192
<b>Subtotal Site Restoration</b>				<b>\$5,739,244</b>

**Project Management**

Project Manager	39	Weeks	\$3,749.00	\$146,211
Superintendent	39	Weeks	\$3,525.00	\$137,475
Field Engineer	39	Weeks	\$3,269.00	\$127,491
Clerk	39	Weeks	\$750.00	\$29,250
<b>Subtotal Project Management</b>				<b>\$440,427</b>

*Standard industry weekly rates from RSMeans.*

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**Subtotal Demolition/Removals** **\$40,037,358**


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**Salvage**

Fencing (Wire/Agricultural)	131	Tons	\$248.34	\$32,533
Fencing (Chain Link)	44	Tons	\$248.34	\$10,927
Steel Posts	14,515	Tons	\$248.34	\$3,604,655
Module Racking	34,929	Tons	\$248.34	\$8,674,268
PV Modules	1,051,901	Each	\$56.70	\$59,642,775
Transformers and Inverters	1,965,972	Pounds	\$0.26	\$511,153
Substation Transformers (Core and Coils)	329,042	Pounds	\$0.26	\$85,551
Substation Transformers (Tanks and Fittings)	111	Tons	\$248.34	\$27,566
Transformers (Oil)	244,695	Gallons	\$0.70	\$171,287
Substation Ground Grid (Copper)	13,000	Pounds	\$2.65	\$34,450
DC Collection Line Stub-Ups (Copper)	103,443	Pounds	\$0.94	\$97,236
AC Collection Line Stub-Ups (Aluminum)	27,375	Pounds	\$0.72	\$19,710
Transmission Lines (Steel)	32	Tons	\$323.18	\$10,342
Transmission Lines (Aluminum)	106,140	Pounds	\$0.72	\$76,421
<b>Subtotal Salvage</b>				<b>\$73,007,316</b>

*Salvage values are a combination of the following factors; current market metal salvage prices, current secondary market for solar panel*

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**Total Demolition Minus Salvage** **(\$32,970,000)**


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**Notes:**

1. Prices used in analysis are estimated based on research of current average costs and salvage values.
2. Prices provided are estimates and may fluctuate over the life of the project.
3. Contractor means and methods may vary and price will be affected by these.

## Cost Estimate Assumptions

To develop a cost estimate for the decommissioning of the Roadrunner Energy Farm Project, Westwood engineers made the following assumptions and used the following pricing references. Costs were estimated based on current pricing, technology, and regulatory requirements. The assumptions are listed in order from top to bottom of the estimate spreadsheet. When publicly available bid prices or State Department of Transportation bid summaries were not available for particular work items, we developed time- and material-based estimates considering composition of work crews and equipment and material required. While materials may have a salvage value at the end of the project life, the construction activity costs and the hauling/freight costs are separated from the disposal costs or salvage value to make revisions to salvage values more transparent.

1. Project quantities are based on the preliminary layout, dated 2/1/2023. Project quantities not yet determined were extrapolated from projects of similar size.
2. A project of this size and complexity requires a full-time project manager with full-time support staff.
3. Common labor will be used for the majority of tasks, supplemented by electricians, steel workers, and equipment operators where labor rules may require. The labor rates reflect union labor rates.
4. Mobilization was estimated at approximately 7% of total cost of other items.
5. Permit applications will require the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasure (SPCC) Plan.
6. Road gravel removal was estimated on a time and material basis. Since the material will not remain on site, a hauling cost is added to the removal cost. Clean aggregate can typically be used as “daily cover” at landfills without incurring a disposal cost. The road gravel may also be used to fortify local driveways and roads, lowering hauling costs but incurring placing and compaction costs. The hauling costs to a landfill represents an upper limit to costs for disposal of the road gravel.
7. The selected disposal facility (Morgan County Landfill) is located in Fort Morgan, CO, State, approximately 14 miles from the project site. Hauling costs to the landfill are estimated to be \$7.89 per ton.
8. Erosion and sediment control along road reflects the cost of silt fence on the downgradient side of the proposed roads. As such, the length of controls has been estimated to be approximately 50% of the road length.
9. Topsoil is required to be stockpiled on site during construction, so no topsoil replacement is expected to replace the road aggregate. Subsoiling cost to decompact roadway areas is estimated as \$222.97 per acre, and tilling to an agriculture-ready condition is estimated as \$177.52 per acre.
10. The selected metal recycling facility (Atwood Auto & Metal) is located in Atwood, CO, approximately 28.1 miles from the project site. Hauling costs to the recycling facility are approximately \$0.33 per ton mile, or \$9.23 per ton.
11. Tracker foundation posts are lightweight “I” beam sections installed with a specialized piece of equipment and can be removed with a standard backhoe with an attachment for gripping the piles. We estimate crew productivity at 240 posts per day, resulting in a per post cost of approximately \$16.60. The posts weigh approximately 150 pounds each.
12. It is assumed that the racking structures weigh approximately 15 pounds per linear foot of array. Each solar panel has a width of 47.83 inches. The facility has 1,107,264 modules, 4,650,509 feet of array, weighing 34,879 tons. The arrays are made of steel pipes; a crew with hand tools can disassemble and cut the pieces to sizes for recycling at a rate of about 1800 pounds per person per hour, or about \$174.25 per ton.
13. The solar panels for this project measure approximately 3.99 feet by 7.55 feet and weigh 87.52 pounds. They can easily be disconnected, removed, and packed by a three-person crew at a rate we estimate at 18 panels per hour.
14. The equipment skids will consist of inverter(s), a transformer, and a panel on a metal frame approximately 19 feet long by 8 feet wide by 8 feet 6 inches tall. The skids weigh approximately 36,000 pounds and can be disconnected by a crew of electricians. They must be lifted by a mobile crane for transport to the recycler. They contain copper or aluminum windings.



15. The transformers contain copper windings that have significant salvage value. They are typically oil filled, but most transformer recyclers will accept the transformers with oil. The estimated costs include removal of metal frame and conduits feeding the equipment.
16. Medium voltage (MV) equipment and SCADA equipment are mounted on the same equipment skids as the inverters and transformers, and they are enclosed in weatherproof cabinets. Their size requires light equipment to remove them. The costs for the removal of the pile foundations are included in the "Remove Steel Foundation Posts" estimate.
17. The underground collector system cables are placed in trenches with a minimum of 18 inches of cover. Several cables/circuits are placed side by side in each trench. The conduits and cables can be removed by trenching.
18. Perimeter control pricing is based on silt fence installation around downgradient sides of the project perimeter.
19. The salvage value for steel uses pricing from the Midwest United States at \$365 per metric ton, or \$331.12 for U.S. ton. Posted prices are three months old. These prices are based on delivery to the recycling facility with the material prepared to meet size, thickness, cleanliness, and other specifications.
20. A reduction of 25% has been taken from all pricing obtained from [www.scrapmonster.com](http://www.scrapmonster.com) to reflect the processing by the contractor to meet the specifications.
21. The salvage value for steel uses pricing from the Midwest Region of United States at \$365 per metric ton, or \$331.12 for U.S. ton.
22. Solar module salvage values are shown in current values, assuming near-new conditions for the first few years of operations. Pricing for used panels has been discounted from the average price of used panels, as published in EnergyBin's 2023 "Module Price Index."
23. There is an active market for reselling and recycling electrical transformers and inverters with several national companies specializing in recycling. However, we have assumed that the electrical equipment will be obsolete at the time of decommissioning, so we have based the pricing on a percentage of the weight that reflects the copper windings that can be salvaged. Pricing was used for Copper Transformer Scrap for the Midwest United States, at \$0.35 per pound.
24. The collection lines are priced assuming copper conductor wire for the direct current circuits and aluminum wire for the alternating current circuits. The prices reflect a reduced yield of copper or aluminum resulting from the stripping of insulation and other materials from the wire prior to recycling. The estimate uses the Midwest Region prices of #2 insulated copper wire with a 50% recovery rate (\$1.25 /pound) and E.C. Aluminum Wire (\$0.96 /pound).
25. Care to prevent damage and breakage of equipment, PV modules, inverters, capacitors, and SCADA must be exercised, but removal assumes unskilled common labor under supervision.

**Appendix L: Title Insurance Commitments**



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

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

**NOTICE**

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

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

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


**COMMITMENT TO ISSUE POLICY**

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

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



  
Frederick H. Eppinger  
President and CEO

  
David Hisey  
Secretary

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File No.: NCT24431

010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



## COMMITMENT CONDITIONS

### 1. DEFINITIONS

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

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

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

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

### 4. COMPANY'S RIGHT TO AMEND

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

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010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



## 5. LIMITATIONS OF LIABILITY

- a. The Company's liability under Commitment Condition 4 is limited to the Proposed Insured's actual expense incurred in the interval between the Company's delivery to the Proposed Insured of the Commitment and the delivery of the amended Commitment, resulting from the Proposed Insured's good faith reliance to:
  - i. comply with the Schedule B, Part I - Requirements;
  - ii. eliminate, with the Company's written consent, any Schedule B, Part II - Exceptions; or
  - iii. acquire the Title or create the Mortgage covered by this Commitment.
- b. The Company is not liable under Commitment Condition 5.a. if the Proposed Insured requested the amendment or had Knowledge of the matter and did not notify the Company about it in writing.
- c. The Company is only liable under Commitment Condition 4 if the Proposed Insured would not have incurred the expense had the Commitment included the added matter when the Commitment was first delivered to the Proposed Insured.
- d. The Company's liability does not exceed the lesser of the Proposed Insured's actual expense incurred in good faith and described in Commitment Condition 5.a. or the Proposed Amount of Insurance.
- e. The Company is not liable for the content of the Transaction Identification Data, if any.
- f. The Company is not obligated to issue the Policy referred to in this Commitment unless all of the Schedule B, Part I - Requirements have been met to the satisfaction of the Company.
- g. The Company's liability is further limited by the terms and provisions of the Policy to be issued to the Proposed Insured.

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

- a. Only a Proposed Insured identified in Schedule A, and no other person, may make a claim under this Commitment.
- b. Any claim must be based in contract under the State law of the State where the Land is located and is restricted to the terms and provisions of this Commitment. Any litigation or other proceeding brought by the Proposed Insured against the Company must be filed only in a State or federal court having jurisdiction.
- c. This Commitment, as last revised, is the exclusive and entire agreement between the parties with respect to the subject matter of this Commitment and supersedes all prior commitment negotiations, representations, and proposals of any kind, whether written or oral, express or implied, relating to the subject matter of this Commitment.
- d. The deletion or modification of any Schedule B, Part II—Exception does not constitute an agreement or obligation to provide coverage beyond the terms and provisions of this Commitment or the Policy.
- e. Any amendment or endorsement to this Commitment must be in writing and authenticated by a person authorized by the Company.
- f. When the Policy is issued, all liability and obligation under this Commitment will end and the Company's only liability will be under the Policy.

## 7. IF THIS COMMITMENT IS ISSUED BY AN ISSUING AGENT

The issuing agent is the Company's agent only for the limited purpose of issuing title insurance commitments and policies. The issuing agent is not the Company's agent for closing, settlement, escrow, or any other purpose.

## 8. PRO-FORMA POLICY

The Company may provide, at the request of a Proposed Insured, a pro-forma policy illustrating the coverage that the Company may provide. A pro-forma policy neither reflects the status of Title at the time that the pro-forma policy is delivered to a Proposed Insured, nor is it a commitment to insure.

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010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



**9. CLAIMS PROCEDURES**

This Commitment incorporates by reference all Conditions for making a claim in the Policy to be issued to the Proposed Insured. Commitment Condition 9 does not modify the limitations of liability in Commitment Conditions 5 and 6.

**10. CLASS ACTION**

ALL CLAIMS AND DISPUTES ARISING OUT OF OR RELATING TO THIS COMMITMENT, INCLUDING ANY SERVICE OR OTHER MATTER IN CONNECTION WITH ISSUING THIS COMMITMENT, ANY BREACH OF A COMMITMENT PROVISION, OR ANY OTHER CLAIM OR DISPUTE ARISING OUT OF OR RELATING TO THE TRANSACTION GIVING RISE TO THIS COMMITMENT, MUST BE BROUGHT IN AN INDIVIDUAL CAPACITY. NO PARTY MAY SERVE AS PLAINTIFF, CLASS MEMBER, OR PARTICIPANT IN ANY CLASS OR REPRESENTATIVE PROCEEDING. ANY POLICY ISSUED PURSUANT TO THIS COMMITMENT WILL CONTAIN A CLASS ACTION CONDITION.

**11. ARBITRATION (INTENTIONALLY DELETED)**

**STEWART TITLE GUARANTY COMPANY**

All notices required to be given the Company and any statement in writing required to be furnished the Company shall be addressed to it at: Stewart Title Guaranty Company, P.O. Box 2029, Mail Code: Policies 187, Houston, TX 77036.

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010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



# ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021) SCHEDULE A

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

Transaction Identification Data, for which the Company assumes no liability as set forth in Commitment Condition 5.e.:

Issuing Agent: Northern Colorado Title Services Co., Inc.  
Issuing Office: 205 W. Kiowa Avenue, Fort Morgan, CO 80701  
Issuing Office's ALTA® Registry ID: 0044474  
Commitment No.: NCT24431  
Issuing Office File No.: NCT24431  
Property Address: VACANT, CO

1. Commitment Date: **January 22, 2024 at 08:00 AM**

2. Policy or Policies to be issued:	AMOUNT:	PREMIUM:
ALTA Owners Policy (07/01/21)	TBD	\$100.00

**Proposed Insured: TO BE DETERMINED**

Other Charges:

---

**TOTAL DUE: \$100.00**

**NOTE: A Minimum Fee of \$115.00 will be charged if file is cancelled.**

3. The estate or interest in the Land at the Commitment Date is:

**Fee Simple**

4. The Title is, at the Commitment Date, vested in:

**BONNIE FRAZIER**

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010-UN ALTA Commitment for Title Insurance Schedule A (07-01-2021)



# SCHEDULE A

(Continued)

5. The Land is described as follows:

**The NW1/4 of Section 19, Township 3 North, Range 55 West of the 6th P.M., Morgan County, Colorado.**

and commonly known as (for informational purposes only): **VACANT, CO**

Northern Colorado Title Services Co., Inc.



Linda L. Reding, Authorized Signatory

**stewart**  
title guaranty company



Frederick H. Eppinger  
President and CEO



Denise Carraux  
Secretary

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010-UN ALTA Commitment for Title Insurance Schedule A (07-01-2021)





# ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021) SCHEDULE B PART I

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

## Requirements

File No.: NCT24431

All of the following Requirements must be met:

1. The Proposed Insured must notify the Company in writing of the name of any party not referred to in this Commitment who will obtain an interest in the Land or who will make a loan on the Land. The Company may then make additional Requirements or Exceptions.
2. Pay the agreed amount for the estate or interest to be insured.
3. Pay the premiums, fees, and charges for the Policy to the Company.
4. Documents satisfactory to the Company that convey the Title or create the Mortgage to be insured, or both, must be properly authorized, executed, delivered, and recorded in the Public Records.
  - a. Proper Deed from BONNIE FRAZIER to TO BE DETERMINED, conveying the land described herein.
  - b. Dollar amount of Policy coverage must be provided to the Company.
  - c. The Company reserves the right to assert additional requirements or exceptions regarding the Grantee(s) when they are designated.

Valid as a Commitment for an ALTA Policy only if attached to a countersigned Commitment for Title Insurance, a Schedule A, a Schedule B - Section II and a Schedule C (if applicable) with matching Commitment Numbers.

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010-UN ALTA Commitment for Title Insurance Schedule BI (07-01-2021)



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

## SCHEDULE B PART II

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

### Exceptions

File No.: NCT24431

**Some historical land records contain Discriminatory Covenants that are illegal and unenforceable by law. This Commitment and the Policy treat any Discriminatory Covenant in a document referenced in Schedule B as if each Discriminatory Covenant is redacted, repudiated, removed, and not republished or recirculated. Only the remaining provisions of the document will be excepted from coverage.**

The Policy will not insure against loss or damage resulting from the terms and conditions of any lease or easement identified in Schedule A, and will include the following Exceptions unless cleared to the satisfaction of the Company:

1. Any defect, lien, encumbrance, adverse claim, or other matter that appears for the first time in the Public Records or is created, attaches, or is disclosed between the Commitment Date and the date on which all of the Schedule B, Part I - Requirements are met.
2. Any facts, rights, interests or claims which are not shown by the Public Records, but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easements, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. Any lien, or right to a lien, for services, labor or material theretofore or hereafter furnished, imposed by law and not shown in the Public Records.
6. Taxes or special assessments which are a lien or due and payable; or which are not shown as existing liens by the public records; and any tax, special assessments, or charges or liens imposed for water or sewer service, or any other special taxing district, and any unredeemed tax sales.
7. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water; (d) Minerals of whatsoever kind, subsurface and surface substances, in, on, under and that may be produced from the Land, together with all rights, privileges, and immunities relating thereto, whether or not the matters excepted under (a), (b), (c) or (d) are shown by the Public Records or listed in Schedule B.
8. Reservation as contained in United States Patent recorded AUGUST 29, 1908 in [Book 44 at page 203](#) as follows: Right of the proprietor of a vein or lode to extract and remove his ore therefrom, should the same be found to penetrate or intersect the premises and right of way for ditches or canals constructed by the authority of the United States.

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010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



## SCHEDULE B PART II

(Continued)

9. Reservation as contained in United States Patent recorded JANUARY 20, 1917 in [Book 122 at Page 54](#); recorded OCTOBER 10, 1972 in [Book 732 at page 228](#) as follows: Right of way for ditches or canals constructed by the authority of the United States.
10. Right of way for ROAD purposes as specified in ROAD PETITION recorded APRIL 27, 1887 in [Book 15 at Page 8](#), said road to be not less than 60 feet in width.
11. Right of way for ROAD purposes as specified in ROAD PETITION recorded MAY 6, 1885 in [Book 15 at Page 6](#), said road to be not less than 60 feet in width.
12. An undivided 1/2 interest in all oil, gas and other mineral rights, as reserved by CHARLES W. REICHARD aka C.W. REICHARD in the instrument to A.G. MOELLER and RACHEL MOELLER recorded NOVEMBER 3, 1938 in [Book 369 at Page 387](#), and any and all assignments thereof or interests therein.
13. Oil and Gas Lease between WAYNE E. COLBURN and MARTHA COLBURN and MORGAN OIL COMPANY, recorded DECEMBER 5, 1980 in [Book 809 at page 373](#), and any and all assignments thereof or interests therein. NOTE: The Company makes no representation as to the present ownership of any such interests. There may be leases, grants, exceptions or reservations of interests that are not listed.
14. Subject to a 30 foot easement along the North side of subject property as shown in Warranty Deed recorded December 4, 1986 in [Book 885 at page 858](#).
15. All interest in oil, gas and other mineral rights as reserved by WAYNE COLBURN and MARTHA COLBURN in DEED to BOB L. CARPENTER aka BOBBY L. CARPENTER and BONNIE M. FRAZIER recorded JANUARY 14, 2000 in [Book 1065 at Page 235](#), and any and all assignments thereof or interests therein.
16. Terms, conditions, provisions, agreements, burdens, obligations, easements and right of ways as contained in TRANSMISSION EASEMENT AGREEMENT between BOB L. CARPENTER and BONNIE M. CARPENTER, formerly known as BONNIE M. FRAZIER and INVENERGY WIND LLC recorded DECEMBER 5, 2006 at [Reception No. 839538](#).
17. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF LEASE between BONNIE M. CARPENTER and CODY W. FRAZIER and WINDY HILL GAS STORAGE, LLC recorded APRIL 14, 2015 at [Reception No. 892836](#).
18. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF SPECIAL MINERAL LEASE AND STORAGE AGREEMENT between WINDY HILL WATER OPERATIONS LLC and WILMA JUNE COVEY recorded DECEMBER 21, 2022 at [Reception No. 944233](#).
19. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF SPECIAL MINERAL LEASE AND STORAGE AGREEMENT between WINDY HILL WATER OPERATIONS LLC and MARTHA E. COLBURN recorded DECEMBER 21, 2022 at [Reception No. 944234](#).

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010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



## SCHEDULE B PART II

(Continued)

20. Terms, conditions, provisions, agreements, burdens and obligations as contained in NOTICE OF SOLAR ENERGY LEASE AND EASEMENT AGREEMENT between BONNIE FRAZIER and STORY SOLAR, LLC recorded DECEMBER 22, 2022 at [Reception No. 944251](#).
21. Terms, conditions, provisions, agreements, burdens and obligations as contained in ADDENDUM TO SOLAR LEASE AND EASEMENT AGREEMENT between STORY SOLAR, LLC and BONNIE FRAZIER recorded MAY 31, 2023 at [Reception No. 946544](#).
22. Terms, conditions, provisions, agreements, burdens and obligations as contained in SURFACE USE WAIVER between WINDY HILL WATER OPERATIONS LLC and ROADRUNNER ENERGY FARM, LLC recorded JANUARY 18, 2024 at [Reception No. 949612](#).
23. LEASEHOLD DEED OF TRUST, FINANCING STATEMENT, FIXTURE FILING, SECURITY AGREEMENT AND ASSIGNMENT OF LEASES AND RENTS from LOGAN WIND ENERGY, LLC to the Public Trustee of Morgan County for the use of U.S. BANK NATIONAL ASSOCIATION to secure \$540,000,000.00 recorded DECEMBER 22, 2023 at [Reception No. 949331](#).
24. Burdens, obligations, terms, conditions, stipulations and restrictions of any and all unrecorded LEASES AND TENANCIES.
25. Right of way and rights incidental thereto for County Roads 30 feet on either side of Section and Township lines as established by the Board of County Commissioners of Morgan County, Colorado, in instrument recorded May 6, 1907 in [Book 62 at page 109](#).
26. NOTE: The following notices pursuant to CRS 9-1.5 103 concerning underground facilities have been filed with the Clerk and Recorder. These statements are general and do not necessarily give notice of underground facilities within the subject property: (A) MOUNTAIN BELL TELEPHONE COMPANY RECORDED OCTOBER 2, 1981 IN [BOOK 821 AT PAGE 502](#); (B) PUBLIC SERVICE COMPANY OF COLORADO RECORDED OCTOBER 2, 1981 IN [BOOK 821 AT PAGE 514](#); AND (C) MORGAN COUNTY RURAL ELECTRIC ASSOCIATION RECORDED JANUARY 22, 1982 IN [BOOK 825 AT PAGE 656](#).

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

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File No.: NCT24431

010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



# STEWART TITLE GUARANTY COMPANY PRIVACY NOTICE

This Stewart Title Guaranty Company Privacy Notice ("Notice") explains how Stewart Title Guaranty Company and its subsidiary title insurance companies (collectively, "Stewart") collect, use, and protect personal information, when and to whom we disclose such information, and the choices you have about the use and disclosure of your information. Pursuant to Title V of the Gramm-Leach Bliley Act ("GLBA") and other Federal and state laws and regulations applicable to financial institutions, consumers have the right to limit some, but not all sharing of their personal information. Please read this Notice carefully to understand how Stewart uses your personal information.

The types of personal information Stewart collects, and shares depends on the product or service you have requested.

## **Stewart may collect the following categories of personal and financial information from you throughout your transaction:**

1. Identifiers: Real name, alias, online IP address if accessing company websites, email address, account name, unique online identifier, social security number, driver's license number, passport number, or other similar identifiers;
2. Demographic Information: Marital status, gender, date of birth.
3. Personal Information and Personal Financial Information: Name, signature, social security number, physical characteristics or description, address, telephone number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, credit reports, or any other information necessary to complete the transaction.

## **Stewart may collect personal information about you from:**

1. Publicly available information from government records.
2. Information we receive directly from you or your agent(s), such as your lender or real estate broker;
3. Information about your transactions with Stewart, our affiliates, or others; and
4. Information we receive from consumer reporting agencies and/or governmental entities, either directly from these entities or through others.

## **Stewart may use your personal information for the following purposes:**

1. To provide products and services to you or in connection with a transaction.
2. To improve our products and services.
3. To communicate with you about our, our affiliates', and others' products and services, jointly or independently.

## **Stewart may use or disclose the personal information we collect for one or more of the following purposes:**

- a. To fulfill or meet the reason for which the information is provided.
- b. To provide, support, personalize, and develop our website, products, and services.
- c. To create, maintain, customize, and secure your account with Stewart.
- d. To process your requests, purchases, transactions, and payments and prevent transactional fraud.
- e. To prevent and/or process claims.
- f. To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
- g. As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
- h. To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
- i. To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
- j. To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
- k. Auditing for compliance with federal and state laws, rules and regulations.
- l. Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments.
- m. To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal information or use the personal information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

## **Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties**

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a non-affiliated third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter in a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

- a. Non-affiliated service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
- b. To enable Stewart to prevent criminal activity, fraud, material misrepresentation, or nondisclosure.
- c. Stewart's affiliated and subsidiary companies.
- d. Non-affiliated third-party service providers with whom we perform joint marketing, pursuant to an agreement with them to jointly market financial products or services to you.
- e. Parties involved in litigation and attorneys, as required by law.
- f. Financial rating organizations, rating bureaus and trade associations.
- g. Federal and State Regulators, law enforcement and other government entities to law enforcement or authorities in connection with an investigation, or in response to a subpoena or court order.

The law does not require your prior authorization or consent and does not allow you to restrict the disclosures described above. Additionally, we may disclose your information to third parties for whom you have given us authorization or consent to make such disclosure. We do not otherwise share your Personal Information or Browsing Information with non-affiliated third parties, except as required or permitted by law.

### **Right to Limit Use of Your Personal Information**

You have the right to opt-out of sharing of your personal information among our affiliates to directly market to you. To opt-out of sharing to our affiliates for direct marketing, you may send an "opt out" request to [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com), or contact us through other available methods provided under "Contact Information" in this Notice. We do not share your Personal Information with nonaffiliates for their use to direct market to you without your consent.

### **How Stewart Protects Your Personal Information**

Stewart maintains physical, technical and administrative safeguards and policies to protect your personal information.

### **Contact Information**

If you have questions or comments about this Notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under law, please do not hesitate to contact us at:

**Phone:** Toll Free at 1-866-571-9270

**Email:** [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com)

**Postal Address:** Stewart Information Services Corporation  
Attn: Mary Thomas, Chief Compliance and Regulatory Officer  
1360 Post Oak Blvd., Ste. 100, MC #14-1  
Houston, TX 77056

### Privacy Notice at Collection for California Residents

Pursuant to the California Consumer Privacy Act of 2018 ("CCPA") and the California Privacy Rights Act of 2020, effective January 1, 2023 ("CPRA"), Stewart Information Services Corporation and its subsidiary companies (collectively, "Stewart") are providing this **Privacy Notice at Collection for California Residents** ("CCPA and CPRA Notice"). This CCPA and CPRA Notice supplements the information contained in Stewart's existing privacy notice and applies solely to all visitors, users, and consumers and others who reside in the State of California or are considered California Residents as defined in the CCPA and CPRA ("consumers" or "you"). All terms defined in the CCPA and CPRA have the same meaning when used in this Notice.

#### **Personal and Sensitive Personal Information Stewart Collects**

- Publicly available information from government records.
- Deidentified or aggregated consumer information.
- Certain personal information protected by other sector-specific federal or California laws, including but not limited to the Fair Credit Reporting Act (FCRA), Gramm Leach Bliley Act (GLBA) and California Financial Information Privacy Act (FIPA).

Specifically, Stewart has collected the following categories of **personal and sensitive personal information** from consumers within the last twelve (12) months:

<b>Category</b>	<b>Examples</b>	<b>Collected</b>
A. Identifiers	A real name, alias, postal address, unique personal identifier, online identifier, Internet Protocol address, email address, account name, Social Security number, driver's license number, passport number, or other similar identifiers.	YES
B. Personal information categories listed in the California Customer Records statute (Cal. Civ. Code § 1798.80(e)).	A name, signature, Social Security number, physical characteristics or description, address, telephone number, passport number, driver's license or state identification card number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, or any other financial information, medical information, or health insurance information. Some personal information included in this category may overlap with other categories.	YES
C. Protected classification characteristics under California or federal law.	Age (40 years or older), race, color, ancestry, national origin, citizenship, religion or creed, marital status, medical condition, physical or mental disability, sex (including gender, gender identity, gender expression, pregnancy or childbirth and related medical conditions), sexual orientation, veteran or military status, genetic information (including familial genetic information).	YES
D. Commercial information.	Records of personal property, products or services purchased, obtained, or considered, or other purchasing or consuming histories or tendencies.	YES
E. Biometric information.	Genetic, physiological, behavioral, and biological characteristics, or activity patterns used to extract a template or other identifier or identifying information, such as, fingerprints, faceprints, and voiceprints, iris or retina scans, keystroke, gait, or other physical patterns, and sleep, health, or exercise data.	YES
F. Internet or other similar network activity.	Browsing history, search history, information on a consumer's interaction with a website, application, or advertisement.	YES
G. Geolocation data.	Physical location or movements.	YES
H. Sensory data.	Audio, electronic, visual, thermal, olfactory, or similar information.	YES
I. Professional or employment related information.	Current or past job history or performance evaluations.	YES
J. Non-public education information (per the Family Educational Rights and Privacy Act(20 U.S.C. Section 1232g, 34 C.F.R. Part 99)).	Education records directly related to a student maintained by an educational institution or party acting on its behalf, such as grades, transcripts, class lists, student schedules, student identification codes, student financial information, or student disciplinary records.	YES
K. Inferences drawn from other personal information.	Profile reflecting a person's preferences, characteristics, psychological trends, predispositions, behavior, attitudes, intelligence, abilities, and aptitudes.	YES

Stewart obtains the categories of personal and sensitive information listed above from the following categories of sources:

- Directly and indirectly from customers, their designees, or their agents (For example, realtors, lenders, attorneys, brokers, etc.)
- Directly and indirectly from activity on Stewart's website or other applications.
- From third-parties that interact with Stewart in connection with the services we provide.

### **Use of Personal and Sensitive Personal Information**

Stewart may use or disclose the personal or sensitive information we collect for one or more of the following purposes:

- a. To fulfill or meet the reason for which the information is provided.
- b. To provide, support, personalize, and develop our website, products, and services.
- c. To create, maintain, customize, and secure your account with Stewart.
- d. To process your requests, purchases, transactions, and payments and prevent transactional fraud.
- e. To prevent and/or process claims.
- f. To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
- g. As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
- h. To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
- i. To personalize your website experience and to deliver content and product and service offerings relevant to your interests, including targeted offers and ads through our website, third-party sites, and via email or text message (with your consent, where required by law).
- j. To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
- k. To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
- l. Auditing for compliance with federal and state laws, rules and regulations.
- m. Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing advertising or marketing services or other similar services.
- n. To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal or sensitive information or use the personal or sensitive information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

### **Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties**

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter into a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

- a. Service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
- b. Affiliated Companies.
- c. Parties involved in litigation and attorneys, as required by law.
- d. Financial rating organizations, rating bureaus and trade associations.
- e. Federal and State Regulators, law enforcement and other government entities

In the preceding twelve (12) months, Stewart has disclosed the following categories of personal information for a business purpose:

- Category A: Identifiers
- Category B: California Customer Records personal information categories
- Category C: Protected classification characteristics under California or federal law
- Category D: Commercial Information
- Category E: Biometric Information
- Category F: Internet or other similar network activity
- Category G: Geolocation data
- Category H: Sensory data
- Category I: Professional or employment-related information
- Category J: Non-public education information
- Category K: Inferences

### **Your Consumer Rights and Choices Under CPPA and CPRA**



## **Your Rights Under CCPA**

The CCPA provides consumers (California residents as defined in the CCPA) with specific rights regarding their personal information. This section describes your CCPA rights and explains how to exercise those rights.

### **Access to Specific Information and Data Portability Rights**

You have the right to request that Stewart disclose certain information to you about our collection and use of your personal information over the past 12 months. Once we receive and confirm your verifiable consumer request, Stewart will disclose to you:

- The categories of personal information Stewart collected about you.
- The categories of sources for the personal information Stewart collected about you.
- Stewart's business or commercial purpose for collecting that personal information.
- The categories of third parties with whom Stewart shares that personal information.
- The specific pieces of personal information Stewart collected about you (also called a data portability request).
- If Stewart disclosed your personal data for a business purpose, a listing identifying the personal information categories that each category of recipient obtained.

### **Deletion Request Rights**

You have the right to request that Stewart delete any of your personal information we collected from you and retained, subject to certain exceptions. Once we receive and confirm your verifiable consumer request, Stewart will delete (and direct our service providers to delete) your personal information from our records, unless an exception applies.

Stewart may deny your deletion request if retaining the information is necessary for us or our service providers to:

1. Complete the transaction for which we collected the personal information, provide a good or service that you requested, take actions reasonably anticipated within the context of our ongoing business relationship with you, or otherwise perform our contract with you.
2. Detect security incidents, protect against malicious, deceptive, fraudulent, or illegal activity, or prosecute those responsible for such activities.
3. Debug products to identify and repair errors that impair existing intended functionality.
4. Exercise free speech, ensure the right of another consumer to exercise their free speech rights, or exercise another right provided for by law.
5. Comply with the California Electronic Communications Privacy Act (Cal. Penal Code § 1546 seq.).
6. Engage in public or peer-reviewed scientific, historical, or statistical research in the public interest that adheres to all other applicable ethics and privacy laws, when the information's deletion may likely render impossible or seriously impair the research's achievement, if you previously provided informed consent.
7. Enable solely internal uses that are reasonably aligned with consumer expectations based on your relationship with us.
8. Comply with a legal obligation.
9. Make other internal and lawful uses of that information that are compatible with the context in which you provided it.

## **Your Rights Under CPRA**

CPRA expands upon your consumer rights and protections offered by the CCPA. This section describes your CPRA rights and explains how to exercise those rights.

### **Opt-Out of Information Sharing and Selling**

Stewart does not share or sell information to third parties, as the terms are defined under the CCPA and CPRA. Stewart only shares your personal information as commercially necessary and in accordance with this CCPA and CPRA Notice.

### **Correction of Inaccurate Information**

You have the right to request that Stewart correct any inaccurate information maintained about.

### **Limit the Use of Sensitive Personal Information**

You have the right to limit how your sensitive personal information, as defined in the CCPA and CPRA is disclosed or shared with third parties.

### **Exercising Your Rights Under CCPA and CPRA**

To exercise the access, data portability, deletion, opt-out, correction, or limitation rights described above, please submit a verifiable consumer request to us by the available means provided below:

1. Calling us Toll Free at 1-866-571-9270; or
2. Emailing us at [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com); or
3. Visiting <http://stewart.com/ccpa>.

Only you, or someone legally authorized to act on your behalf, may make a verifiable consumer request related to your personal information. You may also make a verifiable consumer request on behalf of your minor child, if applicable.

To designate an authorized agent, please contact Stewart through one of the methods mentioned above.

You may only make a verifiable consumer request for access or data portability twice within a 12-month period. The verifiable consumer request must:

- Provide sufficient information that allows us to reasonably verify you are the person about whom we collected personal information or an authorized representative.
- Describe your request with sufficient detail that allows us to properly understand, evaluate, and respond to it.

Stewart cannot respond to your request or provide you with personal information if we cannot verify your identity or authority to make the request and confirm the personal information relates to you.

Making a verifiable consumer request does not require you to create an account with Stewart.

### **Response Timing and Format**

We endeavor to respond to a verifiable consumer request within forty-five (45) days of its receipt. If we require more time (up to an additional 45 days), we will inform you of the reason and extension period in writing.

A written response will be delivered by mail or electronically, at your option.

Any disclosures we provide will only cover the 12-month period preceding the verifiable consumer request's receipt. The response we provide will also explain the reasons we cannot comply with a request, if applicable. For data portability requests, we will select a format to provide your personal information that is readily useable and should allow you to transmit the information from one entity to another entity without hindrance.

Stewart does not charge a fee to process or respond to your verifiable consumer request unless it is excessive, repetitive, or manifestly unfounded. If we determine that the request warrants a fee, we will tell you why we made that decision and provide you with a cost estimate before completing your request.

### **Non-Discrimination**

Stewart will not discriminate against you for exercising any of your CCPA and CPRA rights. Unless permitted by the CCPA or CPRA, we will not:

- Deny you goods or services.
- Charge you a different prices or rates for goods or services, including through granting discounts or other benefits, or imposing penalties.
- Provide you a different level or quality of goods or services.
- Suggest that you may receive a different price or rate for goods or services or a different level or quality of goods or services.

### **Record Retention**

Your personal information will not be kept for longer than is necessary for the business purpose for which it is collected and processed. We will retain your personal information and records based on established record retention policies pursuant to California law and in compliance with all federal and state retention obligations. Additionally, we will retain your personal information to comply with applicable laws, regulations, and legal processes (such as responding to subpoenas or court orders), and to respond to legal claims, resolve disputes, and comply with legal or regulatory recordkeeping requirements

### **Changes to This CCPRA and CPRA Notice**

Stewart reserves the right to amend this CCPA and CPRA Notice at our discretion and at any time. When we make changes to this CCPA and CPRA Notice, we will post the updated Notice on Stewart's website and update the Notice's effective date.

### **Link to Privacy Notice**

Stewarts Privacy Notice can be found on our website at <https://www.stewart.com/en/privacy.html>.

## **Contact Information**

If you have questions or comments about this notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under California law, please do not hesitate to contact us at:

**Phone:** Toll Free at 1-866-571-9270

**Website:** <http://stewart.com/ccpa>

**Email:** [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com)

**Postal Address:** Stewart Information Services Corporation  
Attn: Mary Thomas, Chief Compliance and Regulatory Officer  
1360 Post Oak Blvd., Ste. 100, MC #14-1  
Houston, TX 77056



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

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

## NOTICE

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

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

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


## COMMITMENT TO ISSUE POLICY

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

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



  
Frederick H. Eppinger  
President and CEO

  
David Hisey  
Secretary

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

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



## COMMITMENT CONDITIONS

### 1. DEFINITIONS

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

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

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

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

### 4. COMPANY'S RIGHT TO AMEND

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

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

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



## 5. LIMITATIONS OF LIABILITY

- a. The Company's liability under Commitment Condition 4 is limited to the Proposed Insured's actual expense incurred in the interval between the Company's delivery to the Proposed Insured of the Commitment and the delivery of the amended Commitment, resulting from the Proposed Insured's good faith reliance to:
  - i. comply with the Schedule B, Part I - Requirements;
  - ii. eliminate, with the Company's written consent, any Schedule B, Part II - Exceptions; or
  - iii. acquire the Title or create the Mortgage covered by this Commitment.
- b. The Company is not liable under Commitment Condition 5.a. if the Proposed Insured requested the amendment or had Knowledge of the matter and did not notify the Company about it in writing.
- c. The Company is only liable under Commitment Condition 4 if the Proposed Insured would not have incurred the expense had the Commitment included the added matter when the Commitment was first delivered to the Proposed Insured.
- d. The Company's liability does not exceed the lesser of the Proposed Insured's actual expense incurred in good faith and described in Commitment Condition 5.a. or the Proposed Amount of Insurance.
- e. The Company is not liable for the content of the Transaction Identification Data, if any.
- f. The Company is not obligated to issue the Policy referred to in this Commitment unless all of the Schedule B, Part I - Requirements have been met to the satisfaction of the Company.
- g. The Company's liability is further limited by the terms and provisions of the Policy to be issued to the Proposed Insured.

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

- a. Only a Proposed Insured identified in Schedule A, and no other person, may make a claim under this Commitment.
- b. Any claim must be based in contract under the State law of the State where the Land is located and is restricted to the terms and provisions of this Commitment. Any litigation or other proceeding brought by the Proposed Insured against the Company must be filed only in a State or federal court having jurisdiction.
- c. This Commitment, as last revised, is the exclusive and entire agreement between the parties with respect to the subject matter of this Commitment and supersedes all prior commitment negotiations, representations, and proposals of any kind, whether written or oral, express or implied, relating to the subject matter of this Commitment.
- d. The deletion or modification of any Schedule B, Part II—Exception does not constitute an agreement or obligation to provide coverage beyond the terms and provisions of this Commitment or the Policy.
- e. Any amendment or endorsement to this Commitment must be in writing and authenticated by a person authorized by the Company.
- f. When the Policy is issued, all liability and obligation under this Commitment will end and the Company's only liability will be under the Policy.

## 7. IF THIS COMMITMENT IS ISSUED BY AN ISSUING AGENT

The issuing agent is the Company's agent only for the limited purpose of issuing title insurance commitments and policies. The issuing agent is not the Company's agent for closing, settlement, escrow, or any other purpose.

## 8. PRO-FORMA POLICY

The Company may provide, at the request of a Proposed Insured, a pro-forma policy illustrating the coverage that the Company may provide. A pro-forma policy neither reflects the status of Title at the time that the pro-forma policy is delivered to a Proposed Insured, nor is it a commitment to insure.

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



**9. CLAIMS PROCEDURES**

This Commitment incorporates by reference all Conditions for making a claim in the Policy to be issued to the Proposed Insured. Commitment Condition 9 does not modify the limitations of liability in Commitment Conditions 5 and 6.

**10. CLASS ACTION**

ALL CLAIMS AND DISPUTES ARISING OUT OF OR RELATING TO THIS COMMITMENT, INCLUDING ANY SERVICE OR OTHER MATTER IN CONNECTION WITH ISSUING THIS COMMITMENT, ANY BREACH OF A COMMITMENT PROVISION, OR ANY OTHER CLAIM OR DISPUTE ARISING OUT OF OR RELATING TO THE TRANSACTION GIVING RISE TO THIS COMMITMENT, MUST BE BROUGHT IN AN INDIVIDUAL CAPACITY. NO PARTY MAY SERVE AS PLAINTIFF, CLASS MEMBER, OR PARTICIPANT IN ANY CLASS OR REPRESENTATIVE PROCEEDING. ANY POLICY ISSUED PURSUANT TO THIS COMMITMENT WILL CONTAIN A CLASS ACTION CONDITION.

**11. ARBITRATION (INTENTIONALLY DELETED)**

**STEWART TITLE GUARANTY COMPANY**

All notices required to be given the Company and any statement in writing required to be furnished the Company shall be addressed to it at: Stewart Title Guaranty Company, P.O. Box 2029, Mail Code: Policies 187, Houston, TX 77036.

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Without Arbitration (07-01-2021)



**ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021)  
SCHEDULE A**

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

**Transaction Identification Data, for which the Company assumes no liability as set forth in Commitment Condition 5.e.:**

**Issuing Agent:** Northern Colorado Title Services Co., Inc.  
**Issuing Office:** 205 W. Kiowa Avenue, Fort Morgan, CO 80701  
**Issuing Office's ALTA® Registry ID:** 0044474  
**Commitment No.:** NCT24432  
**Issuing Office File No.:** NCT24432  
**Property Address:** VACANT, CO

1. Commitment Date: **January 22, 2024 at 08:00 AM**

2. Policy or Policies to be issued:	AMOUNT:	PREMIUM:
ALTA Owners Policy (07/01/21)	TBD	\$100.00

**Proposed Insured: TO BE DETERMINED**

Other Charges:

---

**TOTAL DUE: \$100.00**

**NOTE: A Minimum Fee of \$115.00 will be charged if file is cancelled.**

3. The estate or interest in the Land at the Commitment Date is:

**Fee Simple**

4. The Title is, at the Commitment Date, vested in:

**BONNIE FRAZIER**

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Schedule A (07-01-2021)





# SCHEDULE A

(Continued)

5. The Land is described as follows:

**The SE1/4 of Section 19, Township 3 North, Range 55 West of the 6th P.M., Morgan County, Colorado.**

and commonly known as (for informational purposes only): **VACANT, CO**

**stewart**  
title guaranty company

Northern Colorado Title Services Co., Inc.



Linda L. Reding, Authorized Signatory



Frederick H. Eppinger  
President and CEO



Denise Carraux  
Secretary

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Schedule A (07-01-2021)



# ALTA COMMITMENT FOR TITLE INSURANCE (07-01-2021) SCHEDULE B PART I

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

## Requirements

File No.: NCT24432

All of the following Requirements must be met:

1. The Proposed Insured must notify the Company in writing of the name of any party not referred to in this Commitment who will obtain an interest in the Land or who will make a loan on the Land. The Company may then make additional Requirements or Exceptions.
2. Pay the agreed amount for the estate or interest to be insured.
3. Pay the premiums, fees, and charges for the Policy to the Company.
4. Documents satisfactory to the Company that convey the Title or create the Mortgage to be insured, or both, must be properly authorized, executed, delivered, and recorded in the Public Records.
  - a. Proper Deed from BONNIE FRAZIER to TO BE DETERMINED, conveying the land described herein.
  - b. Dollar amount of Policy coverage must be provided to the Company.
  - c. The Company reserves the right to assert additional requirements or exceptions regarding the Grantee(s) when they are designated.

Valid as a Commitment for an ALTA Policy only if attached to a countersigned Commitment for Title Insurance, a Schedule A, a Schedule B - Section II and a Schedule C (if applicable) with matching Commitment Numbers.

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Schedule BI (07-01-2021)



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

## SCHEDULE B PART II

ISSUED BY  
STEWART TITLE GUARANTY COMPANY

### Exceptions

File No.: NCT24432

**Some historical land records contain Discriminatory Covenants that are illegal and unenforceable by law. This Commitment and the Policy treat any Discriminatory Covenant in a document referenced in Schedule B as if each Discriminatory Covenant is redacted, repudiated, removed, and not republished or recirculated. Only the remaining provisions of the document will be excepted from coverage.**

The Policy will not insure against loss or damage resulting from the terms and conditions of any lease or easement identified in Schedule A, and will include the following Exceptions unless cleared to the satisfaction of the Company:

1. Any defect, lien, encumbrance, adverse claim, or other matter that appears for the first time in the Public Records or is created, attaches, or is disclosed between the Commitment Date and the date on which all of the Schedule B, Part I - Requirements are met.
2. Any facts, rights, interests or claims which are not shown by the Public Records, but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easements, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. Any lien, or right to a lien, for services, labor or material theretofore or hereafter furnished, imposed by law and not shown in the Public Records.
6. Taxes or special assessments which are a lien or due and payable; or which are not shown as existing liens by the public records; and any tax, special assessments, or charges or liens imposed for water or sewer service, or any other special taxing district, and any unredeemed tax sales.
7. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water; (d) Minerals of whatsoever kind, subsurface and surface substances, in, on, under and that may be produced from the Land, together with all rights, privileges, and immunities relating thereto, whether or not the matters excepted under (a), (b), (c) or (d) are shown by the Public Records or listed in Schedule B.
8. Reservation as contained in United States Patent recorded AUGUST 2, 1920 in [Book 155 at Page 248](#) as follows: Right of way for ditches or canals constructed by the authority of the United States.

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File No.: NCT24432

010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



## SCHEDULE B PART II

(Continued)

9. An undivided 1/2 interest in all oil, gas and other mineral rights, as reserved by S.A. KREHMEYER and ILMA M. KREHMEYER in the instrument to COLONEL E. GORDON and GUIDOTTA J. GORDON recorded APRIL 16, 1946 in [Book 428 at Page 369](#), and any and all assignments thereof or interests therein.
10. An undivided 1/2 interest in all oil, gas and other mineral rights, as reserved by COLONEL E. GORDON and GUIDOTTA J. GORDON in the instrument to V.J. CHVATAL and LYDIA CHVATAL recorded NOVEMBER 24, 1951 in Book [498 at Page 325](#), and any and all assignments thereof or interests therein.
11. An undivided 1/2 interest in all oil, gas and other mineral rights, as reserved by V.J. CHVATAL and LYDIA CHVATAL in the instrument to ROY C. BAUGHMAN and KATHRYN A. BAUGHMAN recorded FEBRUARY 15, 1989 in [Book 910 at Page 75](#), and any and all assignments thereof or interests therein.
12. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF LEASE between BONNIE M. CARPENTER and CODY W. FRAZIER and WINDY HILL GAS STORAGE, LLC recorded APRIL 14, 2015 at [Reception No. 892836](#).
13. Terms, conditions, provisions, agreements, burdens and obligations as contained in MEMORANDUM OF SPECIAL MINERAL LEASE AND STORAGE AGREEMENT between WINDY HILL WATER OPERATIONS LLC and MYRNA RUTH JACOBS recorded DECEMBER 21, 2022 at [Reception No. 944235](#).
14. Terms, conditions, provisions, agreements, burdens and obligations as contained in ADDENDUM TO SOLAR LEASE AND EASEMENT AGREEMENT between STORY SOLAR, LLC and BONNIE FRAZIER recorded MAY 31, 2023 at [Reception No. 946544](#).
15. Terms, conditions, provisions, agreements, burdens and obligations as contained in SURFACE USE WAIVER between WINDY HILL WATER OPERATIONS LLC and ROADRUNNER ENERGY FARM, LLC recorded JANUARY 18, 2024 at [Reception No. 949612](#).
16. Burdens, obligations, terms, conditions, stipulations and restrictions of any and all unrecorded LEASES AND TENANCIES.
17. Right of way and rights incidental thereto for County Roads 30 feet on either side of Section and Township lines as established by the Board of County Commissioners of Morgan County, Colorado, in instrument recorded May 6, 1907 in [Book 62 at page 109](#).
18. Lack of a right of access from the land to any open public road, street or highway - This exception is necessary because it does not appear from the instruments in the office of the Clerk and Recorder of the county in which the subject property is situated, that any right of access to an open public roadway.

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010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



## SCHEDULE B PART II

(Continued)

19. NOTE: The following notices pursuant to CRS 9-1.5 103 concerning underground facilities have been filed with the Clerk and Recorder. These statements are general and do not necessarily give notice of underground facilities within the subject property: (A) MOUNTAIN BELL TELEPHONE COMPANY RECORDED OCTOBER 2, 1981 IN [BOOK 821 AT PAGE 502](#); (B) PUBLIC SERVICE COMPANY OF COLORADO RECORDED OCTOBER 2, 1981 IN [BOOK 821 AT PAGE 514](#); AND (C) MORGAN COUNTY RURAL ELECTRIC ASSOCIATION RECORDED JANUARY 22, 1982 IN [BOOK 825 AT PAGE 656](#).

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010-UN ALTA Commitment for Title Insurance Schedule BII (07-01-2021)



# STEWART TITLE GUARANTY COMPANY PRIVACY NOTICE

This Stewart Title Guaranty Company Privacy Notice ("Notice") explains how Stewart Title Guaranty Company and its subsidiary title insurance companies (collectively, "Stewart") collect, use, and protect personal information, when and to whom we disclose such information, and the choices you have about the use and disclosure of your information. Pursuant to Title V of the Gramm-Leach Bliley Act ("GLBA") and other Federal and state laws and regulations applicable to financial institutions, consumers have the right to limit some, but not all sharing of their personal information. Please read this Notice carefully to understand how Stewart uses your personal information.

The types of personal information Stewart collects, and shares depends on the product or service you have requested.

## **Stewart may collect the following categories of personal and financial information from you throughout your transaction:**

1. Identifiers: Real name, alias, online IP address if accessing company websites, email address, account name, unique online identifier, social security number, driver's license number, passport number, or other similar identifiers;
2. Demographic Information: Marital status, gender, date of birth.
3. Personal Information and Personal Financial Information: Name, signature, social security number, physical characteristics or description, address, telephone number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, credit reports, or any other information necessary to complete the transaction.

## **Stewart may collect personal information about you from:**

1. Publicly available information from government records.
2. Information we receive directly from you or your agent(s), such as your lender or real estate broker;
3. Information about your transactions with Stewart, our affiliates, or others; and
4. Information we receive from consumer reporting agencies and/or governmental entities, either directly from these entities or through others.

## **Stewart may use your personal information for the following purposes:**

1. To provide products and services to you or in connection with a transaction.
2. To improve our products and services.
3. To communicate with you about our, our affiliates', and others' products and services, jointly or independently.

## **Stewart may use or disclose the personal information we collect for one or more of the following purposes:**

- a. To fulfill or meet the reason for which the information is provided.
- b. To provide, support, personalize, and develop our website, products, and services.
- c. To create, maintain, customize, and secure your account with Stewart.
- d. To process your requests, purchases, transactions, and payments and prevent transactional fraud.
- e. To prevent and/or process claims.
- f. To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
- g. As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
- h. To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
- i. To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
- j. To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
- k. Auditing for compliance with federal and state laws, rules and regulations.
- l. Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments.
- m. To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal information or use the personal information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

## **Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties**

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a non-affiliated third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter in a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

- a. Non-affiliated service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
- b. To enable Stewart to prevent criminal activity, fraud, material misrepresentation, or nondisclosure.
- c. Stewart's affiliated and subsidiary companies.
- d. Non-affiliated third-party service providers with whom we perform joint marketing, pursuant to an agreement with them to jointly market financial products or services to you.
- e. Parties involved in litigation and attorneys, as required by law.
- f. Financial rating organizations, rating bureaus and trade associations.
- g. Federal and State Regulators, law enforcement and other government entities to law enforcement or authorities in connection with an investigation, or in response to a subpoena or court order.

The law does not require your prior authorization or consent and does not allow you to restrict the disclosures described above. Additionally, we may disclose your information to third parties for whom you have given us authorization or consent to make such disclosure. We do not otherwise share your Personal Information or Browsing Information with non-affiliated third parties, except as required or permitted by law.

### **Right to Limit Use of Your Personal Information**

You have the right to opt-out of sharing of your personal information among our affiliates to directly market to you. To opt-out of sharing to our affiliates for direct marketing, you may send an "opt out" request to [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com), or contact us through other available methods provided under "Contact Information" in this Notice. We do not share your Personal Information with nonaffiliates for their use to direct market to you without your consent.

### **How Stewart Protects Your Personal Information**

Stewart maintains physical, technical and administrative safeguards and policies to protect your personal information.

### **Contact Information**

If you have questions or comments about this Notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under law, please do not hesitate to contact us at:

**Phone:** Toll Free at 1-866-571-9270

**Email:** [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com)

**Postal Address:** Stewart Information Services Corporation  
Attn: Mary Thomas, Chief Compliance and Regulatory Officer  
1360 Post Oak Blvd., Ste. 100, MC #14-1  
Houston, TX 77056

### Privacy Notice at Collection for California Residents

Pursuant to the California Consumer Privacy Act of 2018 ("CCPA") and the California Privacy Rights Act of 2020, effective January 1, 2023 ("CPRA"), Stewart Information Services Corporation and its subsidiary companies (collectively, "Stewart") are providing this **Privacy Notice at Collection for California Residents** ("CCPA and CPRA Notice"). This CCPA and CPRA Notice supplements the information contained in Stewart's existing privacy notice and applies solely to all visitors, users, and consumers and others who reside in the State of California or are considered California Residents as defined in the CCPA and CPRA ("consumers" or "you"). All terms defined in the CCPA and CPRA have the same meaning when used in this Notice.

#### **Personal and Sensitive Personal Information Stewart Collects**

- Publicly available information from government records.
- Deidentified or aggregated consumer information.
- Certain personal information protected by other sector-specific federal or California laws, including but not limited to the Fair Credit Reporting Act (FCRA), Gramm Leach Bliley Act (GLBA) and California Financial Information Privacy Act (FIPA).

Specifically, Stewart has collected the following categories of **personal and sensitive personal information** from consumers within the last twelve (12) months:

<b>Category</b>	<b>Examples</b>	<b>Collected</b>
A. Identifiers	A real name, alias, postal address, unique personal identifier, online identifier, Internet Protocol address, email address, account name, Social Security number, driver's license number, passport number, or other similar identifiers.	YES
B. Personal information categories listed in the California Customer Records statute (Cal. Civ. Code § 1798.80(e)).	A name, signature, Social Security number, physical characteristics or description, address, telephone number, passport number, driver's license or state identification card number, insurance policy number, education, employment, employment history, bank account number, credit card number, debit card number, or any other financial information, medical information, or health insurance information. Some personal information included in this category may overlap with other categories.	YES
C. Protected classification characteristics under California or federal law.	Age (40 years or older), race, color, ancestry, national origin, citizenship, religion or creed, marital status, medical condition, physical or mental disability, sex (including gender, gender identity, gender expression, pregnancy or childbirth and related medical conditions), sexual orientation, veteran or military status, genetic information (including familial genetic information).	YES
D. Commercial information.	Records of personal property, products or services purchased, obtained, or considered, or other purchasing or consuming histories or tendencies.	YES
E. Biometric information.	Genetic, physiological, behavioral, and biological characteristics, or activity patterns used to extract a template or other identifier or identifying information, such as, fingerprints, faceprints, and voiceprints, iris or retina scans, keystroke, gait, or other physical patterns, and sleep, health, or exercise data.	YES
F. Internet or other similar network activity.	Browsing history, search history, information on a consumer's interaction with a website, application, or advertisement.	YES
G. Geolocation data.	Physical location or movements.	YES
H. Sensory data.	Audio, electronic, visual, thermal, olfactory, or similar information.	YES
I. Professional or employment related information.	Current or past job history or performance evaluations.	YES
J. Non-public education information (per the Family Educational Rights and Privacy Act(20 U.S.C. Section 1232g, 34 C.F.R. Part 99)).	Education records directly related to a student maintained by an educational institution or party acting on its behalf, such as grades, transcripts, class lists, student schedules, student identification codes, student financial information, or student disciplinary records.	YES
K. Inferences drawn from other personal information.	Profile reflecting a person's preferences, characteristics, psychological trends, predispositions, behavior, attitudes, intelligence, abilities, and aptitudes.	YES



Stewart obtains the categories of personal and sensitive information listed above from the following categories of sources:

- Directly and indirectly from customers, their designees, or their agents (For example, realtors, lenders, attorneys, brokers, etc.)
- Directly and indirectly from activity on Stewart's website or other applications.
- From third-parties that interact with Stewart in connection with the services we provide.

### **Use of Personal and Sensitive Personal Information**

Stewart may use or disclose the personal or sensitive information we collect for one or more of the following purposes:

- To fulfill or meet the reason for which the information is provided.
- To provide, support, personalize, and develop our website, products, and services.
- To create, maintain, customize, and secure your account with Stewart.
- To process your requests, purchases, transactions, and payments and prevent transactional fraud.
- To prevent and/or process claims.
- To assist third party vendors/service providers who complete transactions or perform services on Stewart's behalf pursuant to valid service provider agreements.
- As necessary or appropriate to protect the rights, property or safety of Stewart, our customers or others.
- To provide you with support and to respond to your inquiries, including to investigate and address your concerns and monitor and improve our responses.
- To personalize your website experience and to deliver content and product and service offerings relevant to your interests, including targeted offers and ads through our website, third-party sites, and via email or text message (with your consent, where required by law).
- To help maintain the safety, security, and integrity of our website, products and services, databases and other technology-based assets, and business.
- To respond to law enforcement or regulator requests as required by applicable law, court order, or governmental regulations.
- Auditing for compliance with federal and state laws, rules and regulations.
- Performing services including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing advertising or marketing services or other similar services.
- To evaluate or conduct a merger, divestiture, restructuring, reorganization, dissolution, or other sale or transfer of some or all of our assets, whether as a going concern or as part of bankruptcy, liquidation, or similar proceeding, in which personal information held by us is among the assets transferred.

Stewart will not collect additional categories of personal or sensitive information or use the personal or sensitive information we collected for materially different, unrelated, or incompatible purposes without providing you notice.

### **Disclosure of Personal Information to Affiliated Companies and Nonaffiliated Third Parties**

Stewart does not sell your personal information to nonaffiliated third parties. Stewart may share your information with those you have designated as your agent throughout the course of your transaction (for example, a realtor, broker, or a lender). Stewart may disclose your personal information to a third party for a business purpose. Typically, when we disclose personal information for a business purpose, we enter into a contract that describes the purpose and requires the recipient to both keep that personal information confidential and not use it for any purpose except performing the contract.

We share your personal information with the following categories of third parties:

- Service providers and vendors we contract with to render specific services (For example, search companies, mobile notaries, and companies providing credit/debit card processing, billing, shipping, repair, customer service, auditing, marketing, etc.)
- Affiliated Companies.
- Parties involved in litigation and attorneys, as required by law.
- Financial rating organizations, rating bureaus and trade associations.
- Federal and State Regulators, law enforcement and other government entities

In the preceding twelve (12) months, Stewart has disclosed the following categories of personal information for a business purpose:

- Category A: Identifiers
- Category B: California Customer Records personal information categories
- Category C: Protected classification characteristics under California or federal law
- Category D: Commercial Information
- Category E: Biometric Information
- Category F: Internet or other similar network activity
- Category G: Geolocation data
- Category H: Sensory data
- Category I: Professional or employment-related information
- Category J: Non-public education information
- Category K: Inferences

### **Your Consumer Rights and Choices Under CPPA and CPRA**

## **Your Rights Under CCPA**

The CCPA provides consumers (California residents as defined in the CCPA) with specific rights regarding their personal information. This section describes your CCPA rights and explains how to exercise those rights.

### **Access to Specific Information and Data Portability Rights**

You have the right to request that Stewart disclose certain information to you about our collection and use of your personal information over the past 12 months. Once we receive and confirm your verifiable consumer request, Stewart will disclose to you:

- The categories of personal information Stewart collected about you.
- The categories of sources for the personal information Stewart collected about you.
- Stewart's business or commercial purpose for collecting that personal information.
- The categories of third parties with whom Stewart shares that personal information.
- The specific pieces of personal information Stewart collected about you (also called a data portability request).
- If Stewart disclosed your personal data for a business purpose, a listing identifying the personal information categories that each category of recipient obtained.

### **Deletion Request Rights**

You have the right to request that Stewart delete any of your personal information we collected from you and retained, subject to certain exceptions. Once we receive and confirm your verifiable consumer request, Stewart will delete (and direct our service providers to delete) your personal information from our records, unless an exception applies.

Stewart may deny your deletion request if retaining the information is necessary for us or our service providers to:

1. Complete the transaction for which we collected the personal information, provide a good or service that you requested, take actions reasonably anticipated within the context of our ongoing business relationship with you, or otherwise perform our contract with you.
2. Detect security incidents, protect against malicious, deceptive, fraudulent, or illegal activity, or prosecute those responsible for such activities.
3. Debug products to identify and repair errors that impair existing intended functionality.
4. Exercise free speech, ensure the right of another consumer to exercise their free speech rights, or exercise another right provided for by law.
5. Comply with the California Electronic Communications Privacy Act (Cal. Penal Code § 1546 seq.).
6. Engage in public or peer-reviewed scientific, historical, or statistical research in the public interest that adheres to all other applicable ethics and privacy laws, when the information's deletion may likely render impossible or seriously impair the research's achievement, if you previously provided informed consent.
7. Enable solely internal uses that are reasonably aligned with consumer expectations based on your relationship with us.
8. Comply with a legal obligation.
9. Make other internal and lawful uses of that information that are compatible with the context in which you provided it.

## **Your Rights Under CPRA**

CPRA expands upon your consumer rights and protections offered by the CCPA. This section describes your CPRA rights and explains how to exercise those rights.

### **Opt-Out of Information Sharing and Selling**

Stewart does not share or sell information to third parties, as the terms are defined under the CCPA and CPRA. Stewart only shares your personal information as commercially necessary and in accordance with this CCPA and CPRA Notice.

### **Correction of Inaccurate Information**

You have the right to request that Stewart correct any inaccurate information maintained about.

### **Limit the Use of Sensitive Personal Information**

You have the right to limit how your sensitive personal information, as defined in the CCPA and CPRA is disclosed or shared with third parties.

## **Exercising Your Rights Under CCPA and CPRA**

To exercise the access, data portability, deletion, opt-out, correction, or limitation rights described above, please submit a verifiable consumer request to us by the available means provided below:

1. Calling us Toll Free at 1-866-571-9270; or
2. Emailing us at [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com); or
3. Visiting <http://stewart.com/ccpa>.

Only you, or someone legally authorized to act on your behalf, may make a verifiable consumer request related to your personal information. You may also make a verifiable consumer request on behalf of your minor child, if applicable.

To designate an authorized agent, please contact Stewart through one of the methods mentioned above.

You may only make a verifiable consumer request for access or data portability twice within a 12-month period. The verifiable consumer request must:

- Provide sufficient information that allows us to reasonably verify you are the person about whom we collected personal information or an authorized representative.
- Describe your request with sufficient detail that allows us to properly understand, evaluate, and respond to it.

Stewart cannot respond to your request or provide you with personal information if we cannot verify your identity or authority to make the request and confirm the personal information relates to you.

Making a verifiable consumer request does not require you to create an account with Stewart.

### **Response Timing and Format**

We endeavor to respond to a verifiable consumer request within forty-five (45) days of its receipt. If we require more time (up to an additional 45 days), we will inform you of the reason and extension period in writing.

A written response will be delivered by mail or electronically, at your option.

Any disclosures we provide will only cover the 12-month period preceding the verifiable consumer request's receipt. The response we provide will also explain the reasons we cannot comply with a request, if applicable. For data portability requests, we will select a format to provide your personal information that is readily useable and should allow you to transmit the information from one entity to another entity without hindrance.

Stewart does not charge a fee to process or respond to your verifiable consumer request unless it is excessive, repetitive, or manifestly unfounded. If we determine that the request warrants a fee, we will tell you why we made that decision and provide you with a cost estimate before completing your request.

### **Non-Discrimination**

Stewart will not discriminate against you for exercising any of your CCPA and CPRA rights. Unless permitted by the CCPA or CPRA, we will not:

- Deny you goods or services.
- Charge you a different prices or rates for goods or services, including through granting discounts or other benefits, or imposing penalties.
- Provide you a different level or quality of goods or services.
- Suggest that you may receive a different price or rate for goods or services or a different level or quality of goods or services.

### **Record Retention**

Your personal information will not be kept for longer than is necessary for the business purpose for which it is collected and processed. We will retain your personal information and records based on established record retention policies pursuant to California law and in compliance with all federal and state retention obligations. Additionally, we will retain your personal information to comply with applicable laws, regulations, and legal processes (such as responding to subpoenas or court orders), and to respond to legal claims, resolve disputes, and comply with legal or regulatory recordkeeping requirements

### **Changes to This CCPRA and CPRA Notice**

Stewart reserves the right to amend this CCPA and CPRA Notice at our discretion and at any time. When we make changes to this CCPA and CPRA Notice, we will post the updated Notice on Stewart's website and update the Notice's effective date.

### **Link to Privacy Notice**

Stewart's Privacy Notice can be found on our website at <https://www.stewart.com/en/privacy.html>.

## **Contact Information**

If you have questions or comments about this notice, the ways in which Stewart collects and uses your information described herein, your choices and rights regarding such use, or wish to exercise your rights under California law, please do not hesitate to contact us at:

**Phone:** Toll Free at 1-866-571-9270

**Website:** <http://stewart.com/ccpa>

**Email:** [Privacyrequest@stewart.com](mailto:Privacyrequest@stewart.com)

**Postal Address:** Stewart Information Services Corporation  
Attn: Mary Thomas, Chief Compliance and Regulatory Officer  
1360 Post Oak Blvd., Ste. 100, MC #14-1  
Houston, TX 77056



N A R D A C

**Certificate of Insurance:  
Commercial General Liability**

**Insured:  
RAI Energy US Development LLC;**

**Policy Period:  
16 June 2023 To 16 June 2024**

# N A R D A C

Reference: Various

03 April 2024

**LRC RAI Investco, LLC**  
Attention: Loan Servicing  
807 East Main Street, Suite 2-210  
Durham, NC 27701

**Policy Reference:** PER 23 SLL 0108  
PER 23 SLU 0107

## Certificate of Insurance

In accordance with your instructions, we confirm having effected the following insurance on your behalf. Please read this document carefully and notify us immediately should you disagree with any point.

Insured: RAI Energy US Development LLC;

Address: 1875 S BASCOM AVE STE 2400 CAMPBELLCA95008-2356

Additional Insured: Roadrunner Energy Farm LLC;

Project: Roadrunner

Policy Type: Section 1 – General Liability  
Section 2 – Umbrella Liability

Policy Period: From: 16 June 2023  
To: 16 June 2024  
Both days at 00:01 hours Central Standard Time

Limit of Liability: Section 1 – General Liability

Each Occurrence	USD 1,000,000
General Aggregate	USD 2,000,000
Products-Completed Operations Aggregate	USD 2,000,000
Personal and Advertising Injury	USD 1,000,000
Damage to Premises Rented to You	USD 1,000,000
Hired and Non-Owned Auto	USD 1,000,000
Medical Payments	USD 5,000

Section 2 – Umbrella Liability

Each Occurrence	USD 5,000,000
Products-Completed Operations Aggregate	USD 5,000,000
Personal and Advertising Injury	USD 5,000,000
General Aggregate	USD 5,000,000
Excess of Section 1	

Deductible: Section 1 – General Liability

Each Occurrence	USD 10,000
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# N A R D A C

Reference: Various

03 April 2024

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*Our Debit Note(s) reflecting the premium amount due and its payment terms for the insurance is/are shared with you separately via an email for your attention.*

**This is only a summary of your insurance, and a detailed version of the terms and conditions are stated in detail in the attached contract documentation.**

## **Security Schedule**

Below are the subscribing insurers and their respective participations on the above referenced policy.

### **Order Hereon and Insurers**

21.62% of 100.00%	Lloyd's Syndicate BRT 2987
20.00% of 100.00%	Convex Insurance UK Limited
19.46% of 100.00%	Lloyd's Syndicate TAL 1183
15.14% of 100.00%	Lloyds Syndicate CSL 1084
12.97% of 100.00%	Lloyd's Syndicate ASC 1414
10.81% of 100.00%	<u>Lloyds Syndicate HIG 1221</u>

**100.00% of 100.00%**

## **Important Notes**

### **Duty to Disclose Material Facts**

Every proposer or Insured when seeking a new policy of insurance or cover for additional risks or renewal under an existing policy, must disclose any information that might influence the insurers in fixing the premium or determining whether to accept the risk. Failure to do so may entitle insurers to void cover from inception and seek repayment of paid claims. If you are in any doubt as to whether information is material, you should disclose it. The duty of disclosure is re-imposed when there are changes or variations in cover and when the insurance document is renewed or extended. In addition, changes that substantially increase the risk or relate to compliance with a warranty or condition in the insurance document must be notified at once.

### **Subjectivities (per contract wording)**

If the cover provided is granted by (re)insurers subject to certain requirements, failure to comply may result in cover not being in place. The applicable subjectivities to your contract, if any, have already been highlighted to you. Please contact us immediately if you are unsure as to the meaning of a subjectivity, or if unable to comply within the timeframe specified.

### **Warranties**

Warranties are important provisions contained in a contract and must be exactly complied with at all times. Breach of a warranty may cause (re)insurers to be automatically off risk from the date of that breach and in some instances may mean (re)insurers do not come on risk at all. This is the position regardless of any connection between the breach and any loss which leads to the breach becoming evident. A warranty may exist in the contract using other terminology and without reference to the word 'warranty'. The applicable warranties to your contract, if any, have already been highlighted to you. Please contact us immediately if you are unsure as to the meaning of a warranty, or if unable to comply with.

### **Conditions Precedent**

These are types of conditions that must be satisfied either before the contract becomes valid or before an (re)insurer becomes liable to pay a claim. If a condition precedent to the validity of this contract or the commencement of the risk is not complied with, the (re)insurer will not come on risk. If a condition precedent to the (re)insurer's liability under this contract is not complied with, the (re)insurer will not be liable for the loss in question. Such conditions precedent may exist in the contract using other terminology and without reference to the words 'conditions precedent'. The applicable conditions precedent to your contract, if any, have already been highlighted to you. Please contact us immediately if you are unsure as to the meaning of a warranty, or if unable to comply with.

### **Claims Notification (per contract wording)**

As soon as you become aware of a circumstance that could give rise to a claim under this insurance, the Claims Notification process contained within the Policy will need to be followed. If you are the entity named for notification, you must forward the notification to [claims.support@nardac.com](mailto:claims.support@nardac.com) as soon as reasonably practicable, not exceeding 3 business days.

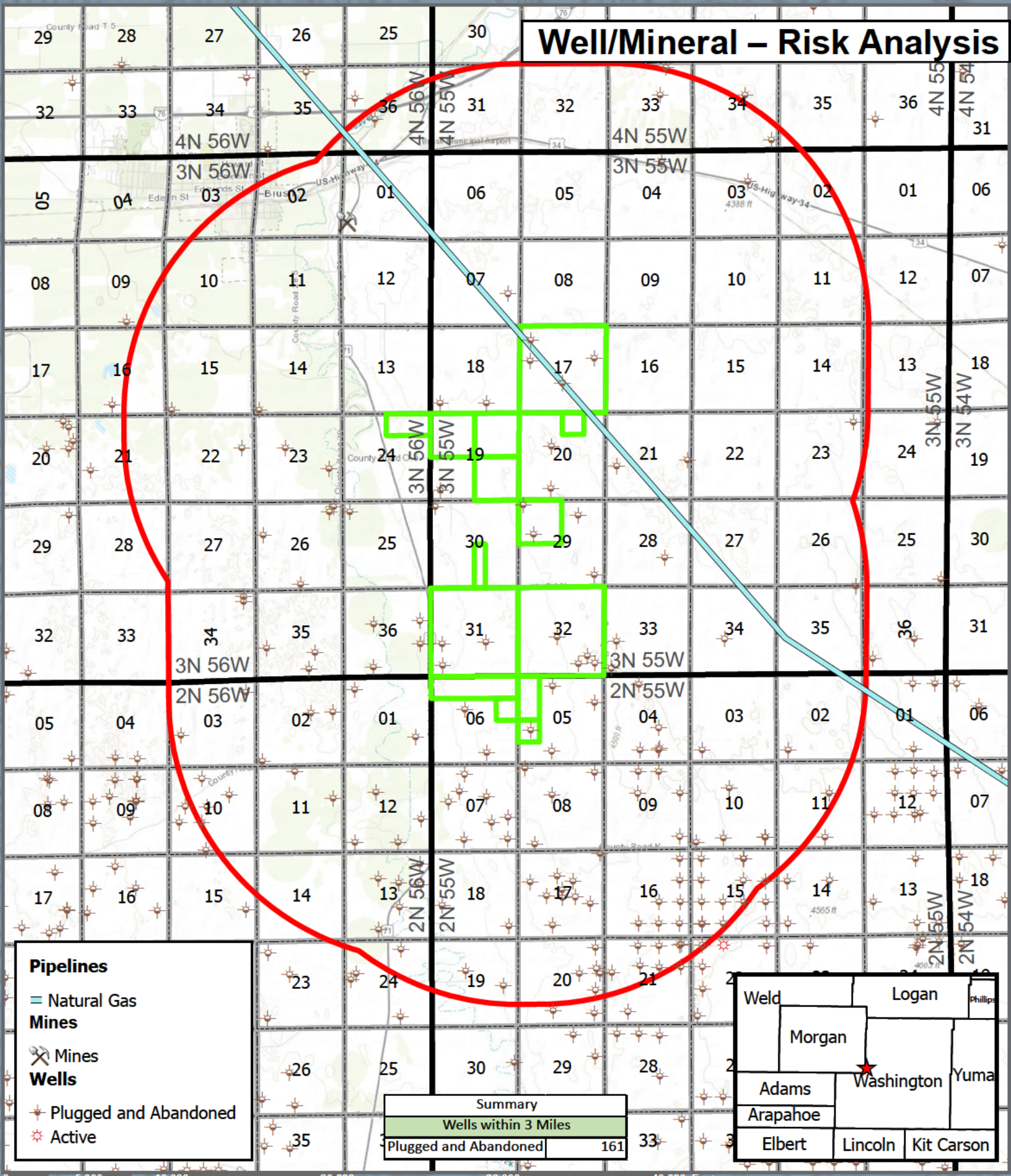
### **Underwriting Information**

Nardac Insurance Services obtained certain information about the insured projects that we analyzed and included with our insurance submission to obtain the coverage bound. We provide the results of our analysis for your reference and files; which we recommend you review in detail. To the extent you wish to discuss our findings and/or methods, please contact us at your soonest convenience.



**Appendix M: Mineral Right Holders**

# Well/Mineral – Risk Analysis



### Pipelines

— Natural Gas

### Mines

⚒ Mines

### Wells

⬮ Plugged and Abandoned

⚡ Active

### Summary

Wells within 3 Miles

Plugged and Abandoned	161
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## Well Analysis

Morgan County

Colorado

### Coordinate System:

WGS 1984 UTM Zone 13N  
Projection: Transverse Mercator  
Linear Unit: Meter  
Datum: WGS 1984

### Map Scale Units:

1:90,000  
1 inch equals 7,500 feet

### Map Document Credits:

Prepared by: R.Grim  
Map Date: 1/24/2023

- Project Area
- 3-Mile Radius
- Sections
- Townships



WESTERN LAND SERVICES

CONFIDENTIAL

The information contained herein is based upon, in part, information compiled from sources beyond the control of Western Land Services, Inc. ("WLS") and errors and inconsistencies may exist. In addition, WLS is not a law firm and does not offer certified opinions of title, surface, easements or mineral ownership. WLS makes no representation of warranties as to the accuracy, completeness, or suitability for any particular use of this information, and this map and supporting data contained within it are provided on an "AS IS WITH ALL FAULTS" basis. By receipt of this information, you assume all risk for any errors and omissions in this information.



01/24/2023

Re: Story Solar

Dear Lindsey,

This is the scope of my research for Story Solar.

The Project Area for this report was created by referencing the provided parcel numbers to identify the boundaries and then drawing it into the map.

Within the 3-Mile Radius, there is a total of 161 wells, all of which are Plugged and Abandoned. There is 1 Natural Gas pipelines within the 3-Mile Radius. The data shown on our map is an approximation of the pipeline location from the Homeland Infrastructure Foundation-Level Dataset (HIFLD) and while verifying with the National Pipeline Mapping System (NPMS) public viewer, the locations of the pipelines differ as seen on the screenshot below. There is 1 mining operation, a Sand Pit, in the 3-Mile Radius. This data was verified through the USGS Mineral Resource Data System (MRDS) website

Specific to the Project Area, there are 14 Plugged and Abandoned wells. There is 1 Natural Gas pipeline that crosses the Project Area. There are no mines within the Project Area.

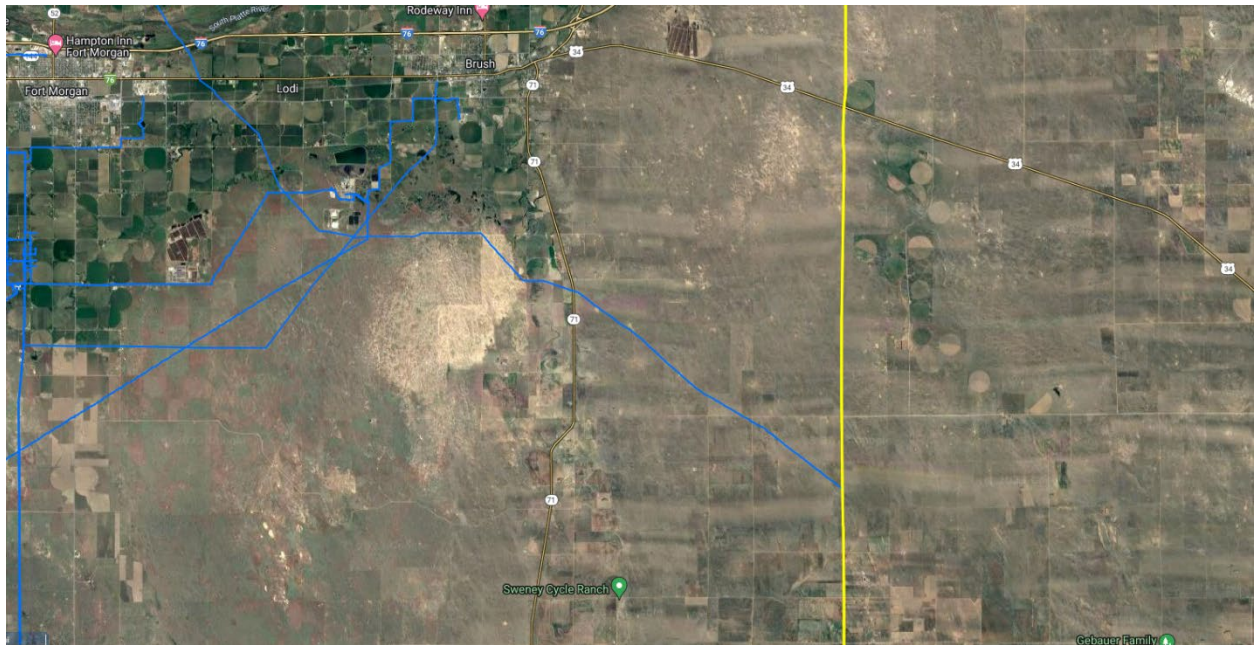
This was verified with records found from the Colorado Oil and Gas Conservation Commission. The attached Appendix A is a glossary of well types and symbol codes as given by the Colorado Oil and Gas Conservation Commission. Title work was not completed during this research. This data was only verified from the source of the well data and not from local courthouses. I have included a map of the project area showing the location of these wells.

Best,

Robert Grim  
GIS Analyst  
Western Land Services, Inc.  
wls\_mapping@westernls.com

WESTERN LAND SERVICES, INC.  
1100 Conrad Industrial Drive • Ludington, Michigan 49431-2679  
Phone: [REDACTED] • Fax: (231) 843-3183 • E-mail: [REDACTED]

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National Pipeline Mapping System data

**WESTERN LAND SERVICES, INC.**

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Symbol Code	Type of Well	GIS Grouping
AB	Abandoned Wellbore or Completion	Plugged and Abandoned
AC	Active	Active
AL	Abandoned Location	Plugged and Abandoned
CM	Commingled	Active
DA	Dry and Abandoned	Plugged and Abandoned
DG	Drilling	Active
DM	Domestic Well	Active
IJ	Injecting	Injection
PA	Plugged and Abandoned	Plugged and Abandoned
PR	Producing	Active
SI	Shut-In	Shut-In
SU	Cancelled Permit	Cancelled Permit
TA	Temporarily Abandoned	Plugged and Abandoned
WO	Waiting on Completion	Active
XX	Permitted Location	Permit

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## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface from date of severance to present  
**Certification Period:** 1/1/1925-9/28/2023

### Property Description

**Parcel:** All **Acreage:** 119.71  
**County:** Morgan **State:** CO  
**S-T-R:** 5-2N-55W  
**Tax Amount:** \$100.36 **Tax Status:** Paid  
**Legal Description:** Lot 4, SW/4NW/4, NW/4SW/4 of Section 5-2N-55W of the 6th P.M.

### Subsurface Mineral Ownership

**Description:** Lot 4, SW/4NW/4 (aka W/2NW/4), NW/4SW/4 of Section 5, T2N, R55W of 6th P.M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Michael L. Dixon Family LLLP 10826 Hwy 71 Brush, CO 80723 (Circa: 2021, WD 937313)	0.50000	59.85500	Unleased	937313
Albert Wayne Teter 31625 County Road D Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Alvin Leroy Teter 921 Krista Kort Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Arnold Douglas Teter 4949 County Road 309 Parachute, CO 81635 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Nancy Marie Pottorff 8855 Beachwood Drive Windsor, CO 80550 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Carol Gayleen Gilliland 1546 S. Fraser Way Aurora, CO 80012 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Virginia Arlene Urbach 1961 Eppinger Blvd. Thornton, CO 80229 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Roger Lowell Teter 5750 20th Street #1 Greeley, CO 80634 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Roberta Kay Teter 161 45th Ave. Greeley, CO 80632 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Judith Ann Queen PO Box 403 Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	6.31803	Unleased	943306; 947463
Brian Koehler 5102 W. 11th Street Rd. Greeley, CO 80634 (Circa: 2022, MD 943306)	0.02500	2.99275	Unleased	943306
<b>TOTALS:</b>	<b>1.0000</b>	<b>119.7100</b>		

### Mortgages

**Instrument:** 937244  
**Corrected:** 937314  
**Date:** 12/8/2021  
**Mortgagor:** Michael L. Dixon Family LLLP  
**Mortgagee:** The Farmers State Bank of Brush  
**Amount:** \$1,140,000.00  
**Term:** 5 yrs

### Title Notes

**Note 1:**

Due to the passage of time and the lack of historical production data, we have assumed the following historical oil and gas leases have expired in their primary and/or extended term: 360849, 423648, 640762, 683956

**DISCLAIMER STATEMENT:**

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**Examined By: Jerri Turney**

**Reviewed By: Ashley Bone**

File/Order Number:	State: CO	County: Morgan	Parcel: 128705000002	Certification Dates: 1/1/1925 to 9/28/2023	Examiner: Jerri Turney
Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306		Assessed Acreage: 119.71	Taxes: Paid	Judgments and Liens: Yes

Legal Description: Lot 4, SW/4NW/4 (aka W/2), NW/4SW/4 of Section 5, T2N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Patent	2/19/1919	N/A	P-667035	United States of America	William E. Webber	Lot 4 and SW/4NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands, subject to right of way for ditches and canals Note: Patent is dated prior to 1925 and not available online. Patent was found on BLM website.
The online records of Morgan County start 1/1/1925, as a result, there is a gap in title from William E. Webber to Jennie McAfee. It is assumed that Jennie McAfee has acquired all RTI in stated lands prior to 1/1/1925.							
Warranty Deed	10/8/1926	10/9/1926	163572	Jennie McAfee	Ethel McAfee and Dassie McAfee	NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Warranty Deed	10/8/1926	10/9/1926	163573	Jennie McAfee	Ethel McAfee and Dassie McAfee	Lot 4 and SW/4NW/4, of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Warranty Deed	9/10/1927	9/17/1927	172093	Ethel McAfee and Dassie McAfee	Jennie McAfee	Lot 4 and SW/4NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Warranty Deed	4/30/1929	6/4/1929	187220	Jennie McAfee	Charles F. Kast	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Deed	1/14/1949	2/8/1949	344446	Charles F. Kast and Myrtle T. Kast, husband and wife	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Oil and Gas Lease	7/20/1950	9/16/1950	360849	Walter Weiss and Mayme L. Weiss, husband and wife Harry Weiss and Neda B. Weiss, husband and wife Alex Weiss and Minnie Weiss, husband and wife Carl Weiss and Marie Weiss, husband and wife	The Superior Oil Company	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	OGML, 5 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Oil and Gas Lease	4/11/1956	5/16/1956	423648	Walter Weiss and Mayme Louise Weiss, his wife Harry Weiss and Neda B. Weiss, his wife Alex Weiss and Minnie Weiss, his wife Carl Weiss and Marie E. Weiss, his wife	The Pure Oil Company	Lot 4 and SW/4NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	OGML, Unknown yrs., 16.5% Royalty, No Pugh Well must be commenced by 10/11/56 or lease will terminate Historical Unreleased OGML
Deed	11/25/1957	12/30/1957	439822	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	Harry Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Non Participating Royalty Deed	11/25/1957	12/30/1957	439823	Harry Weiss	Alex Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	An und 3/10 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439824	Harry Weiss	Walter Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	An und 1/5 of 1/8 royalty NPRI



Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 119.71	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: Lot 4, SW/4NW/4 (aka W/2), NW/4SW/4 of Section 5, T2N, R55W of the 6th P.M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Non Participating Royalty Deed	11/25/1957	12/30/1957	439825	Harry Weiss	Carl Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	An und 1/5 of 1/8 royalty NPRI
Quit Claim Deed	12/9/1974	12/11/1974	591781	Carl Weiss and Walter Weiss	Harry Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	QCD as to all RTI in stated lands
Oil and Gas Lease	3/14/1980	4/7/1980	640762	Harry Weiss and Neda Bell Weiss, his wife	John P. Ellbogen	Lot 4 and SW/4NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	OGML, 3 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Warranty Deed	5/17/1982	5/17/1982	661761	Harry Weiss	Teter Oil Field Construction Co., Inc.	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	All RTI in stated lands
Non Participating Royalty Deed	5/17/1982	5/17/1982	661762	Teter Oil Field Construction Co., Inc.	Harry Weiss	W/2NW/4, NW/4SW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	An und 90% NPRI of Grantors interest
Oil and Gas Lease	7/30/1984	8/3/1984	683956	Teter Oil Field Construction Co., Inc.	BlueSky Oil & Gas, Inc.	Lot 4 and SW/4NW/4 of Section 5, Township 2N, Range 55W, of the 6th P.M.	OGML, 3 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface from the date of severance to present  
**Certification Period:** 1/1/1925-9/28/2023

### Property Description

**Parcel:** All **Acreage:** 204.98  
**County:** Morgan **State:** CO  
**S-T-R:** 32-3N-55W  
**Tax Amount:** \$172.04 **Tax Status:** Paid  
**Legal Description:** Lots 1-4, SENE of Section 06-2N-55W of the 6th P.M.

### Subsurface Mineral Ownership

**Description:** Lots 1-4, (ada N/2N/2), SE/4NE/4 of Section 6-2N-55W of the 6th P.M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Michael L. Dixon Family LLLP 10826 Hwy 71 Brush, CO 80723 (Circa; 2021, WD 937313)	0.50000	102.49000	Unleased	937313
Albert Wayne Teter 31625 CR D Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Alvin Leroy Teter 921 Krista Kort Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Arnold Douglas Teter 4949 CR 309 Parachute, CO 81635 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Nancy Marie Pottorff 8855 Beachwood Drive Windsor, CO 80550 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Carol Gayleen Gilliland 1546 S. Fraser Way Aurora, CO 80012 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Virginia Arlene Urbach 1961 Eppinger Blvd. Thornton, CO 80229 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Roger Lowell Teter 5750 20th Street #1 Greeley, CO 80634 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Roberta Kay Teter 161 45th Ave. Greeley, CO 80632 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Judith Ann Queen P.O. Box 403 Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	10.81839	Unleased	943306; 947463
Brian Koehler 5102 W. 11th Street Rd. Greeley, CO 80634 (Circa: 2022, MD 943306)	0.02500	5.12450	Unleased	943306
<b>TOTALS:</b>	<b>1.0000</b>	<b>204.9800</b>		

### Mortgages

**Instrument:** 937244  
**Corrected:** 937314  
**Date:** 12/8/2021  
**Mortgagor:** Michael L. Dixon Family LLLP  
**Mortgagee:** The Farmers State Bank of Brush  
**Amount:** \$1,140,000.00  
**Term:** 5 yrs

### Title Notes

**Note 1:**

Due to the passage of time and the lack of historical production data, we have assumed the following historical oil and gas leases have expired in their primary and/or extended term: 360849, 423648, 446674, 640763, 683956

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**Examined By: Scott Turney**

**Reviewed By: Ashley Bone**

<b>File/Order Number:</b>	State: CO	County: Morgan	Parcel: 12870600001	Certification Dates: 1/1/1925 to 9/28/2023	Examiner: Scott Turney
Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306		Assessed Acreage: 204.98	Taxes: Paid	Judgments and Liens: Yes

Legal Description: Lots 1-4, SENE of Section 06, T2N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Patent	2/19/1919	N/A	P-667035	United States of America	William E. Webber	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1-4, SENE	All RTI in stated lands, subject to right of way for ditches and canals Note: Patent is dated prior to 1925 and not available online. Patent was found on BLM website.
The online records of Morgan County start 1/1/1925, as a result, there is a gap in title from William E. Webber to Jennie McAfee. It is assumed that Jennie McAfee has acquired all RTI in stated lands prior to 1/1/1925.							
Warranty Deed	10/8/1926	10/9/1926	163573	Jennie McAfee	Ethel McAfee and Dassie McAfee	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1-4, SENE	All RTI in stated lands
Warranty Deed	9/10/1927	9/17/1927	172093	Ethel McAfee and Dassie McAfee	Jennie McAfee	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	All RTI in stated lands
Warranty Deed	4/30/1929	6/4/1929	187220	Jennie McAfee	Charles F. Kast	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	All RTI in stated lands
Deed	1/14/1949	2/8/1949	344446	Charles F. Kast and Myrtle T. Kast, husband and wife	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE, except ROW	All RTI in stated lands
Oil and Gas Lease	7/20/1950	9/16/1950	360849	Walter Weiss and Mayme L. Weiss, husband and wife Harry Weiss and Neda B. Weiss, husband and wife Alex Weiss and Minnie Weiss, husband and wife Carl Weiss and Marie Weiss, husband and wife	The Superior Oil Company	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	OGML, 5 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Right of Way	10/17/1953	1/20/1954	393751	Walter Weiss, Harry Weiss, Aleck Weiss, Carl Weiss	Goodall Pipe Line Company	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- NE	Pipeline Easement ROW
Oil and Gas Lease	4/11/1956	5/16/1956	423648	Walter Weiss and Mayme Louise Weiss, his wife Harry Weiss and Neda B. Weiss, his wife Alex Weiss and Minnie Weiss, his wife Carl Weiss and Marie Weiss, his wife	The Pure Oil Company	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1-4, SENE	OGML, Unknown yrs., 16.5% Royalty, No Pugh Well must be commenced by 10/11/56 or lease will terminate Historical Unreleased OGML
Deed	11/25/1957	12/30/1957	439822	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	Harry Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	All RTI in stated lands
Non Participating Royalty Deed	11/25/1957	12/30/1957	439823	Harry Weiss	Alex Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	An und 3/10 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439824	Harry Weiss	Walter Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	An und 1/5 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439825	Harry Weiss	Carl Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	An und 1/5 of 1/8 royalty NPRI

Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 204.98	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: Lots 1-4, SENE of Section 06, T2N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Oil and Gas Lease	6/23/1958	7/24/1958	446674	Harry Weiss	Pan American Petroleum Corporation	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2NW/4	OGML, 1 yr., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Quit Claim Deed	12/9/1974	12/11/1974	591781	Carl Weiss and Walter Weiss	Harry Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	QCD as to all RTI in stated lands
Oil and Gas Lease	3/14/1980	4/7/1980	640763	Harry Weiss and Neda Bell Weiss, his wife	John P. Ellbogen	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1,2, SENE	OGML, 3 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Warranty Deed	5/17/1982	5/17/1982	661761	Harry Weiss	Teter Oil Field Construction Co., Inc.	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	All RTI in stated lands
Non Participating Royalty Deed	5/17/1982	5/17/1982	661762	Teter Oil Field Construction Co., Inc.	Harry Weiss	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	An und 90% NPRI
Oil and Gas Lease	7/30/1984	8/3/1984	683956	Teter Oil Field Construction Co., Inc.	BlueSky Oil & Gas, Inc.	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1,2, SENE	OGML, 3 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Statement of Authority	12/8/2021	12/8/2021	937242	Michael Dixon, General Partner	Public	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	Statement of Authority as to the Michael L. Dixon Family LLLP Names and positions of each person authorized to execute instruments: Michael L. Dixon, General Partner Janice Dixon, Limited Partner Clarie E. Dixon, Limited Partner
Warranty Deed	12/8/2021	12/8/2021	937243	Teter Oil Field Construction Co., Inc.	Michael L. Dixon Family LLLP	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	All RTI in stated lands. Grantor retains an und 1/2 of Grantors mineral interests and conveys 1/2 of Grantors mineral interest.
Deed of Trust	12/8/2021	12/8/2021	937244	Michael L. Dixon Family LLLP	The Farmers State Bank of Brush	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	DT, in the amount of \$1,140,000.00, maturing 12/8/2026
Warranty Deed	12/8/2021	12/10/2021	937313	Teter Oil Field Construction Co., Inc.	Michael L. Dixon Family LLLP	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	All RTI in stated lands. Grantor retains an und 1/2 of Grantors mineral interests and conveys 1/2 of Grantors mineral interest.  Corrects WD 937243 as to legal description of other lands
Deed of Trust	12/8/2021	12/10/2021	937314	Michael L. Dixon Family LLLP	The Farmers State Bank of Brush	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	DT, in the amount of \$1,140,000.00, maturing 12/8/2026  Corrects legal description in DT 937244
Statement of Authority	12/14/2021	12/14/2021	937388	Alvin Leroy Teter, President	Public	<u>T-2N, R-55W of 6th P.M.</u> Sec 6- N/2N/2, SENE	Statement of Authority as to the Teter Oil Field Construction Co., Inc. Name and position of person authorized to execute instruments: Alvin Leroy Teter, President
Mineral Deed	8/16/2022	8/17/2022	942273	Teter Oil Field Construction Co., Inc.	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Personal Representatives of the Estate of Virginia E. Teter, aka Virginia Teter, deceased, and Virginia Arlene Urbach and Alvin Leroy Teter, Co-Trustees of the Gale E. Teter Residuary Trust	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	All of Grantors Mineral Interest in equal shares

Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 204.98	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: Lots 1-4, SENE of Section 06, T2N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Mineral Deed	10/20/2022	10/20/2022	943306	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Trustees of the Gale E. Teter Residuary Trust	Albert Wayne Teter Alvin Leroy Teter Arnold Douglas Teter Nancy Marie Bottorff Carol Gayleen Gilliland Virginia Arlene Urbach Roger Lowell Teter Roberta Kay Teter Judith Ann Queen Brian Koehler	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	All of Grantors Mineral Interest in equal 1/10th shares
Personal Representative's Mineral Deed	8/2/2023	8/2/2023	947463	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Personal Representatives of the Estate of Virginia E. Teter, aka Virginia Teter, deceased	Albert Wayne Teter Alvin Leroy Teter Arnold Douglas Teter Nancy Marie Pottorff Carol Gayleen Gilliland Virginia Arlene Urbach Roger Lowell Teter Roberta Kay Teter Judith Ann Queen	Parcel D: <u>T-2N, R-55W of 6th P.M.</u> Sec 6- Lots 1, 2, 3, 4 (aka N/2N/2), SENE, except ROW	All of Grantors Mineral Interest in equal 1/9th shares

**END OF DEEDS / CHAIN OF TITLE**



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 4/16/1946 to 1/4/2024

### Property Description

**Parcel:** 123319000008      **Acreage:** 160.00  
**County:** Morgan      **State:** Colorado  
**S-T-R:** 19-3N-55W  
**Tax Amount:** \$134.40      **Tax Status:** Paid  
**Legal Description:** The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

### Surface Ownership (Per Reported Assessment)

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Cody W. Frazier 30475 County Road O Brush, Colorado 80723 (Circa: 2023, Assessor's Website)	1.00000	160.00000	Not Examined	Not Examined
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

### Subsurface/Formation/Mineral Ownership

Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.				
Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Estate of Ilma M. Krehmeyer, Deceased and the Heirs at Law of Ilma M. Krehmeyer, Deceased Address Unknown (Circa: 1946, WD 428-369)	0.50000	80.00000	OPEN	Note: Vesting deed for this owner is unknown; It occurs before the initial mineral severance of WD 428-369  <b>See Note 1, 4 &amp; 5</b>
Estate of Colonel E. Gordon, Apparently Deceased and the Heirs at Law of Colonel E. Gordon, Apparently Deceased Address Unknown (Circa: 1960, 635-378)	0.12500	20.00000	OPEN	WD 428-369 <b>See Note 2</b>
Estate of Guidotta J. Gordon, Apparently Deceased and the Heirs at Law of Guidotta J. Gordon, Apparently Deceased Address Unknown (Circa: 1986, 882-632)	0.12500	20.00000	OPEN	WD 428-369 <b>See Note 2</b>
Estate of Lydia Chvatal, also known as Lidia Chvatal, Deceased and the Heirs at Law of Lydia Chvatal, also known as Lidia Chvatal, Deceased Address Unknown (Circa: 1989, SWD 910-75)	0.12500	20.00000	OPEN	WD 498-325 and Declaration of Interests 635-378 <b>See Note 3</b>
Cody W. Frazier 30289 CO RD O Brush, Colorado 80723 (Circa: 2018, QCD #913550)	0.12500	20.00000	OPEN	QCD #913550
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

**\*\*Current Lease of Record**

**Lease Number:** N/A                      **Status:** See Note 4  
**Original Lessor:** Myrna Ruth Jacobs  
**Original Lessee:** Windy Hill Water Operations LLC  
**Instrument:** 944235                      **Dated:** 12/7/2022  
**Acres Leased:** 320.00000                      **Term:** None given  
**Notes:** (Plus outside lands in Lot 3 & 4, E2 SW4, E2 of 18-3N-55W) **See Note 4**

**Leasehold Ownership**

**Description: East Half (E/2) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.**

<b>Owner:</b>	<b>Interest:</b>	<b>Net Acres:</b>	<b>OGL:</b>	<b>Vesting Doc:</b>
Windy Hill Water Operations LLC 3001 Ranch Road 620 S. Suite 321 Austin, Texas 78738 (Circa: 2022, Instrument #944235)	See Note 5	See Note 5	N/A	Instrument #944235  See Note 5
<b>TOTALS:</b>	0.0000	0.0000		

**Mortgages**

**None Open/Unsatisfied of Record.**

**Judgments/Liens**

**None Open/Unsatisfied of Record.**

**Well Information**

**No active or producing wells found located upon property or unitized with property.**

**Unit Information**

**None Found.**

**Title Notes****Note 1:**

In DB 428-369, between S. A. Krehmeyer, also known as Samuel August Krehmeyer, and Ilma M. Krehmeyer, his wife and Colonel E. Gordon and Guidotta J. Gordon, his wife, the Grantors reserve 1/2 interest in all the minerals in the E/2 of Sec. 19-3N-55W. After DB 428-369, the Krehmeyer's who made the 1/2 reservation in said conveyance do not reappear in title. There was a Death Certificate filed at 707-516 which states that S.A. Krehmeyer, aka Samuel August Krehmeyer died on 12/20/1957, but the examiner could not locate any conveyance out of "S.A.", or any Probate, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information. Additionally, per Find-A-Grave it is known that Ilma Krehmeyer (widow of S.A.) passed away on 3/3/2002, however the examiner could not locate any conveyance out of "Ilma", or any Probate, LWT, Affidavit or any other death related instrument filed of record. Since it is known that S.A. died before his wife, Ilma, along with all of the other facts described herein, this examination is leaving their 1/2 interest in the Estate of Ilma M. Krehmeyer, Deceased and the Heirs at Law of Ilma M. Krehmeyer, Deceased. There are a number of unreleased Oil and Gas Leases executed by what could be possible apparent heirs of Samuel August Krehmeyer as seen at (e.g. DB 807-358; 807-947; 876-784; 876-786; 876-788; 876-790; and 876-792), although there is nothing to verify this. Those possible apparent heirs executing leases are: Ilma Krehmeyer, a widow; Samuel Joseph Krehmeyer, Wilma June Covey, Fred Herman Krehmeyer, George Calvin Krehmeyer and Myrna Ruth Jacobs, a married person.

The examiner also could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for any of those parties found leasing. Additionally, per Find-A-Grave, the Dates of Death for the following are: Samuel J. Krehmeyer (DOD 7/4/1991); George Calvin Krehmeyer (DOD 3/7/2005); Fred Herman Krehmeyer (DOD 7/14/2017); and Per the Find-A-Grave for Samuel J. Krehmeyer, a/k/a Samuel Joseph Krehmeyer, it was found that "Samuel" had 2 sisters Wilma June Covey and Myrna Ruth Jacobs. Further curative measures are needed.

**Note 2:**

In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, as Joint Tenants and then V. J. Chvatal and Lydia Chvatal also as Joint Tenants, it is explained, for the purpose of clarifying and correcting the mineral ownership created by virtue of the Warranty Deed at 498/325, that the two Joint Tenancies each both own a 1/4 mineral interest and not a 1/2 mineral interest each as preciously stated, in the E/2 of Sec.19-3N-55W respectively. The examiner could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for Guidotta J. Gordon or Colonel E. Gordon. However, Guidotta J. Gordon, a widow did execute two Oil & Gas Leases, at DB 806-392 and at DB 882-630 so it is likely that "Colonel" pre-deceased her although no further internet research revealed a DOD for either. Therefore, for the purpose of this examination, the corrected "1/4 mineral interest" is being reflected as a 1/8th mineral interest to both, the Estate of Colonel E. Gordon, Apparently Deceased and the Heirs at Law of Colonel E. Gordon, Apparently Deceased and to the Estate of Guidotta J. Gordon, Apparently Deceased and the Heirs at Law of Guidotta J. Gordon, Apparently Deceased.



**Note 3:**

In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, husband and wife, and V. J. Chvatal and Lydia Chvatal, husband and wife, all Parties state that the instrument is being executed/filed for the purpose to clarify and correct the oil, gas and other mineral ownership created under/by virtue of 498-325. Furthermore it's stated that what was the intent in previous instruments, is now being stipulated and agreed upon by V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants, so that each "The Chvatal's" and the "Gordon's" should be the owner of an undivided 1/4th interest in all O,G&O/M. Per Find-A-Grave, it is known that V. J. Chvatal passed away on 9/15/1995 and Lydia Chvatal passed away on 12/10/1997 and per record title it is known that this made "Lydia" the surviving joint tenant. However, the examiner could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for Lydia Chvatal, a/k/a Lydia H. Chvatal. Therefore their 1/4th interest is being left in the Estate of Lydia Chvatal, also known as Lidia Chvatal, Deceased and the Heirs at Law of Lydia Chvatal, also known as Lidia Chvatal, Deceased.

**Note 4:**

**UNRELEASED OIL & GAS LEASES**

DB 806-215, DB 806-392, DB 807-358, DB 807-947, DB 876-784, DB 876-786, DB 876-788, DB 876-790, DB 876-792, DB 882-630, and DB 882-632.

(This list should also include instrument #944235, Memorandum of Special Mineral Lease and Storage Agreement)

**Note 5:**

The Lessee, Windy Hill Water Operations, LLC is being shown above under the "Leasehold" portion of this report only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreement, might still be active in its primary term. The Memorandum of Special Mineral Lease and Storage Agreement was executed 12/7/2022 and filed 12/21/2022, as instrument #944235, with Myrna Ruth Jacobs, as Lessor and Windy Hill Water Operations, LLC, as Lessee. It is for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. Even with the limited information that is typically given in a "Memorandum", this one gave no term or period of lease and there was never any Release filed of record. There has been no Release filed of record.

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**Examined By:** Michael Powell

**Reviewed By:** Aaron Barnes

File/Order Number:	State: Colorado	County: Morgan	Parcel: 123319000008	Certification Dates: 4/16/1946 to 1/4/2024	Examiner: Michael Powell
Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)		Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No

Legal Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 C. Frazier, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Warranty Deed	4/15/1946	4/16/1946	428-369	S. A. Krehmeyer, also known as Samuel August Krehmeyer, and Ilma M. Krehmeyer, his wife	Colonel E. Gordon and Guidotta J. Gordon, his wife, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI  Subject to a 1/2 mineral reservation by Abby L. Kernochan as seen in 422/398 (no distinction is made as to if this applies to Sec. 19 or the OSL)  Grantor reserves 1/2 of all oil and gas rights in the E/2 of Sec. 19-3N-55W & OSL  <b>See Note 1</b>
Warranty Deed	10/18/1951	11/24/1951	498-325	Colonel E. Gordon and Guidotta J. Gordon, husband and wife	V. J. Chvatal and Lydia Chvatal, husband and wife, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI  Grantor reserves 1/2 of all O,G&O/M not having been reserved by prior grantors; and the other 1/2 O,G&O/M not previously reserved by grantors passing to grantees  Except (subject to) a reservation of 1/2 of all O,G&O/M, as seen in 428-369  <b>See Note 2 and 3</b>
Declaration of Interests	9/5/1960	10/6/1960	635-378	V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants	The Public	E/2 of Sec. 19-3N-55W (OSL)	Parties state that this instrument is being executed/filed for the purpose to clarify and correct the oil, gas and other mineral ownership created under/by virtue of 498-325.  Further it's stated that it is the intent in previous instruments, but is now the stipulation and agreement of V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants, that each "The Chvatal's" and the "Gordon's" should be the owner of an undivided 1/4th interest in all O,G&O/M.  <b>See Note 2 and 3</b>
Death Certificate	4/26/1968	5/23/1968	707-516	State of Colorado, Department of Health, Education, and Welfare and Samuel August Krehmeyer, Deceased	The Public	N/A	Samuel August Krehmeyer DOD is 12/20/1957.  <b>See Note 1</b>

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 C. Frazier, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Special Warranty Deed	2/14/1989	2/15/1989	910-75	V. J. Chvatal and Lydia Chvatal	Roy C. Baughman and Kathryn A. Baughman, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI Grantor reserves 1/2 of all O,G&O/M, if any, now owned by Grantors.  See Note 3
Warranty Deed	5/14/1990	5/16/1990	922-295	Roy C. Baughman and Kathryn A. Baughman	Jesse L. Frazier, Bonnie M. Frazier, and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/17/1995	11/21/1995	987-758	Jesse L. Frazier	Bonnie M. Frazier and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/20/2000	11/22/2000	1080-371	Cody W. Frazier	Bonnie M. Frazier	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/20/2000	10/2/2003	1159-45	Cody W. Frazier AKA Cody Frazier	Bonnie M. Frazier	E/2 of Sec. 19, T3N, R55W	ARTI
Quit Claim Deed	9/8/2014	9/9/2014	889394	Bonne M. Frazier	Bonnie M. Carpenter and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Correction Quit Claim Deed	9/30/2014	10/2/2014	889837	Bonnie M. Frazier	Bonnie M. Carpenter and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quit Claim Deed	8/3/2018	8/3/2018	913550	Bonnie M. Carpenter nka Bonnie Frazier and Cody W. Frazier	Cody W. Frazier	NE/4 of Sec. 19, T3N, R55W	ARTI

**END OF DEEDS / CHAIN OF TITLE**

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 C. Frazier, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				

**EXCEPTIONS / REQUIREMENTS**

Oil and Gas Lease	8/14/1980	8/29/1980	806-215	V. J. Chvatal and Lidia Chvatal, (also known as Lydia Chvatal) husband and wife	Morgan Oil Company	E/2 of Sec. 19-3N-55W Lot 1, Lot 2, Lot 3, Lot 4, E/2 W/2, E/2 of Sec. 18-3N-55W NE/4 of Sec. 13-3N-56W	5yrs; 1/8th UNRELEASED
Oil and Gas Lease	8/25/1980	9/8/1980	806-392	Guidotta J. Gordon, a widow	Morgan Oil Company	E/2 of Sec. 19-3N-55W Lot 1, Lot 2, Lot 3, Lot 4, E/2 W/2, E/2 of Sec. 18-3N-55W NE/4 of Sec. 13-3N-56W	5yrs; 1/8th UNRELEASED See Note 2
Oil and Gas Lease	8/29/1980	10/3/1980	807-358	George Calvin Krehmeyer and Beverly K. Krehmeyer, his wife	Morgan Oil Company	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	5yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	8/29/1980	10/21/1980	807-947	Ilma Krehmeyer, a widow; Samuel Joseph Krehmeyer and Diana Krehmeyer, his wife; Wilma June Covey and Mason Covey, her husband; Fred Herman Krehmeyer and Beverlee Krehmeyer, his wife	Morgan Oil Company	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	5yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	12/30/1985	2/12/1986	876-784	Wilma June Covey, a married woman dealing in his sole and separate property	Donald C. Winslow	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	2yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	12/30/1985	2/12/1986	876-786	Ilma Krehmeyer, a widow and Samuel Joseph Krehmeyer, a/k/a Samuel J. Krehmeyer	Donald C. Winslow	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	2yrs; 1/8th UNRELEASED See Note 1

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Oil and Gas Lease	12/30/1985	2/12/1986	876-788	George Calvin Krehmeyer, a married man dealing in his own separate property	Donald C. Winslow	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	2yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	12/30/1985	2/12/1986	876-790	Fred Herman Krehmeyer, a married man dealing in his sole and separate property	Donald C. Winslow	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	2yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	12/30/1985	2/12/1986	876-792	Myma Ruth Jacobs, a married person	Donald C. Winslow	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	2yrs; 1/8th UNRELEASED See Note 1
Oil and Gas Lease	7/18/1986	8/22/1986	882-630	Guidotta J. Gordon, a widow	Donald C. Winslow	E/2 of Sec. 19-3N-55W	2yrs; 1/8th UNRELEASED See Note 2
Oil and Gas Lease	7/18/1986	8/22/1986	882-632	V. J. Chvatal and Lydia Chvatal, a/k/a Lidia H. Chvatal, husband and wife	Donald C. Winslow	E/2 of Sec. 19-3N-55W	Primary Term of 2 Years Royalty of 1/8 UNRELEASED
Memorandum of Special Mineral Lease and Storage Agreement	12/7/2022	12/21/2022	944235	Myma Ruth Jacobs	Windy Hill Water Operations LLC	E/2 of Sec. 19-3N-55W Lot 3, Lot 4, E/2 SW/4, E/2 of Sec. 18-3N-55W	Lease Agreement was entered into by both parties on 10/10/2022 Note: There is no "Term" or Royalty given UNRELEASED See Note 4



Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northeast Quarter (NE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				

**END OF EXCEPTIONS / REQUIREMENTS**

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				

**NOTES**

**Note 1:** In DB 428-369, between S. A. Krehmeyer, also known as Samuel August Krehmeyer, and Ilma M. Krehmeyer, his wife and Colonel E. Gordon and Guidotta J. Gordon, his wife, the Grantors reserve 1/2 interest in all the minerals in the E/2 of Sec. 19-3N-55W. After DB 428-369, the Krehmeyer's who made the 1/2 reservation in said conveyance do not reappear in title. There was a Death Certificate filed at 707-516 which states that S.A. Krehmeyer, aka Samuel August Krehmeyer died on 12/20/1957, but the examiner could not locate any conveyance out of "S.A.", or any Probate, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information. Additionally, per Find-A-Grave it is known that Ilma Krehmeyer (widow of S.A.) passed away on 3/3/2002, however the examiner could not locate any conveyance out of "Ilma", or any Probate, LWT, Affidavit or any other death related instrument filed of record. Since it is known that S.A. died before his wife, Ilma, along with all of the other facts described herein, this examination is leaving their 1/2 interest in the Estate of Ilma M. Krehmeyer, Deceased and the Heirs at Law of Ilma M. Krehmeyer, Deceased. There are a number of unreleased Oil and Gas Leases executed by what could be possible apparent heirs of Samuel August Krehmeyer as seen at (e.g. DB 807-358; 807-947; 876-784; 876-786; 876-788; 876-790; and 876-792), although there is nothing to verify this. Those possible apparent heirs executing leases are: Ilma Krehmeyer, a widow; Samuel Joseph Krehmeyer, Wilma June Covey, Fred Herman Krehmeyer, George Calvin Krehmeyer and Myrna Ruth Jacobs, a married person. The examiner also could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for any of those parties found leasing. Additionally, per Find-A-Grave, the Dates of Death for the following are: Samuel J. Krehmeyer (DOD 7/4/1991); George Calvin Krehmeyer (DOD 3/7/2005); Fred Herman Krehmeyer (DOD 7/14/2017); and Per the Find-A-Grave for Samuel J. Krehmeyer, a/k/a Samuel Joseph Krehmeyer, it was found that "Samuel" had 2 sisters Wilma June Covey and Myrna Ruth Jacobs. Further curative measures are needed.

**Note 2:** In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, as Joint Tenants and then V. J. Chvatal and Lydia Chvatal also as Joint Tenants, it is explained, for the purpose of clarifying and correcting the mineral ownership created by virtue of the Warranty Deed at 498/325, that the two Joint Tenancies each both own a 1/4 mineral interest and not a 1/2 mineral interest each as preciously stated, in the E/2 of Sec.19-3N-55W respectively. The examiner could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for Guidotta J. Gordon or Colonel E. Gordon. However, Guidotta J. Gordon, a widow did execute two Oil & Gas Leases, at DB 806-392 and at DB 882-630 so it is likely that "Colonel" pre-deceased her although no further internet research revealed a DOD for either. Therefore, for the purpose of this examination, the corrected "1/4 mineral interest" is being reflected as a 1/8th mineral interest to both, the Estate of Colonel E. Gordon, Apparently Deceased and the Heirs at Law of Colonel E. Gordon, Apparently Deceased and to the Estate of Guidotta J. Gordon, Apparently Deceased and the Heirs at Law of Guidotta J. Gordon, Apparently Deceased.

**Note 3:** In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, husband and wife, and V. J. Chvatal and Lydia Chvatal, husband and wife, all Parties state that the instrument is being executed/filed for the purpose to clarify and correct the oil, gas and other mineral ownership created under/by virtue of 498-325. Furthermore it's stated that what was the intent in previous instruments, is now being stipulated and agreed upon by V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants, so that each "The Chvatal's" and the "Gordon's" should be the owner of an undivided 1/4th interest in all O,G&O/M. Per Find-A-Grave, it is known that V. J. Chvatal passed away on 9/15/1995 and Lydia Chvatal passed away on 12/10/1997 and per record title it is known that this made "Lydia" the surviving joint tenant. However, the examiner could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for Lydia Chvatal, a/k/a Lydia H. Chvatal. Therefore their 1/4th interest is being left in the Estate of Lydia Chvatal, also known as Lidia Chvatal, Deceased and the Heirs at Law of Lydia Chvatal, also known as Lidia Chvatal, Deceased.

**Note 4:** The Lessee, Windy Hill Water Operations, LLC is being shown as a possible Leasehold Owner, only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreement, might still be active in its primary term. The Memorandum of Special Mineral Lease and Storage Agreement was executed 12/7/2022 and filed 12/21/2022, as instrument #944235, with Myrna Ruth Jacobs, as Lessor and Windy Hill Water Operations, LLC, as Lessee. It is for he purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. Even with the limited information that is typically given in a "Memorandum", this one gave no term or period of lease and there was never any Release filed of record. There has been no Release filed of record.

**END OF NOTES**



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 11/3/1938 to 1/4/2024

### Property Description

**Parcel:** 123319000001      **Acreage:** 165.52  
**County:** Morgan      **State:** Colorado  
**Township/District:** 3N-55W  
**Tax Amount:** \$138.88      **Tax Status:** Paid

**Legal Description:** The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

### Surface Ownership (Per Reported Assessment)

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Bonnie Frazier 30475 County Road O Brush, Colorado 80723 (Circa: 2023, Assessor's Website)	1.00000	165.52000	Not Examined	Not Examined
<b>TOTALS:</b>	<b>1.0000</b>	<b>165.5200</b>		

### Subsurface/Formation/Mineral Ownership

**Description:** The Northeast Quarter of the Northwest Quarter (NE/4 NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Martha E. Colburn, a/k/a Martha Colburn 14998 Highway 71 Brush, Colorado 80723 (Circa: 1986, OGL 880-296)	1.00000	40.00000	OPEN	ED 744-663 and Instrument #875166
<b>TOTALS:</b>	<b>1.0000</b>	<b>40.0000</b>		

### Subsurface/Formation/Mineral Ownership

**Description:** The West Half of the Northwest Quarter (W/2 NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Martha E. Colburn, a/k/a Martha Colburn 14998 Highway 71 Brush, Colorado 80723 (Circa: 1986, OGL 880-296)	0.50000	42.76000	LEASED	ED 744-663 and Instrument #875166
The Estate of Charles W. Reichard and the Estate of Sarah Reichard, both deceased and their known/unknown Heirs at Law Address Unknown (Circa: 1938, WD 369-387)	0.50000	42.76000	OPEN	WD 369-387  <b>See Note 1</b>
<b><u>Apparent Heirs (As shown in POA 523-83):</u></b>				
Mattie A. Johnston, a widow Address Unknown				POA 523-83
<b><u>Possible Heir or Predecessor to Mattie A. Johnston, a widow:</u></b>				
Martha Krohn, Joseph M. Johnston and Isabel Hatfield, Trustees of the Johnston Trust Marion County, IA (Circa- 1979, 800-529)				QCD 800-529
Gerald Johnston Leuty and Norma Jean Leuty, H&W Sonoma County, CA (Circa- 1979, 800-530)				QCD 800-530



Martha O. Stentz Crouch, a widow, deceased Knoxville, Marion County, IA (Circa- 1963, Findagrave.com)				POA 523-83
Myrtle R. Irvin and C.C. Irvin, apparently deceased Address Unknown				POA 523-83
<b><u>Apparent Heirs of Myrtle R. Irvin &amp; C.C. Irvin:</u></b>				
Frank Philip Irvin and Florence Nelson Irvin, Trustees of Irvin Family Trust, previously owned by Frank Irvin Address Unknown				765-839  Note:
Grace Stentz Ruby and Boyd E. Ruby, W&H, apparently deceased Address Unknown				POA 523-83
Grace Stentz, Trustee of Grace Stentz Ruby Trust Los Angeles County, CA (Circa- 1979, 800-519)				QCD 800-519
J.C. Stentz and Estelle Stentz, H&W apparently deceased Address Unknown				POA 523-83
Angie Manhardt, unmarried, apparently deceased Knoxville, Marion County, IA (Circa- 1944, Findagrave.com)				POA 523-83
Helen Stentz Ashton and Ned Ashton, W&H, both deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				POA 523-83
C.P. Stentz and Ann Stentz, H&W Address Unknown				POA 523-83
Howard E. Reichard and Dorothy Reichard, H&W Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				POA 523-83
Clara J. Banks, unmarried, deceased Oskaloosa, Mahaska County, IA (Circa- 1947, Findagrave.com)				POA 523-83
Charles H. Banks and Hermine Banks, H&W, both deceased Oskaloosa, Mahaska County, IA (Circa- 1957, Findagrave.com)				POA 523-83
J.R. Ashton and Charles E. Ashton Address Unknown				POA 523-83
Mary Stentz, possibly deceased, as Sister and Heir of the Estate of Charles W. Reichard, deceased Address Unknown				WD 635-233 Note: Received interest from Helen Ashton in POA 523-83
<b><u>Possible Heir or Predecessor to Mary Stentz:</u></b>				
Muriel E. Carney and John W. Carney, W&H 489 Hartnell Pl Sacramento, CA, 95825 (Circa- 2023, IDICORE.com)				QCD 800-513
Betty Jane Tinti and Jay A. Tinti, W&H Alameda, Colorado (Circa-1979, 800-514)				QCD 800-514
Carl C. Irvin and Marian S. Irvin, H&W Kerns County, CO (Circa- 1979, 800-515)				QCD 800-515
Elizabeth Irvin Farris, a widow Fort Worth, Tarrant County, TX (Circa- 1993, Findagrave.com)				QCD 800-516
Helen Ashton, a widow, Deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				QCD 800-517
Anna M. Stentz, a widow San Miguel County, New Mexico (Circa- 1979, 800-518)				QCD 800-518
Charles E. Ashton, Deceased and Marjorie A. Ashton, Deceased H&W 119 Firwood Drive Saint Louis, MO 63119 (Circa- 2023, IDICORE.com)				QCD 800-520

John Robert Ashton, Deceased and Neola M. Ashton, H&W 1080 Silvercrest Way APT 205 Iowa City, IA 52240 (Circa- 2023, IDICORE.com)				QCD 800-521
James E. Sullivan Marie C. Sullivan, H&W 10900 Grand Cypress Ave. Las Vegas, NV 89134 (Circa- 2023, IDICORE.com)				QCD 800-522
Paul Sullivan and Jacqueline Sullivan, H&W Tarrant County, TX (Circa- 1979, 800-253)				QCD 800-523
Martha Jo Jucks and William R. Jucks, W&H, both deceased 5417 Beretta Way Wilmington, NC 28409 (Circa- 2023, IDICORE.com)				QCD 800-524
John C. Sullivan and Linda L. Sullivan, H&W Portage County, OH (Circa- 1979, 800-525)				QCD 800-525
Josephine R. Overton and Corwin W. Overton, W&H, both deceased 665 Oxford Oaks Lane Oxford, MI 48371 (Circa- 2023, IDICORE.com)				QCD 800-526
D.F. Reichard, possibly deceased, as Brother and Heir of the Estate of Charles W. Reichard, deceased Address Unknown				QCD 800-527
<b><u>Possible Heir or Predecessor to D.F. Reichard:</u></b>				
Georgia R. MacGibbon, a widow				
Dorothy Reichard, Deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				QCD 800-528
Dorothy E. Lager, aka Dorothy E. Monninger, aka Dorothy E. Banks and Alvin Lager 2520 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-531
William R. Banks, aka William Banks and Rosemary A. Banks Address Unknown				QCD 800-533
Wilma E. Wagenblast, formerly Wilma Banks and Jack E. Wagenblast, both deceased 2520 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-535
Eleanor M. Lytle, formerly Eleanor Banks and James L. Lytle, deceased 2500 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-537
Edwin Phillip Banks aka Edward John Banks and Virginia Banks, both deceased 3060 Dover Dr. Boulder, CO 80305 (Circa- 2023, IDICORE.com)				QCD 800-539
John Alfred Banks, aka Alfred Banks and Etta Mae Banks, his wife Arapahoe County, CO (Circa- 1979, 800-541)				QCD 800-541
Irvin Family Trust Kern County, CA (Circa- 1980, 805-420)				QCD 805-420
Jeanne Butler Address Unknown				MD 827457

Reichard-Banks Investment Co. 14261 E. Warren Place Aurora County, CO (Circa- 1986, 882-628)				<b>See Note 1</b>
<b>TOTALS:</b>		1.0000	85.5200	
<b>Subsurface/Formation/Mineral Ownership</b>				
<b>Description: The Southeast Quarter of the Northwest Quarter (SE/4 NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.</b>				
<b>Owner:</b>	<b>Interest:</b>	<b>Net Acres:</b>	<b>Status:</b>	<b>Vesting Doc:</b>
Martha E. Colburn, a/k/a Martha Colburn 14998 Highway 71 Brush, Colorado 80723 (Circa: 1986, OGL 880-296)	0.50000	20.00000	OPEN	ED 744-663 and Instrument #875166
The Estate of Charles W. Reichard, Deceased and Heirs at Law of Charles W. Reichard, Deceased Address Unknown (Circa: 1938, WD 369-387)	0.50000	20.00000	OPEN	WD 369-387  <b>See Note 1</b>
<b><u>Apparent Heirs (As shown in POA 523-83):</u></b>				
Mattie A. Johnston, a widow Address Unknown				POA 523-83
<b><u>Possible Heir or Predecessor to Mattie A. Johnston, a widow:</u></b>				
Martha Krohn, Joseph M. Johnston and Isabel Hatfield, Trustees of the Johnston Trust Marion County, IA (Circa- 1979, 800-529)				QCD 800-529
Gerald Johnston Leuty and Norma Jean Leuty, H&W Sonoma County, CA (Circa- 1979, 800-530)				QCD 800-530
Martha O. Stentz Crouch, a widow, deceased Knoxville, Marion County, IA (Circa- 1963, Findagrave.com)				POA 523-83
Myrtle R. Irvin and C.C. Irvin, apparently deceased Address Unknown				POA 523-83
<b><u>Apparent Heirs of Myrtle R. Irvin &amp; C.C. Irvin:</u></b>				
Frank Philip Irvin and Florence Nelson Irvin, Trustees of Irvin Family Trust, previously owned by Frank Irvin Address Unknown				765-839  Note:
Grace Stentz Ruby and Boyd E. Ruby, W&H, apparently deceased Address Unknown				POA 523-83
Grace Stentz, Trustee of Grace Stentz Ruby Trust Los Angeles County, CA (Circa- 1979, 800-519)				QCD 800-519
J.C. Stentz and Estelle Stentz, H&W apparently deceased Address Unknown				POA 523-83
Angie Manhardt, unmarried, apparently deceased Knoxville, Marion County, IA (Circa- 1944, Findagrave.com)				POA 523-83
Helen Stentz Ashton and Ned Ashton, W&H, both deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				POA 523-83
C.P. Stentz and Ann Stentz, H&W Address Unknown				POA 523-83
Howard E. Reichard and Dorothy Reichard, H&W Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				POA 523-83
Clara J. Banks, unmarried, deceased Oskaloosa, Mahaska County, IA (Circa- 1947, Findagrave.com)				POA 523-83

Charles H. Banks and Hermine Banks, H&W, both deceased Oskaloosa, Mahaska County, IA (Circa- 1957, Findagrave.com)				POA 523-83
J.R. Ashton and Charles E. Ashton Address Unknown				POA 523-83
Mary Stentz, possibly deceased, as Sister and Heir of the Estate of Charles W. Reichard, deceased Address Unknown				WD 635-233 Note: Received interest from Helen Ashton in POA 523-83
<b><u>Possible Heir or Predecessor to Mary Stentz:</u></b>				
Muriel E. Carney and John W. Carney, W&H 489 Hartnell Pl Sacramento, CA, 95825 (Circa- 2023, IDICORE.com)				QCD 800-513
Betty Jane Tinti and Jay A. Tinti, W&H Alameda, Colorado (Circa-1979, 800-514)				QCD 800-514
Carl C. Irvin and Marian S. Irvin, H&W Kerns County, CO (Circa- 1979, 800-515)				QCD 800-515
Elizabeth Irvin Farris, a widow Fort Worth, Tarrant County, TX (Circa- 1993, Findagrave.com)				QCD 800-516
Helen Ashton, a widow, Deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				QCD 800-517
Anna M. Stentz, a widow San Miguel County, New Mexico (Circa- 1979, 800-518)				QCD 800-518
Charles E. Ashton, Deceased and Marjorie A. Ashton, Deceased H&W 119 Firwood Drive Saint Louis, MO 63119 (Circa- 2023, IDICORE.com)				QCD 800-520
John Robert Ashton, Deceased and Neola M. Ashton, H&W 1080 Silvercrest Way APT 205 Iowa City, IA 52240 (Circa- 2023, IDICORE.com)				QCD 800-521
James E. Sullivan Marie C. Sullivan, H&W 10900 Grand Cypress Ave. Las Vegas, NV 89134 (Circa- 2023, IDICORE.com)				QCD 800-522
Paul Sullivan and Jacqueline Sullivan, H&W Tarrant County, TX (Circa- 1979, 800-253)				QCD 800-523
Martha Jo Jucks and William R. Jucks, W&H, both deceased 5417 Beretta Way Wilmington, NC 28409 (Circa- 2023, IDICORE.com)				QCD 800-524
John C. Sullivan and Linda L. Sullivan, H&W Portage County, OH (Circa- 1979, 800-525)				QCD 800-525
Josephine R. Overton and Corwin W. Overton, W&H, both deceased 665 Oxford Oaks Lane Oxford, MI 48371 (Circa- 2023, IDICORE.com)				QCD 800-526
D.F. Reichard, possibly deceased, as Brother and Heir of the Estate of Charles W. Reichard, deceased Address Unknown				QCD 800-527
<b><u>Possible Heir or Predecessor to D.F. Reichard:</u></b>				
Georgia R. MacGibbon, a widow Multnomah, OR (Circa- 1979, 800-527)				

Dorothy Reichard, Deceased Knoxville, Marion County, IA (Circa- 1986, Findagrave.com)				QCD 800-528
Dorothy E. Lager, aka Dorothy E. Monninger, aka Dorothy E. Banks and Alvin Lager 2520 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-531
William R. Banks, aka William Banks and Rosemary A. Banks Address Unknown				QCD 800-533
Wilma E. Wagenblast, formerly Wilma Banks and Jack E. Wagenblast, both deceased 2520 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-535
Eleanor M. Lytle, formerly Eleanor Banks and James L. Lytle, deceased 2500 S. Jackson St. Denver, CO 80210 (Circa- 2023, IDICORE.com)				QCD 800-537
Edwin Phillip Banks aka Edward John Banks and Virginia Banks, both deceased 3060 Dover Dr. Boulder, CO 80305 (Circa- 2023, IDICORE.com)				QCD 800-539
John Alfred Banks, aka Alfred Banks and Etta Mae Banks, his wife Arapahoe County, CO (Circa- 1979, 800-541)				QCD 800-541
Irvin Family Trust Kern County, CA (Circa- 1980, 805-420)				QCD 805-420
Jeanne Butler Address Unknown				MD 827457
Reichard-Banks Investment Co. 14261 E. Warren Place Aurora County, CO (Circa- 1986, 882-628)				<b>See Note 1</b>
<b>TOTALS:</b>	<b>1.0000</b>	<b>40.0000</b>		

#### Current Lease of Record

<b>Lease Number:</b>	N/A	<b>Status:</b>	<b>See Note 2</b>
<b>Original Lessor:</b>	Martha E. Colburn, a/k/a Martha Colburn		
<b>Original Lessee:</b>	Windy Hill Water Operations LLC		
<b>Instrument:</b>	944234	<b>Dated:</b>	12/7/2022
<b>Acres Leased:</b>	85.52000	<b>Term:</b>	None given

**Notes: See Note 2**

#### Leasehold Ownership

**Description: The West Half of the Northwest Quarter (W/2 NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.**

Owner:	Interest:	Net Acres:	OGL:	Vesting Doc:
Windy Hill Water Operations LLC 3001 Ranch Road 620 S. Suite 321 Austin, Texas 78738 (Circa: 2022, Instrument #944235)	<b>See Note 3</b>	<b>See Note 3</b>	N/A	Instrument #944234 <b>See Note 3</b>
<b>TOTALS:</b>	<b>0.0000</b>	<b>0.0000</b>		

#### Mortgages

None Open/Unsatisfied of Record.

#### Judgments/Liens

None Open/Unsatisfied of Record.

#### Well Information

No active or producing wells found located upon property or unitized with property.

**Unit Information**

**None Found.**

**Title Notes**

**Note 1:**

In Warranty Deed dated 7/16/1938, DB 369-387, between Charles W. Reichard, also known as C. W. Reichard, and A. G. Moeller and Rachel Moeller, the Grantor reserves 1/2 interest in all the minerals under the W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W. In Power of Attorney dated 10/22/1940, DB 523-83, the possible heirs at law of Charles W. Reichard and Sarah Reichard, both deceased, appoint Joe M. Johnston as their attorney in fact. In Quit Claim Deed dated 12/17/1980, DB 800-513, it states that the interest being conveyed is a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased who died testate on 9/30/1940. However, the examiner was unable to locate a Probate/ Last Will and Testament of record for the said Charles W. Reichard nor Sarah Reichard in the Morgan County, Colorado public records. Additionally, the examiner reached out to the Colorado Judicial Branch to obtain Charles W. Reichard's probate record and there is no probate of record filed in Morgan County, Colorado. The record chain of title reflects that 25 Quit Claim Deeds were executed by the possible heirs at law of Charles W. Reichard, deceased, as Grantors conveying to the Reichard-Banks Investment Co., as Grantee. It is unknown as to what mineral interest each Grantor holds as the Probate for Charles W. Reichard was not locatable. For the purposes of this examination, the examiner left the ½ mineral interest owned by Charles W. Reichard in the following manner: The Estate of Charles W. Reichard, Deceased and Heirs at Law of Charles W. Reichard, Deceased. The Grantors of the said Quit Claim Deeds hereinabove named are reflected as the possible heirs at law or predecessor of Charles W. Reichard, deceased. Further curative measures are needed.

**Note 2:**

**UNRELEASED OIL & GAS LEASES**

Upon examination there are seven unreleased Oil and Gas Leases: DB 487-107, DB 598-197, DB 785-521, DB 807-949, DB 809-373, DB 880-296, DB 882-628.

(This list should also include instrument #944235, Memorandum of Special Mineral Lease and Storage Agreement)

**Note 3:**

The Lessee, Windy Hill Water Operations, LLC is being shown above under the "Leasehold" portion of this report only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreement, might still be active in its primary term. The Memorandum of Special Mineral Lease and Storage Agreement was executed 12/7/2022 and filed 12/21/2022, as instrument #944234, with Martha E. Colburn, a/k/a Martha Colburn, as Lessor and Windy Hill Water Operations, LLC, as Lessee. It is for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. Even with the limited information that is typically given in a "Memorandum", this one gave no term or period of lease and there was never any Release filed of record.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**Examined By:** Michael Powell

**Reviewed By:** Gabe Esparza

File/Order Number:	State: Colorado	County: Morgan	Parcel: 123319000001	Certification Dates: 11/3/1938 to 1/4/2024	Examiner: Michael Powell
Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)		Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes

Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bonnie Frazier, to current county effective date.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Warranty Deed	7/16/1938	11/3/1938	369-387	Charles W. Reichard, also known as C. W. Reichard	A. G. Moeller and Rachel Moeller, as joint tenants	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Grantor reserves 1/2 of all oil and mineral rights.  See Note 1
Quit Claim Deed	11/30/1948	11/22/1948	457-11	Robert Truex	J. F. Lemons	NE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Geneva Lemons receives this property in DB 365-438, dated 4/27/1938, which is beyond the purview of this assignment.
Quit Claim Deed	11/15/1948	11/22/1948	457-13	J. M. Lemons	J. F. Lemons	NE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Geneva Lemons receives this property in DB 365-438, dated 4/27/1938, which is beyond the purview of this assignment.
Quit Claim Deed	11/17/1948	11/22/1948	457-15	C. E. Lemons	J. F. Lemons	NE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Geneva Lemons receives this property in DB 365-438, dated 4/27/1938, which is beyond the purview of this assignment.
Quit Claim Deed	11/15/1948	11/22/1948	457-17	R. E. Lemons	J. F. Lemons	NE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Geneva Lemons receives this property in DB 365-438, dated 4/27/1938, which is beyond the purview of this assignment.

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bonnie Frazier, to current county effective date.

**DISCLAIMER STATEMENT:**

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Power of Attorney	10/22/1940	12/2/1953	523-83	Mattie A. Johnston, a widow; Martha O. Crouch, a widow; Myrtle R. Irvin and C. C. Irvin, wife and husband; Grace Stentz Ruby and Boyd E. Ruby, wife and husband; J. C. Stentz and Estelle Stentz, husband and wife; Angie Manhardt, unmarried; Helen Stentz Ashton and Ned Ashton, wife and husband; C. P. Stentz and Ann Stentz, husband and wife; Howard E. Reichard and Dorothy Reichard, husband and wife; Georgia R. MacGibbon and William MacGibbon, wife and husband; Clara J. Banks, unmarried; Charles H. Banks and Hermine Banks, husband and wife; and John E. Banks and Elizabeth Banks, husband and wife	Joe M. Johnston	None given	This Power of Attorney appoints Joe M. Johnston as the attorney in fact for the following individuals. Additionally, Joe M. Johnston is authorized once all of the property that may be in the hands of and under the control of the representatives of the estate of Charles W. Reichard and of Sarah Reichard, both deceased, is reduced to money or other acceptable items of property so that the same can be conveniently divided, said attorney in fact is directed to distribute the same to the following named persons and in the following proportions, to wit: Mattie A. Johnston: 14/84. Mattie O. Crouch: 2/84 Myrtle R. Irvin: 2/84 Grace Stentz Ruby: 2/84 J. C. Stentz: 2/84 Ange Manhardt: 2/84 Helen Stentz Ashton: 2/84 C. P. Stentz: 2/84 Howard E. Reichard: 7/84 Georgia R. MacGibbon: 7/84 Clara J. Banks: 14/84 Charles H. Banks: 14/84 John E. Banks: 14/84
Warranty Deed	12/5/1957	7/23/1959	620-81	Joe M. Johnston & Mary Johnston, husband and wife	Martha Krohn, Isabel Kruse, Joseph M. Johnston and the Community National Bank and Trust Company, as Trustees under the Trust Agreement dated 8/1/1995 and known as Trust No. 45, Community National Bank and Trust Company	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	Grantors convey their undivided interest in the oil and mineral rights underlying the subject lands.  The record chain of title reflects that Joe M. Johnston & Mary Johnston, husband and wife, did not receive any interest in the oil and mineral rights underlying the subject lands and that Joe M. Johnston was only appointed as the attorney in fact for the possible heirs at law of Charles W. Reichard, deceased.
Decree of Final Settlement	5/7/1958	5/7/1958	733-39	The County Court of Chaffee and the Estate of Jesse F. Lemons, Deceased	Albert Lemons	None given	All of the proceeds of the Estate of Jesse F. Lemons are the property of Albert Lemons, the decedent's brother.
Warranty Deed	9/14/1960	9/28/1960	635-233	Helen Ashton, a widow	J. R. Ashton and Charles E. Ashton	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in Grantor's undivided interest in the oil and mineral rights underlying said property.  See Note 2



Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bonnie Frazier, to current county effective date.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Last Will and Testament of Jesse F. Lemons	2/8/1954	11/27/1972	733-43	District Court of Chaffee County, Colorado and the Estate of Jesse F. Lemons	Albert Lemons	Outside lands	The rest and residue is bequeathed to Albert Lemons, the decedent's brother. William S. Rush is appointed to the Executor of the Last Will and Testament. Jesse F. Lemons DOD 11/22/1956.
Letters Testamentary	5/25/1972	3/7/1973	734-591	The District Court of Morgan County, Colorado and The Estate of Rachel Moeller, a/k/a Rachel M. Moeller, a/k/a Rachel Mahala Moeller, a/k/a Rachael Moeller, a/k/a Rachell Moeller, Deceased	Adolph H. Moeller	None given	Adolph H. Moeller is appointed to be the Executor of the named estate.  Rachel M. Moeller's DOD 4/1/1972.
Order Admitting Probate and Last Will and Testament	5/25/1972	3/7/1973	734-592	The District Court of Morgan County, Colorado, The Estate of Rachel Moeller, a/k/a Rachel M. Moeller, a/k/a Rachel Mahala Moeller, a/k/a Rachael Moeller, a/k/a Rachell Moeller, Deceased	Adolph Henry Moeller; Emmett Charles Moeller; Henrietta Rachel Goeken; Ella Irene Leakey; Jesse Clay Moeller; and Loren Dean Moeller	None given	Adolph H. Moeller is appointed to be the Executor of the named estate. All interest owned by the decedent is split between her children share and share alike: Adolph Henry Moeller; Emmett Charles Moeller; Henrietta Rachel Goeken; Ella Irene Leakey; Jesse Clay Moeller; and Loren Dean Moeller.
Decree	4/6/1974	5/8/1974	743-930	Adolph H. Moeller, executor of the Estate of Rachel Moeller, the same person as Rachel M. Moeller, Rachel Mahala Moeller, Rachael Moeller, and Rachell Moeller, Plaintiff, vs. J. F. Lemons, Geneva Lemons, Leanner B. Lemons, a.k.a. L. B. Lemons, Albert Lemons, and all persons who claim an interest by, through or under any of them; and all unknown persons who claim any interest in the subject matter of this action	Adolph H. Moeller, executor of the Estate of Rachel Moeller, the same person as Rachel M. Moeller, Rachel Mahala Moeller, Rachael Moeller, and Rachell Moeller	NE/4 NW/4 of Sec. 19-3N-55W (OSL)	It is ordered that Adolph H. Moeller, executor of the Estate of Rachel Moeller, the same person as Rachel M. Moeller, Rachel Mahala Moeller, Rachael Moeller, and Rachell Moeller is the fee simple owner of the described property.
Letters Testamentary	5/25/1972	6/11/1974	744-662	The District Court of Morgan County, Colorado, The Estate of Rachel Moeller, a/k/a Rachel M. Moeller, a/k/a Rachel Mahala Moeller, a/k/a Rachael Moeller, a/k/a Rachell Moeller, Deceased	Adolph H. Moeller	None given	This document is a rerecorded copy of DB 734-591.

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Executor's Deed	6/6/1974	6/11/1974	744-663	Adolph H. Moeller, as Executor of the Estate of Rachel M. Moeller, deceased	Wayne Colburn and Martha Colburn, in joint tenancy	W/2 of Sec. 19-3N-55W (OSL)	ARTI Rachel M. Moeller Last Will and Testament is dated 3/1/1971 and recorded in the District Court of Morgan County, Colorado (Probate No. P-539, dated 5/25/1972).
Individual Grant Deed	10/26/1976	11/1/1976	765-839	Frank Irvin	Frank Phillip Irvin and Florence Nelson Irvin, Trustees of Irvin Family Trust	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Frank Irvin is the son of Myrtle and Charles Chester Irvin per FindAGrave.com.
Quitclaim Deed	12/17/1980	2/6/1980	800-513	Muriel E. Carney and John W. Carney, wife and husband	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 10/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased who died testate on 9/30/1940  See Note 1
Quitclaim Deed	10/31/1979	2/6/1980	800-514	Betty Jane Tinti and Jay A. Tinti, wife and husband	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 10/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	11/9/1979	2/6/1980	800-515	Carl C. Irvin and Marian S. Irvin, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 79/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Quitclaim Deed	10/26/1979	2/6/1980	800-516	Elizabeth Irvin Farris, a widow	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 78/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	10/27/1979	2/6/1980	800-517	Helen Ashton, a widow	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 36/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	11/30/1979	2/6/1980	800-518	Anna M. Stentz	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 236/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	10/27/1979	2/6/1980	800-519	Grace Stentz, Trustee of Grace Stentz Ruby Trust	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 236/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	11/3/1979	2/6/1980	800-520	Charles E. Ashton and Marjorie A. Ashton, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 100/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	10/27/1979	2/6/1980	800-521	John Robert Ashton and Neola M. Ashton, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 100/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Quitclaim Deed	12/28/1979	2/6/1980	800-522	James E. Sullivan Marie C. Sullivan, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 25/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	12/17/1979	2/6/1980	800-523	Paul Sullivan and Jacqueline Sullivan, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 25/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	10/27/1979	2/6/1980	800-524	Martha Jo Jucks and William R. Jucks, wife and husband	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 25/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	11/2/1979	2/6/1980	800-525	John C. Sullivan and Linda L. Sullivan, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 25/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	11/6/1979	2/6/1980	800-526	Josephine R. Overton and Corwin W. Overton, wife and husband	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 136/14400 interest in all minerals. Being a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	10/29/1979	2/6/1980	800-527	Georgia R. Mac Gibbon, a widow	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 1/24 interest in all minerals. Being a 1/2 interest received by D. F. Reichard brother of Charles W. Reichard who died testate on 9/30/1940  See Note 1

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Legal Description: The Northwest Quarter (NW/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

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	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Quitclaim Deed	10/31/1979	2/6/1980	800-528	Dorothy Reichard, a widow	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 1/24 interest in all minerals. Being a 1/2 interest received by D. F. Reichard brother of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	8/1/1979	2/6/1980	800-529	Martha Krohn, Joseph M. Johnston and Isabel Hatfield, Trustees of the Johnston Trust	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 1/24 interest in all minerals. Being a 1/2 interest received by Mattie Johnston sister of Charles W. Reichard who died testate on 9/30/1940  See Note 1
Quitclaim Deed	10/31/1979	2/6/1980	800-530	Gerald Johnston Leuty and Norma Jean Leuty, husband and wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 1/24 interest in all minerals. Being a 1/2 interest received by Mattie Johnston sister of Charles W. Reichard, deceased  See Note 1
Quitclaim Deed	8/20/1979	2/6/1980	800-531	Dorothy E. Lager, aka Dorothy E. Monninger, aka Dorothy E. Banks and Alvin Lager	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals.  See Note 1
Quitclaim Deed	8/20/1979	2/6/1980	800-533	William R. Banks, aka William Banks and Rosemary A. Banks	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals.  See Note 1

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Quitclaim Deed	8/20/1979	2/6/1980	800-535	Wilma E. Wagenblast, formerly Wilma Banks and Jack E. Wagenblast	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals. See Note 1
Quitclaim Deed	8/20/1979	2/6/1980	800-537	Eleanor M. Lytle, formerly Eleanor Banks and James L. Lytle	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals. See Note 1
Quitclaim Deed	8/20/1979	2/6/1980	800-539	Edwin Phillip Banks aka Edward John Banks and Virginia Banks	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals. See Note 1
Quitclaim Deed	8/20/1979	2/6/1980	800-541	John Alfred Banks, aka Alfred Banks and Etta Mae Banks, his wife	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	An undivided 1/2 interest in all minerals. See Note 1
Individual Grant Deed	10/23/1979	8/6/1980	805-424	Florence Nelson Irvin, Trustee of Irvin Family Trust	Florence Nelson Irvin and Lloyds Bank California, a Banking Corporation, Trustees of the Irvin Family Trust	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in oil and mineral rights. See Note 1
Quitclaim Deed	1/31/1980	8/6/1980	805-420	Irvin Family Trust	Reichard-Banks Investment Co.	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI in 79/14400 interest in all minerals. The deed references a 1/6th interest granted to Mary Stentz sister of Charles W. Reichard who died testate on 9/30/1940 See Note 1
Warranty Deed	1/14/2000	1/14/2000	1065-235	Wayne Colburn and Martha Colburn	Bobby L. Carpenter and Bonnie M. Frazier as tenants in common, Bob L. Carpenter as to an undivided 55 percent and Bonnie M. Frazier as to an undivided 45 percent	NW/4 of Sec. 19-3N-55W (OSL)	ARTI in Surface Grantors reserve all oil, gas, and other minerals as joint tenants.
Mineral Deed (With Limited Warranty)	3/1/2005	6/3/2005	827457	Jeanne Butler	Drew C. Deaton	Lots 1-4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	ARTI Effective 1/1/2005.
Affidavit	4/12/2012	4/16/2012	875166	Carl S. McGuire III	The Public	W/2 of Sec. 19-3N-55W (OSL)	The affiant is claiming to known Wayne E. Colburn and that he passed away on 10/13/2011. Additionally, Wayne E. Colburn was in joint tenancy with Martha Colburn at the time of his death in the described lands.

**END OF DEEDS / CHAIN OF TITLE**

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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**EXCEPTIONS / REQUIREMENTS**

Oil, Gas and Mineral Lease	1/3/1951	2/27/1951	487-107	A. G. Moeller and Rachel M. Moeller, his wife	Roy M. Mays	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	Primary Term of 10 Years Royalty of 1/8  UNRELEASED
Oil, Gas and Mineral Lease	11/20/1957	2/28/1958	598-197	Joe M. Johnston, Joseph M. Johnston, and J. Robert Ashton, acting individually and as Agents and Attorneys-in-Fact for William R. Banks and Rosemary Banks, husband and wife; Anna E. Banks, a widow, Wilma Wagenblast and Jack E. Wagenblast, wife and husband; Eleanore Lytle and James L. Lytle, wife and husband; Edwin P. Banks and Virginia Banks, husband and wife; Dorothy E. Monninger and Lawrence V. Monninger, wife and husband; John A. Banks and Etta Mae Banks, husband and wife; Joe M. Johnston and Mary T. Johnston, husband and wife; H. E. Reichard and Dorothy Reichard, husband and wife; Martha (Mattie) Crouch, a widow; Helen Ashton and Ned Ashton, wife and husband; J. C. Stentz, a single man; Chester P. Stentz and Anna M. Stentz, husband and wife; Myrtle R. Irvin and C. C. Irvin (Chester), wife and husband; Grace Stentz Ruby, a widow; Mabel J. Donty Riddle and Paul W. Riddle, wife and husband; Hermine Banks, a widow; Georgia R. MacGibbon and William MacGibbon, wife and husband; Joseph M. Johnston and Joann L. Johnston, husband and wife; J. Robert Ashton and Neola M. Ashton, husband and wife.	The Texas Company	W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	Primary Term until 1/3/1961 Royalty of 1/8  UNRELEASED
Oil and Gas Lease	9/23/1970	10/6/1978	785-521	Wayne and Martha Colburn	Maxey Geological Services, Inc.	W/2 NW/4, SE/4 NW/4, and NE/4 NW/4 of Sec. 19-3N-55W (OSL)	Primary Term of 10 Years Royalty of 1/8  UNRELEASED

Vested Owner: Numerous Owners (See Ownership Report)	Vesting Document(s): Numerous Instruments (See Ownership Report)	Assessed Acreage: 165.520	Taxes: \$138.88 Paid	Judgments and Liens: Yes
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**DEEDS / CHAIN OF TITLE**

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	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Oil and Gas Lease	9/2/1980	10/2/1980	807-949	Reichard-Banks Investment Co.	Morgan Oil Company	Lots 1-4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	Primary Term of 5 Years Royalty of 1/8  UNRELEASED  See Note 1
Oil and Gas Lease	10/6/1980	10/6/1980	809-373	Wayne E. Colburn and Martha Colburn, husband and wife	Morgan Oil Company	Lots 1-4 and E/2 W/2 of Sec. 19-3N-55W (OSL)	Primary Term of 5 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	1/31/1986	6/5/1986	880-296	Wayne Colburn and Martha Colburn, husband and wife	Donald C. Winslow	Lots 1-4 and E/2 W/2 of Sec. 19-3N-55W (OSL)	Primary Term of 5 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	7/7/1986	8/22/1986	882-628	Reichard-Banks Investment Co.	Winslow Resources, Inc.	Lots 1-4 and SE/4 NW/4 of Sec. 19-3N-55W (OSL)	Primary Term of 1 Year Royalty of 1/8  UNRELEASED  See Note 1
Memorandum of Special Mineral Lease and Storage Agreement	12/7/2022	12/21/2022	944234	Martha E. Colburn, a/k/a Martha Colburn	Windy Hill Water Operations LLC	Lots 1-4 and E/2 W/2 of Sec. 19-3N-55W (OSL)	This agreement is allowing the Lessee to explore for minerals on said property. A term for the lease is not mentioned.  See Note 2

**END OF EXCEPTIONS / REQUIREMENTS**

**NOTES**

**Note 1:** In Warranty Deed dated 7/16/1938, DB 369-387, between Charles W. Reichard, also known as C. W. Reichard, and A. G. Moeller and Rachel Moeller, the Grantor reserves 1/2 interest in all the minerals under the W/2 NW/4 and SE/4 NW/4 of Sec. 19-3N-55W. In Power of Attorney dated 10/22/1940, DB 523-83, the possible heirs at law of Charles W. Reichard and Sarah Reichard, both deceased, appoint Joe M. Johnston as their attorney in fact. In Quit Claim Deed dated 12/17/1980, DB 800-513, it states that the interest being conveyed is a portion of the 1/6th interest received by Mary Stentz, sister of Charles W. Reichard, deceased who died testate on 9/30/1940. However, the examiner was unable to locate a Probate/ Last Will and Testament of record for the said Charles W. Reichard nor Sarah Reichard in the Morgan County, Colorado public records. Additionally, the examiner reached out to the Colorado Judicial Branch to obtain Charles W. Reichard's probate record and there is no probate of record filed in Morgan County, Colorado. Then in Warranty Deed dated 9/14/1960, DB 635-233, Helen Ashton, a widow, conveys all of her undivided interest in the oil and mineral rights underlying the subject lands to J.R. Ashton and Charles E. Ashton. However the examiner was unable to locate a conveyance of record in to the said Helen Ashton. The record chain of title reflects that 25 Quit Claim Deeds were executed by the possible heirs at law of Charles W. Reichard, deceased, in and to the Reichard-Banks Investment Co. It is unknown as to what mineral interest each Grantor holds as the Probate for Charles W. Reichard is not available for examination. For the purposes of this examination, the examiner left the 1/2 mineral interest owned by Charles W. Reichard in the following manner: The Estate of Charles W. Reichard, Deceased and Heirs at Law of Charles W. Reichard, Deceased. The Grantors of the said Quit Claim Deeds hereinabove named are reflected as the possible heirs at law or predecessor of Charles W. Reichard, deceased. Further curative measures are needed.

**Note 2:** The Lessee, Windy Hill Water Operations, LLC is being shown as a possible Leasehold Owner only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreement, might still be active in its primary term. The Memorandum of Special Mineral Lease and Storage Agreement was executed 12/7/2022 and filed 12/21/2022, as instrument #944234, with Myrna Ruth Jacobs, as Lessor and Windy Hill Water Operations, LLC, as Lessee. It is for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. Even with the limited information that is typically given in a "Memorandum", this one gave no term or period of lease and there was never any Release filed of record. There has been no Release filed of record.

**END OF NOTES**





## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 4/16/1946 to 1/4/2024

### Property Description

**Parcel:** 123319000009 and 123319000010      **Acreage:** 160.00  
**County:** Morgan      **State:** Colorado  
**S-T-R:** 19-3N-55W  
**Tax Amount:** \$131.72      **Tax Status:** Paid  
**Legal Description:** The East Half (E/2) of Southeast Quarter (SE/4) and the West Half (W/2) of Southeast Quarter (SE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

### Surface Ownership (Per Reported Assessment)

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Bonnie Frazier 30475 County Road O Brush, Colorado 80723 (Circa: 2023, Assessor's Website)	1.00000	160.00000	Not Examined	Not Examined
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

### Subsurface/Formation/Mineral Ownership

Description: The East Half (E/2) of Southeast Quarter (SE/4) and the West Half (W/2) of Southeast Quarter (SE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th PM				
Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Estate of Ilma M. Krehmeyer, Deceased and the Heirs at Law of Ilma M. Krehmeyer, Deceased Address Unknown (Circa: 1946, WD 428-369)	0.50000	80.00000	OPEN	<b>Note:</b> Vesting deed for this owner is unknown; It occurs before the initial mineral severance of WD 428-369  <b>See Note 1, 4 &amp; 5</b>
Estate of Colonel E. Gordon, Apparently Deceased and the Heirs at Law of Colonel E. Gordon, Apparently Deceased Address Unknown (Circa: 1960, 635-378)	0.12500	20.00000	OPEN	WD 428-369 <b>See Note 2</b>
Estate of Guidotta J. Gordon, Apparently Deceased and the Heirs at Law of Guidotta J. Gordon, Apparently Deceased Address Unknown (Circa: 1986, 882-632)	0.12500	20.00000	OPEN	WD 428-369 <b>See Note 2</b>
Estate of Lydia Chvatal, also known as Lidia Chvatal, Deceased and the Heirs at Law of Lydia Chvatal, also known as Lidia Chvatal, Deceased Address Unknown (Circa: 1989, SWD 910-75)	0.12500	20.00000	OPEN	WD 498-325 and Declaration of Interests 635-378  <b>See Note 3</b>
Bonnie Frazier 30475 CO RD O Brush, Colorado 80723 (Circa: 2018, QCD #913551)	0.12500	20.00000	OPEN	QCD #913551
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

### \*\*Current Lease of Record

**Lease Number:** N/A      **Status:** See Note 4  
**Original Lessor:** Myrna Ruth Jacobs  
**Original Lessee:** Windy Hill Water Operations LLC  
**Instrument:** 944235      **Dated:** 12/7/2022

Acres Leased: 320.00000

Term: None given

Notes: (Plus outside lands in Lot 3 & 4, E2 SW4, E2 of 18-3N-55W) See Note 4

**Leasehold Ownership**

Description: East Half (E/2) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Owner:	Interest:	Net Acres:	OGL:	Vesting Doc:
Windy Hill Water Operations LLC 3001 Ranch Road 620 S. Suite 321 Austin, Texas 78738 (Circa: 2022, Instrument #944235)	See Note 5	See Note 5	N/A	Instrument #944235  See Note 5
<b>TOTALS:</b>	<b>0.0000</b>	<b>0.0000</b>		

**Mortgages**

None Open/Unsatisfied of Record.

**Judgments/Liens**

None Open/Unsatisfied of Record.

**Well Information**

No active or producing wells found located upon property or unitized with property.

**Unit Information**

None Found.

**Title Notes**

**Note 1:**

In DB 428-369, between S. A. Krehmeyer, also known as Samuel August Krehmeyer, and Ilma M. Krehmeyer, his wife and Colonel E. Gordon and Guidotta J. Gordon, his wife, the Grantors reserve 1/2 interest in all the minerals in the E/2 of Sec. 19-3N-55W. After DB 428-369, the Krehmeyer's who made the 1/2 reservation in said conveyance do not reappear in title. There was a Death Certificate filed at 707-516 which states that S.A. Krehmeyer, aka Samuel August Krehmeyer died on 12/20/1957, but the examiner could not locate any conveyance out of "S.A.", or any Probate, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information. Additionally, per Find-A-Grave it is known that Ilma Krehmeyer (widow of S.A.) passed away on 3/3/2002, however the examiner could not locate any conveyance out of "Ilma", or any Probate, LWT, Affidavit or any other death related instrument filed of record. Since it is known that S.A. died before his wife, Ilma, along with all of the other facts described herein, this examination is leaving their 1/2 interest in the Estate of Ilma M. Krehmeyer, Deceased and the Heirs at Law of Ilma M. Krehmeyer, Deceased. There are a number of unreleased Oil and Gas Leases executed by what could be possible apparent heirs of Samuel August Krehmeyer as seen at (e.g. DB 807-358; 807-947; 876-784; 876-786; 876-788; 876-790; and 876-792), although there is nothing to verify this. Those possible apparent heirs executing leases are: Ilma Krehmeyer, a widow, Samuel Joseph Krehmeyer, Wilma June Covey, Fred Herman Krehmeyer, George Calvin Krehmeyer and Myrna Ruth Jacobs, a married person.

The examiner also could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for any of those parties found leasing. Additionally, per Find-A-Grave, the Dates of Death for the following are: Samuel J. Krehmeyer (DOD 7/4/1991); George Calvin Krehmeyer (DOD 3/7/2005); Fred Herman Krehmeyer (DOD 7/14/2017); and Per the Find-A-Grave for Samuel J. Krehmeyer, a/k/a Samuel Joseph Krehmeyer, it was found that "Samuel" had 2 sisters Wilma June Covey and Myrna Ruth Jacobs. Further curative measures are needed.

**Note 2:**

In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, as Joint Tenants and then V. J. Chvatal and Lydia Chvatal also as Joint Tenants, it is explained, for the purpose of clarifying and correcting the mineral ownership created by virtue of the Warranty Deed at 498/325, that the two Joint Tenancies each both own a 1/4 mineral interest and not a 1/2 mineral interest each as preciously stated, in the E/2 of Sec. 19-3N-55W respectively. The examiner could not locate any conveyance out of, Probate for, LWT, Affidavit or any other death related instrument filed of record that conveyed interest or gave heirship information for Guidotta J. Gordon or Colonel E. Gordon. However, Guidotta J. Gordon, a widow did execute two Oil & Gas Leases, at DB 806-392 and at DB 882-630 so it is likely that "Colonel" pre-deceased her although no further internet research revealed a DOD for either. Therefore, for the purpose of this examination, the corrected "1/4 mineral interest" is being reflected as a 1/8th mineral interest to both, the Estate of Colonel E. Gordon, Apparently Deceased and the Heirs at Law of Colonel E. Gordon, Apparently Deceased and to the Estate of Guidotta J. Gordon, Apparently Deceased and the Heirs at Law of Guidotta J. Gordon, Apparently Deceased.

**Note 3:**

In DB 635-378 (Declaration of Interests), between Colonel E. Gordon and Guidotta J. Gordon, husband and wife, and V. J. Chvatal and Lydia Chvatal, husband and wife, explains the two couples own 1/4 mineral interest in the E/2 of Sec. 19-3N-55W respectively. Per Oil and Gas Lease recorded in DB 882-632, V. J. Chvatal and Lydia Chvatal, a/k/a Lidia H. Chvatal, husband and wife, still owned minerals as of 7/18/1986. The examiner could not find any conveyances out of the Chvatal's concerning the subject lands, however, found out both V. J. Chvatal and Lydia Chvatal, a/k/a Lidia H. Chvatal, husband and wife, passed away. V. J. Chvatal passed away on 9/15/1995 and Lydia Chvatal passed away on 12/10/1997 thus the examiner requested probate records for each of them from the Colorado Judicial Branch to no avail. For the purposes of this examination their interests of 1/8 mineral interest, respectively, under the E/2 of Section 19, Township 3 North, Range 55 West were left in the following manner: Estate of Lydia Chvatal, also known as Lidia Chvatal, Deceased and the Heirs at Law of Lydia Chvatal, also known as Lidia Chvatal, Deceased.

**Note 4:**

**UNRELEASED OIL & GAS LEASES**

DB 806-215, DB 806-392, DB 807-358, DB 807-947, DB 876-784, DB 876-786, DB 876-788, DB 876-790, DB 876-792, DB 882-630, and DB 882-632.

(This list should also include instrument #944235, Memorandum of Special Mineral Lease and Storage Agreement)

**Note 5:**

The Lessee, Windy Hill Water Operations, LLC is being shown above under the "Leasehold" portion of this report only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreement, might still be active in its primary term. The Memorandum of Special Mineral Lease and Storage Agreement was executed 12/7/2022 and filed 12/21/2022, as instrument #944235, with Myrna Ruth Jacobs, as Lessor and Windy Hill Water Operations, LLC, as Lessee. It is for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. Even with the limited information that is typically given in a "Memorandum", this one gave no term or period of lease and there was never any Release filed of record. There has been no Release filed of record.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**Examined By:** Michael Powell

**Reviewed By:** Aaron Barnes

File/Order Number:	State: Colorado	County: Morgan	Parcel: 123319000009 and 123319000010	Certification Dates: 4/16/1946 to 1/4/2024	Examiner: Michael Powell
Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$131.72 Paid	Judgments and Liens: No	

Legal Description: The East Half (E/2) of Southeast Quarter (SE/4) and the West Half (W/2) of Southeast Quarter (SE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bonnie Frazier, to current county effective date.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Warranty Deed	4/15/1946	4/16/1946	428-369	S. A. Krehmeyer, also known as Samuel August Krehmeyer, and Ilma M. Krehmeyer, his wife	Colonel E. Gordon and Guidotta J. Gordon, his wife, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI Subject to a 1/2 mineral reservation by Abby L. Kernochan as seen in 422/398 (no distinction is made as to if this applies to Sec. 19 or the OSL) Grantor reserves 1/2 of all oil and gas rights in the E/2 of Sec. 19-3N-55W & OSL <b>See Note 1</b>
Warranty Deed	10/18/1951	11/24/1951	498-325	Colonel E. Gordon and Guidotta J. Gordon, husband and wife	V. J. Chvatal and Lydia Chvatal, husband and wife, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI Grantor reserves 1/2 of all O,G&O/M not having been reserved by prior grantors; and the other 1/2 O,G&O/M not previously reserved by grantors passing to grantees Except (subject to) a reservation of 1/2 of all O,G&O/M, as seen in 428-369 <b>See Note 2 and 3</b>
Declaration of Interests	9/5/1960	10/6/1960	635-378	V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants	The Public	E/2 of Sec. 19-3N-55W (OSL)	Parties state that this instrument is being executed/filed for the purpose to clarify and correct the oil, gas and other mineral ownership created under/by virtue of 498-325. Further it's stated that it is the intent in previous instruments, but is now the stipulation and agreement of V. J. Chvatal and Lydia Chvatal, Joint Tenants and Colonel E. Gordon and Guidotta J. Gordon, Joint Tenants, that each "The Chvatal's" and the "Gordon's" should be the owner of an undivided 1/4th interest in all O,G&O/M. <b>See Note 2 and 3</b>
Death Certificate	4/26/1968	5/23/1968	707-516	State of Colorado, Department of Health, Education, and Welfare and Samuel August Krehmeyer, Deceased	The Public	N/A	Samuel August Krehmeyer DOD is 12/20/1957. <b>See Note 1</b>

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$131.72 Paid	Judgments and Liens: No
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Legal Description: The East Half (E/2) of Southeast Quarter (SE/4) and the West Half (W/2) of Southeast Quarter (SE/4) of Section Nineteen (19), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bonnie Frazier, to current county effective date.

**DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Special Warranty Deed	2/14/1989	2/15/1989	910-75	V. J. Chvatal and Lydia Chvatal	Roy C. Baughman and Kathryn A. Baughman, as joint tenants	E/2 of Sec. 19-3N-55W (OSL)	ARTI Grantor reserves 1/2 of all O,G&O/M, if any, now owned by Grantors.  See Note 3
Warranty Deed	5/14/1990	5/16/1990	922-295	Roy C. Baughman and Kathryn A. Baughman	Jesse L. Frazier, Bonnie M. Frazier, and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/17/1995	11/21/1995	987-758	Jesse L. Frazier	Bonnie M. Frazier and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/20/2000	11/22/2000	1080-371	Cody W. Frazier	Bonnie M. Frazier	E/2 of Sec. 19, T3N, R55W	ARTI
Quitclaim Deed	11/20/2000	10/2/2003	1159-45	Cody W. Frazier AKA Cody Frazier	Bonnie M. Frazier	E/2 of Sec. 19, T3N, R55W	ARTI
Quit Claim Deed	9/8/2014	9/9/2014	889394	Bonne M. Frazier	Bonnie M. Carpenter and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Correction Quit Claim Deed	9/30/2014	10/2/2014	889837	Bonnie M. Frazier	Bonnie M. Carpenter and Cody W. Frazier, as joint tenants	E/2 of Sec. 19, T3N, R55W	ARTI
Quit Claim Deed	8/3/2018	8/3/2018	913551	Bonnie M. Carpenter nka Bonnie Frazier and Cody W. Frazier	Bonnie Frazier	SE/4 of Sec. 19, T3N, R55W	ARTI

**END OF DEEDS / CHAIN OF TITLE**



**WESTERN LAND SERVICES**  
AN EMPLOYEE OWNED COMPANY

**Subsurface Ownership Report**

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 3/26/1987 to 12/18/2023

**Property Description**

**Parcel:** 123320000001      **Acreage:** 400.00  
**County:** Morgan      **State:** Colorado  
**Township/District:** 3N-55W  
**Tax Amount:** \$346.99      **Tax Status:** Paid

**Legal Description:** The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

**Surface Ownership (Per Reported Assessment)**

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Bruce B. Bass Family LLLP 30621 County Road N Brush, Colorado 80723 (Circa: 2009, QCD 854847)	1.00000	400.00000	N/A	QCD 854847
<b>TOTALS:</b>	<b>1.0000</b>	<b>400.0000</b>		

**Subsurface/Formation/Mineral Ownership**

**Description:** The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Mary Ellen Hellyer 811 Walnut Street Fort Morgan, Colorado 80701 (Circa: 2023, Assessor's Website)	0.25000	100.00000	OPEN	PRD 950-518  <b>See Note 1</b>
Bruce B. Bass Family LLLP 30621 County Road N Brush, Colorado 80723 (Circa: 2009, QCD 854847)	0.25000	100.00000	OPEN	QCD 854847  <b>See Note 1</b>
Isabelle Norwood 320 Cambridge Street Brush, Colorado 80723 (Circa: 1992, PRD 950-516)	0.25000	100.00000	OPEN	PRD 950-516  <b>See Note 1</b>
Llewellyn W. Bass 11107 Highway 71 Brush, Colorado 80723 (Circa: 1992, PRD 950-514)	0.25000	100.00000	OPEN	PRD 950-516  <b>See Note 1</b>
<b>TOTALS:</b>	<b>1.0000</b>	<b>400.0000</b>		

**\*\*Current Lease of Record**

<b>Lease Number:</b> N/A	<b>Status:</b> See Note 1
<b>Original Lessor:</b> Isabelle Norwood	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 944237	<b>Dated:</b> 12/7/2022
<b>Acres Leased:</b> 400.00000	<b>Term:</b> None given
<b>Notes:</b> Plus additional outside lands See Note 1	
<b>Lease Number:</b> N/A	<b>Status:</b> See Note 1
<b>Original Lessor:</b> Bruce D. Bass Family LLLP	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 942452	<b>Dated:</b> 8/25/2022
<b>Acres Leased:</b> 400.00000	<b>Term:</b> None given
<b>Notes:</b> Plus additional outside lands See Note 1	
<b>Lease Number:</b> N/A	<b>Status:</b> See Note 1
<b>Original Lessor:</b> Mary Ellen Hellyer	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 945052	<b>Dated:</b> 1/18/2023
<b>Acres Leased:</b> 400.00000	<b>Term:</b> None given
<b>Notes:</b> Plus additional outside lands See Note 1	
<b>Lease Number:</b> N/A	<b>Status:</b> See Note 1
<b>Original Lessor:</b> Llewellyn W. Bass, a/k/a L. W. Bass	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 945337	<b>Dated:</b> 2/28/2023
<b>Acres Leased:</b> 400.00000	<b>Term:</b> None given
<b>Notes:</b> Plus additional outside lands See Note 1	

**Leasehold Ownership**

<b>Description:</b> The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.				
<b>Owner:</b>	<b>Interest:</b>	<b>Net Acres:</b>	<b>OGL:</b>	<b>Vesting Doc:</b>
Windy Hill Water Operations LLC 3001 Ranch Road 620 S. Suite 321 Austin, Texas 78738 (Circa: 2022, Special Mineral Lease #944237)	See Note 1	See Note 1	N/A	Instrument #944237; 942452; 945052; and 945337  See Note 1
<b>TOTALS:</b>	0.0000	0.0000		

**Mortgages**

None Open/Unsatisfied of Record.

**Judgments/Liens**

None Open/Unsatisfied of Record.

**Well Information**

No active or producing wells found located upon property or unitized with property.

**Unit Information**

None Found.

**Title Notes**

**Note 1:**

The Lessee, Windy Hill Water Operations, LLC is being shown above under the "Leasehold Ownership" portion of this report only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreements, might still be active in their primary terms. There are four "Memorandum of Special Mineral Lease and Storage Agreements" (Instrument #942452; Instrument #944237; Instrument #945052; and Instrument #945337) where Windy Hill Water Operations, LLC is Lessee. They are all for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. However, even with the limited information that is typically given in a "Memorandum", these gave no term or period of lease; and there were never any Releases filed of record.

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**Examined By:** Michael Powell

**Reviewed By:** Aaron Barnes

File/Order Number:	State: Colorado	County: Morgan	Parcel: 123320000001	Certification Dates: 3/26/1987 to 12/18/2023	Examiner: Michael Powell
Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)		Assessed Acreage: 400.00	Taxes: \$346.99 Paid	Judgments and Liens: No

Legal Description: The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bass Family, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Warranty Deed	3/17/1987	3/26/1987	889-535	The First National Bank of Brush, a national banking association	L. W. Bass; Bruce B. Bass; Mary Ellen Hellyer; and L. C. Bass	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	L. W. Bass receives 1/4 surface interest. Bruce B. Bass receives 3/4 surface interest.  L. W. Bass receives 1/4 mineral interest. Bruce B. Bass receives 1/4 mineral interest. Mary Ellen Hellyer receives 1/4 mineral interest. L. C. Bass receives 1/4 mineral interest.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-514	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Llewellyn W. Bass	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-516	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Isabelle Norwood	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-518	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Mary Ellen Hellyer	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-520	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Bruce B. Bass	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Special Warranty Deed	11/13/1992	12/30/1992	950-526	L. W. Bass, a/k/a Llewellyn W. Bass	Bruce B. Bass	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	ARTI in Surface  Grantor reserves all interest in minerals.



Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 400.00	Taxes: \$346.99 Paid	Judgments and Liens: No
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Legal Description: The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bass Family, to current county effective date.

**DISCLAIMER STATEMENT:**

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Quit Claim Deed	3/20/2007	3/18/2009	854845	Bruce B. Bass	Bruce B. Bass Family LLLP	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	ARTI This deed claims the property is only 360 acres instead of the assessed 400 acres.
Quit Claim Deed	3/20/2007	3/18/2009	854847	Bruce B. Bass	Bruce B. Bass Family LLLP	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	ARTI This deed claims the property is only 360 acres instead of the assessed 400 acres.

**END OF DEEDS / CHAIN OF TITLE**

**EXCEPTIONS / REQUIREMENTS**

Memorandum of Special Mineral Lease and Storage Agreement	8/25/2022	8/26/2022	942452	Bruce D. Bass Family LLLP	Windy Hill Water Operations LLC	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 1</b>
Memorandum of Special Mineral Lease and Storage Agreement	12/7/2022	12/21/2022	944237	Isabelle Norwood	Windy Hill Water Operations LLC	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 1</b>
Memorandum of Special Mineral Lease and Storage Agreement	1/18/2023	2/22/2023	945052	Mary Ellen Hellyer	Windy Hill Water Operations LLC	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 1</b>
Memorandum of Special Mineral Lease and Storage Agreement	2/28/2023	3/10/2023	945337	Llewellyn W. Bass, a/k/a L. W. Bass	Windy Hill Water Operations LLC	W/2 and N/2 NE/4 of Sec. 20-3N-55W (OSL)	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 1</b>

**END OF EXCEPTIONS / REQUIREMENTS**



Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 400.00	Taxes: \$346.99 Paid	Judgments and Liens: No
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Legal Description: The West Half (W/2) and the North Half of the Northeast Quarter (N/2 NE/4) of Section Twenty (20), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Bass Family, to current county effective date.

**DISCLAIMER STATEMENT:**

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				

**NOTES**

Note 1: The Lessee, Windy Hill Water Operations, LLC is being treated as a LEasehold Owner, out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreements, might still be active in their primary terms. There are four "Memorandum of Special Mineral Lease and Storage Agreements" (Instrument #942452; Instrument #944237; Instrument #945052; and Instrument #945337) where Windy Hill Water Operations, LLC is Lessee. They are all for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. However, even with the limited information that is typically given in a "Memorandum", these gave no term or period of lease; and there were never any Releases filed of record.

**END OF NOTES**



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 12/30/1992 to 12/18/2023

### Property Description

**Parcel:** 123329000002 **Acreage:** 160.00  
**County:** Morgan **State:** Colorado  
**Township/District:** 3N-55W  
**Tax Amount:** \$134.40 **Tax Status:** Paid

**Legal Description:** The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

### Surface Ownership (Per Reported Assessment)

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Mary Ellen Hellyer 811 Walnut Street Fort Morgan, Colorado 80701 (Circa: 2023, Assessor's Website)	1.00000	160.00000	Not Examined	PRD 950-524
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

### Subsurface/Formation/Mineral Ownership

**Description:** The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Mary Ellen Hellyer 811 Walnut Street Fort Morgan, Colorado 80701 (Circa: 2023, Assessor's Website)	0.25000	40.00000	OPEN	PRD 950-518  <b>See Note 1 &amp; 2</b>
Bruce B. Bass 30621 Morgan County Road N Brush, Colorado 80723 (Circa: 1992, PRD 950-520)	0.25000	40.00000	OPEN	PRD 950-520  <b>See Note 1</b>
Isabelle Norwood 320 Cambridge Street Brush, Colorado 80723 (Circa: 1992, PRD 950-516)	0.25000	40.00000	OPEN	PRD 950-516  <b>See Note 1</b>
Llewellyn W. Bass 11107 Highway 71 Brush, Colorado 80723 (Circa: 1992, PRD 950-514)	0.25000	40.00000	OPEN	PRD 950-514  <b>See Note 1</b>
<b>TOTALS:</b>	<b>1.0000</b>	<b>160.0000</b>		

### \*\*Current Lease of Record

<b>Lease Number:</b> N/A	<b>Status:</b> See Note 1
<b>Original Lessor:</b> Bruce D. Bass	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 944239	<b>Dated:</b> 12/7/2022
<b>Acres Leased:</b> 160.00000	<b>Term:</b> N/A
<b>Notes:</b> See Note 1	
<b>Lease Number:</b> N/A	<b>Status:</b> See Note 2
<b>Original Lessor:</b> Isabelle Norwood	
<b>Original Lessee:</b> Windy Hill Water Operations LLC	
<b>Instrument:</b> 944237	<b>Dated:</b> 12/7/2022
<b>Acres Leased:</b> 160.00000	<b>Term:</b> N/A
<b>Notes:</b> See Note 2	

<b>Lease Number:</b>	N/A	<b>Status:</b>	See Note 2
<b>Original Lessor:</b>	Bruce D. Bass		
<b>Original Lessee:</b>	Windy Hill Water Operations LLC		
<b>Instrument:</b>	944239	<b>Dated:</b>	12/7/2022
<b>Acres Leased:</b>	160.00000	<b>Term:</b>	N/A
<b>Notes:</b>	See Note 2		

<b>Lease Number:</b>	N/A	<b>Status:</b>	See Note 2
<b>Original Lessor:</b>	Mary Ellen Hellyer		
<b>Original Lessee:</b>	Windy Hill Water Operations LLC		
<b>Instrument:</b>	945051	<b>Dated:</b>	1/18/2023
<b>Acres Leased:</b>	160.00000	<b>Term:</b>	N/A
<b>Notes:</b>	See Note 2		

<b>Lease Number:</b>	N/A	<b>Status:</b>	See Note 2
<b>Original Lessor:</b>	Llewellyn W. Bass, a/k/a L. W. Bass		
<b>Original Lessee:</b>	Windy Hill Water Operations LLC		
<b>Instrument:</b>	945337	<b>Dated:</b>	2/28/2023
<b>Acres Leased:</b>	160.00000	<b>Term:</b>	N/A
<b>Notes:</b>	See Note 2		

**Leasehold Ownership**

<b>Description:</b> The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.				
<b>Owner:</b>	<b>Interest:</b>	<b>Net Acres:</b>	<b>OGL:</b>	<b>Vesting Doc:</b>
Windy Hill Gas Storage LLC c/o NGS Energy Fund, LP 61 Wilton Road Westport, Connecticut 06880 (Circa: 2007, Surface and Mineral Lease for Gas Storage #841234)	See Note 1	See Note 1	N/A	Instrument #841234  See Note 1
Windy Hill Water Operations LLC 3001 Ranch Road 620 S. Suite 321 Austin, Texas 78738 (Circa: 2022, Special Mineral Lease #944237)	See Note 2	See Note 2	N/A	Instrument #944237; 944239; 945051; and 945337  See Note 2
<b>TOTALS:</b>	<b>0.0000</b>	<b>0.0000</b>		

**Mortgages**

None Open/Unsatisfied of Record.

**Judgments/Liens**

None Open/Unsatisfied of Record.

**Well Information**

No active or producing wells found located upon property or unitized with property.

**Unit Information**

None Found.

**Title Notes**

**Note 1:**

The Lessee, Windy Hill Gas Storage, LLC is being shown above under the "Leasehold Ownership" portion of this report only out of an abundance of caution in the event that the Surface and Mineral Lease for Gas Storage, as seen at #841234, might still be active. The Gas Storage Lease Agreement stated that it would perpetuate for as long as operations were continued. There has been no Release filed of record for this Lease.

**Note 2:**

The Lessee, Windy Hill Water Operations, LLC is being shown above under the "Leasehold Ownership" portion of this report only out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreements, might still be active in their primary terms. There are four "Memorandum of Special Mineral Lease and Storage Agreements" (Instrument #944327; Instrument #944239; Instrument #945051; and Instrument #945337) where Windy Hill Water Operations, LLC is Lessee. They are all for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. However, even with the limited information that is typically given in a "Memorandum", these gave no term or period of lease; and there were never any Releases filed of record.

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**Examined By:** Michael Powell

**Reviewed By:** Aaron Barnes

File/Order Number:	State: Colorado	County: Morgan	Parcel: 12332900002	Certification Dates: 12/30/1992 to 12/18/2023	Examiner: Michael Powell
Vested Owner: Multiple Owners (See Ownership Report)		Vesting Document(s): Multiple (See Ownership Report)		Assessed Acreage: 160.00	Taxes: \$134.40 Paid
Judgments and Liens: No					

Legal Description: The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Mary Ellen Hellyer, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-514	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Llewellyn W. Bass	NW/4 of Sec. 29-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-516	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Isabelle Norwood	NW/4 of Sec. 29-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-518	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Mary Ellen Hellyer	NW/4 of Sec. 29-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.
Personal Representative's Deed for Minerals	11/13/1992	12/30/1992	950-520	Bruce B. Bass as Personal Representative of the Estate of Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass, deceased	Bruce B. Bass	NW/4 of Sec. 29-3N-55W (OSL)	1/4 interest in all minerals.  Bruce B. Bass was appointed as Personal Representative by Probate No. 90 PR 71 on 11/19/1990. Llewellyn C. Bass, a/k/a L.C. Bass, a/k/a Llewellyn Bass passed away on 11/1/1990.

**END OF DEEDS / CHAIN OF TITLE**

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Mary Ellen Hellyer, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				

**EXCEPTIONS / REQUIREMENTS**

Surface and Mineral Lease for Gas Storage	1/31/2007	3/6/2007	841234	Mary Ellen Hellyer	Windy Hill Gas Storage, LLC	NW/4 of Sec. 29-3N-55W	<p>This lease is for the purpose of exploring and developing underground caverns in Permian salt beds, for the use of natural gas storage, at depths greater than 5000 feet.</p> <p>"Leased Premises" means from the surface of the earth down to 100 feet below the base of the Lyons Sand or its equivalent.</p> <p>Term: Lease will perpetuate for as long as the procedure, work or development it was taken for continues. Royalty of 12.5%</p> <p>All mineral rights to lease, explore and produce beyond and outside of the above described depth are hereby reserved by Lessor.</p> <p><b>See Note 1</b></p>
First Amendment to Surface and Mineral Lease for Gas Storage	5/4/2009	5/14/2009	855845	Mary Ellen Hellyer	Windy Hill Gas Storage, LLC	NW/4 of Sec. 29-3N-55W	<p>This amendment is changing the Annual Rental Amount from Instrument #841234.</p> <p><b>See Note 1</b></p>
Memorandum of Special Mineral Lease and Storage Agreement	12/7/2022	12/21/2022	944237	Isabelle Norwood	Windy Hill Water Operations LLC	NW/4 of Sec. 29-3N-55W (OSL)	<p>The lease is for the exploration of minerals and the use of the surface.</p> <p>No primary term or royalty specified.</p> <p><b>See Note 2</b></p>
Memorandum of Special Mineral Lease and Storage Agreement	12/7/2022	12/21/2022	944239	Bruce D. Bass	Windy Hill Water Operations LLC	NW/4 of Sec. 29-3N-55W	<p>The lease is for the exploration of minerals and the use of the surface.</p> <p>No primary term or royalty specified.</p> <p><b>See Note 2</b></p>

Vested Owner: Multiple Owners (See Ownership Report)	Vesting Document(s): Multiple (See Ownership Report)	Assessed Acreage: 160.00	Taxes: \$134.40 Paid	Judgments and Liens: No
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Legal Description: The Northwest Quarter (NW/4) of Section Twenty-Nine (29), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M.

Per the client and the scope of work, this report and provided documents reflect a search of the subject lands, from the date of the initial subsurface severance as seen in Commitment #22000370967 Mary Ellen Hellyer, to current county effective date.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Memorandum of Special Mineral Lease and Storage Agreement	1/18/2023	2/22/2023	945051	Mary Ellen Hellyer	Windy Hill Water Operations LLC	NW/4 of Sec. 29-3N-55W	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 2</b>
Memorandum of Special Mineral Lease and Storage Agreement	2/28/2023	3/10/2023	945337	Llewellyn W. Bass, a/k/a L. W. Bass	Windy Hill Water Operations LLC	NW/4 of Sec. 29-3N-55W (OSL)	The lease is for the exploration of minerals and the use of the surface. No primary term or royalty specified. <b>See Note 2</b>

**END OF EXCEPTIONS / REQUIREMENTS**

**NOTES**

Note 1: The Lessee, Windy Hill Gas Storage, LLC is being treated as a possible Leasehold Owner out of an abundance of caution in the event that the Surface and Mineral Lease for Gas Storage, as seen at #841234, might still be active. The Gas Storage Lease Agreement stated that it would perpetuate for as long as operations were continued. There has been no Release filed of record for this Lease.

Note 2: The Lessee, Windy Hill Water Operations, LLC is being treated as a possible Leasehold Owner out of an abundance of caution in the event that the Memorandum of Special Mineral Lease and Storage Agreements, might still be active in their primary terms. There are four "Memorandum of Special Mineral Lease and Storage Agreements" (Instrument #944327; Instrument #944239; Instrument #945051; and Instrument #945337) where Windy Hill Water Operations, LLC is Lessee. They are all for the purpose of exploring & developing Oil, Gas & other Minerals in and under the examined property. However, even with the limited information that is typically given in a "Memorandum", these gave no term or period of lease; and there were never any Releases filed of record.

**END OF NOTES**



# WESTERN LAND SERVICES

AN EMPLOYEE OWNED COMPANY

## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface Severance to Present Search  
**Certification Period:** 8/4/1951 to 1/23/2024

### Property Description

**Parcel:** 123330000009      **Acreage:** 40.00  
**County:** Morgan      **State:** Colorado  
**Township/District:** 3N-55W  
**Tax Amount:** \$34.44      **Tax Status:** Paid

**Legal Description:** The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

### Surface Ownership (Per Reported Assessment)

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Bruce B. Bass Family LLLP PO Box 685 Brush, Colorado 80723-0685 (Circa: 2023, Assessor's Website)	1.00000	40.00000	Not Examined	Not Examined
<b>TOTALS:</b>	<b>1.0000</b>	<b>40.0000</b>		

### Subsurface/Formation/Mineral Ownership

**Description:** The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Bruce B. Bass Family LLLP PO Box 685 Brush, Colorado 80723-0685 (Circa: 2023, Assessor's Website)	0.70000	28.00000	Unleased	QCD 854847
The Estate of Gerry Victor Bass, Deceased, and the Heirs at Law of the Estate of Gerry Victor Bass, Deceased Address Unknown (Circa: 1959, SWD 617-333)	0.10000	4.00000	Unleased	DB 500-92 <b>See Note 1</b>
The Estate of W. H. Bass, also known as William H. Bass, Deceased, and the Heirs at Law of the Estate of W. H. Bass, also known as William H. Bass, Deceased Address Unknown (Circa: 1981, QCD 811-832)	0.10000	4.00000	Unleased	DB 500-92 <b>See Note 2</b>
The Estate of Edna M. Bass, Deceased, and the Heirs at Law of the Estate of Edna M. Bass, Deceased 28186 County Road L Brush, Colorado 80723 (Circa: 1991, QCD 937-362)	0.10000	4.00000	Unleased	QCD 937-362 <b>See Note 3</b>
<b>TOTALS:</b>	<b>1.0000</b>	<b>40.0000</b>		

### Judgments/Liens

**Instrument:** 500-92  
**Date:** 8/4/1951  
 The Estate of Bertha I. Bass, Deceased, and the  
**Party 1:** District Court of Morgan County, Colorado  
 Jacob W. Bass, Wesley W. Bass, William H. Bass,  
 Gerry V. Bass, Bryan E. Bass, and Llewellyn C.  
**Party 2:** Bass  
**Amount:** See Document

**Notes:** This is a decree of Determination of Interest.



## Title Notes

### **Note 1:**

In the Decree of Determination of Interest (DB 500-92), The Estate of Bertha I. Bass, Deceased, and the District Court of Morgan County, Colorado, order the mineral interest owned by the Estate of Bertha I. Bass to be split amongst six individuals in the following manner: 1/2 interest to: Jacob W. Bass. 1/10 interest to: Wesley W. Bass, William H. Bass, Gerry V. Bass, Bryan E. Bass, and Llewellyn C. Bass. After DB 500-92, Gerry Victor Bass is seen conveying ARTI in the Surface, while reserving his mineral interest in the SE/4 of Sec. 30-3N-55W to Llewellyn C. Bass in DB 617-333. DB 617-333 is the last time Gerry V. Bass shows up in the chain of title. The examiner reached out to the Colorado Combined Courts to inquire about a probate record for Gerry Victor Bass to no avail. Gerry Victor Bass died on 5/27/1975 and his widow (Gladys Bass, also known as Gladys Irene Grimes Bass) died on 9/14/1999. Both Dates of Death were found on FindAGrave.com. The examiner also reached out to the Combined Courts to inquire about a probate for Gladys Irene Grimes Bass to no avail. For the purposes of this report, the examiner left the 1/10 interest awarded to Gerry Victor Bass in DB 500-92 in the following entity: The Estate of Gerry Victor Bass, Deceased, and the Heirs at Law of the Estate of Gerry Victor Bass, Deceased. Further curative measures are needed.

### **Note 2:**

In the Decree of Determination of Interest (DB 500/92), The Estate of Bertha I. Bass, Deceased, and the District Court of Morgan County, Colorado, order the mineral interest owned by the Estate of Bertha I. Bass to be split amongst six individuals in the following manner: 1/2 interest to: Jacob W. Bass. 1/10 interest to: Wesley W. Bass, William H. Bass, Gerry V. Bass, Bryan E. Bass, and Llewellyn C. Bass. After DB 500/92, William H. Bass is seen conveying ARTI in the Surface, while reserving his mineral interest (1/10 interest) in the SE/4 of Sec. 30-3N-55W to Llewellyn C. Bass in DB 811/832. DB 811/832 is the last time William H. Bass shows up in the chain of title. However, The Estate of W. H. Bass, also known as William H. Bass, shows up in numerous documents: Last Will and Testament (81PR82); Order Closing Testate Estate (DB 832/428); Order to Complete Administration and Distribution of the Estate and Appointing Successor Personal Representative (Instrument #783600); and Letters Testamentary (Instrument #783601). The examiner did not pass title to the individuals listed (Ernest D. Bass, Charles L. Bass, Wesley F. Bass, Anna Marie Kuck, Bertha A. Arnold, and Mildred A. Bass) in the Last Will and Testament of W.H. Bass, also known as William H. Bass, Deceased, since after the Last Will and Testament there was not any conveyances out of the Co-Personal Representative's of the Estate of W. H. Bass, also known as William H. Bass, Deceased (Mildred A. Bass and Ernest D. Bass). The examiner also noticed that in Instrument #783600, Mildred A. Bass is mentioned to be "incompetent" and Ernest D. Bass is now the Conservator of the Estate of Mildred Bishop (Case No. 98 PR 70). Additionally, the examiner located two Oil and Gas Leases (DB 834/908 and DB 885/52) signed by: "Mildred A. Bass, a widow" and "Mildred A. Bishop, f/k/a Mildred A. Bass, dealing in her sole and separate property" respectively. So, it is unclear as to if the mineral interest was passed to Mildred A. Bass. For the purposes of this report, the examiner left the 1/10 interest awarded to W.H. Bass, also known as William H. Bass, in DB 500/92 in the following ownership: The Estate of W. H. Bass, also known as William H. Bass, Deceased, and the Heirs at Law of the Estate of W. H. Bass, also known as William H. Bass, Deceased. Further curative measures are needed.

### **Note 3:**

In DB 830-100, Edna M. Bass as Personal Representative of the Estate of Bryan E. Bass, aka B. E. Bass, aka Bryan Bass, Deceased, conveys 1/10 interest in the SE/4 of Sec. 30-3N-55W to Edna M. Bass. Additionally, in DB 937-360, Bruce Bass as Personal Representative of the Estate of Bryan E. Bass, a/k/a B. E. Bass, a/k/a Bryan Bass, Deceased, conveys 1/10 interest in the SE/4 of Sec. 30-3N-55W to Bruce Bass. Then Bruce Bass conveys 1/10 mineral interest in the SE/4 of Sec. 30-3N-55W to Edna M. Bass in DB 937-362. The examiner sees the second grouping of conveyances as quieting the title into Edna M. Bass, giving Edna M. Bass 1/10 interest in the SE/4 of Sec. 30-3N-55W since the Estate of Bryan E. Bass, aka B. E. Bass, aka Bryan Bass, Deceased, only had 1/10 mineral interest to convey. Per FindAGrave.com, Edna M. Bass died on 3/19/1995. The examiner reached out to the Colorado Combined Courts to inquire about a probate record for Edna M. Bass to no avail. Due to this, the examiner left the 1/10 mineral interest in the SE/4 of Sec. 30-3N-55W in the following ownership: The Estate of Edna M. Bass, Deceased, and the Heirs at Law of the Estate of Edna M. Bass, Deceased. Lastly, the examiner listed the last known address for Edna M. Bass as there aren't any addresses associated with the Estate of Edna M. Bass. Further curative measures are needed.

### **DISCLAIMER STATEMENT:**

The information set forth herein is based on a limited search of the records of the County(ies) and State(s) as directed by the party requesting the report, and this report has been prepared for the exclusive use of such party. Western Land Services, Inc. ("WLS") is not a law firm and does not offer certified opinions of title for which a licensed title attorney is required. Accordingly, no warranty or certification of title is being made herein. By your acceptance of this Report, you agree to waive any recourse against and hold harmless WLS and its employees and contractors for any title errors or omissions beyond the scope of the work requested and payment received for preparing this report.

**Examined By:** Michael Powell

**Reviewed By:** Scott Colbert

File/Order Number:	State: Colorado	County: Morgan	Parcel: 123330000009	Certification Dates: 8/4/1951 to 1/23/2024	Examiner: Michael Powell
Vested Owner: See Ownership Report	Vesting Document(s): See Ownership Report		Assessed Acreage: 40.00	Taxes: \$34.44 Paid	Judgments and Liens: Yes

Legal Description: The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Decree of Determination of Interest	8/4/1951	8/4/1951	500/92	The Estate of Bertha I. Bass, Deceased, and the District Court of Morgan County, Colorado  Civil Action No. 7796, Morgan County, State of Colorado	Jacob W. Bass, Wesley W. Bass, William H. Bass, Gerry V. Bass, Bryan E. Bass, and Llewellyn C. Bass	SE/4 of Sec. 30-3N-55W	1/2 interest to: Jacob W. Bass 1/10 interest to: Wesley W. Bass, William H. Bass, Gerry V. Bass, Bryan E. Bass, and Llewellyn C. Bass.
Quit Claim Deed	12/31/1953	1/6/1954	527/129	Jacob W. Bass and Wesley W. Bass	Llewellyn C. Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI
Special Warranty Deed	4/14/1959	5/22/1959	617/333	Gerry Victor Bass	Llewellyn C. Bass	SE/4 of Sec. 30-3N-55W	ARTI in 1/10 interest in surface. Grantor reserves 1/10 of the oil, gas, and other minerals.  Gerry Victor Bass DOD 5/27/1975.  <b>See Note 1</b>
Quit Claim Deed	2/5/1981	2/9/1981	811/832	William H. Bass	Llewellyn C. Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI in surface. Grantor reserves all of his interest in the oil, gas, and other minerals.  <b>See Note 2</b>
Warranty Deed	4/17/1981	4/20/1981	814/523	Llewellyn C. Bass	Bruce B. Bass	E/2 E/2 SE/4 of Sec. 30-3N-55W (OSL)	ARTI
Quit Claim Deed	2/5/1981	4/20/1981	814/524	Edna Mae Bass, aka Edna M. Bass, surviving spouse of Bryan E. Bass, a single person	Llewellyn C. Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI in surface. Grantor reserves all of his interest in the oil, gas, and other minerals.

Vested Owner: See Ownership Report	Vesting Document(s): See Ownership Report	Assessed Acreage: 40.00	Taxes: \$34.44 Paid	Judgments and Liens: Yes
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Legal Description: The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Last Will and Testament	4/18/1979	10/22/1981	81PR82	The Estate of W. H. Bass, also known as William H. Bass, Deceased and The District Court of Morgan County, Colorado	Ernest D. Bass, Charles L. Bass, Wesley F. Bass, Anna Marie Kuck, Bertha A. Arnold, and Mildred A. Bass	No Property Listed	Rest and Residue clause splitting the estate (after awarding Mildred A. Bass at least \$250,000) share and share alike between the children of W. H. Bass (Ernest D. Bass, Charles L. Bass, Wesley F. Bass, Anna Marie Kuck, Bertha A. Arnold), Mildred A. Bass (wife) and Ernest D. Bass (son) are appointed to be Co-Personal Representatives of the Last Will and Testament.  <b>See Note 2</b>
Deed of Distribution by Personal Representative	6/7/1982	6/10/1982	830/100	Edna M. Bass as Personal Representative of the Estate of Bryan E. Bass, aka B. E. Bass, aka Bryan Bass, deceased	Edna M. Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI of 1/10 interest.  Edna M. Bass was appointed Personal Representative of the said Estate by the District Court and in Probate No. P-913 on 10/30/1991.
Order Closing Testate Estate	7/22/1982	7/23/1982	832/428	The Estate of W. H. Bass, also known as William H. Bass, Deceased and The District Court of Morgan County, Colorado	The Public	No Property Listed	The Co-Personal Representatives (Mildred A. Bass and Ernest D. Bass) are legally allowed to transfer title out of the estate. No reference to the SE/4 of Sec. 30-3N-55W though.  <b>See Note 2</b>
Deed of Distribution by Personal Representative (Testate Estate)	10/31/1991	10/31/1991	937/360	Bruce Bass as Personal Representative of the Estate of Bryan E. Bass, a/k/a B. E. Bass, a/k/a Bryan Bass, Deceased	Bruce Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI of 1/10 interest.  Bruce Bass was appointed Personal Representative of the said Estate by the District Court and in Probate No. P-913 on 10/30/1991.
Quit Claim Deed	10/30/1991	10/31/1991	937/362	Bruce Bass	Edna M. Bass	SE/4 of Sec. 30-3N-55W (OSL)	ARTI in 1/10 interest in oil, gas and other minerals.  <b>See Note 3</b>
Order to Complete Administration and Distribution of the Estate and Appointing Successor Personal Representative	3/3/2000	3/8/2000	783600	District Court of Morgan County, Colorado, The Estate of W. H. Bass a/k/a William H. Bass, deceased, and Ernest D. Bass	The Public	N/A	Ernest D. Bass and Mildred A. Bass were named Co-Executors of the Estate of W. H. Bass. Mildred A. Bass is listed as incompetent and Ernest is now the Conservator of the Estate of Mildred Bishop (Case No. 98 PR 70).  <b>See Note 2</b>

Vested Owner: See Ownership Report	Vesting Document(s): See Ownership Report	Assessed Acreage: 40.00	Taxes: \$34.44 Paid	Judgments and Liens: Yes
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Legal Description: The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Letters Testamentary	3/7/2000	3/8/2000	783601	District Court of Morgan County, Colorado and The Estate of W. H. Bass, a/k/a William H. Bass, Deceased Case No. 81PR82	The Public	N/A	Ernest D. Bass is appointed to Personal Representative of the named estate.  See Note 2
Quitclaim Deed	3/20/2007	3/18/2009	854845	Bruce B. Bass	Bruce B. Bass Family LLLP	E/2 E/2 SE/4 of Sec. 30-3N-55W (OSL)	ARTI
Quitclaim Deed	3/20/2007	3/18/2009	854847	Bruce B. Bass	Bruce B. Bass Family LLLP	E/2 E/2 SE/4 of Sec. 30-3N-55W (OSL)	ARTI Rerecorded copy of Instrument #854845.

**END OF DEEDS / CHAIN OF TITLE**

**EXCEPTIONS / REQUIREMENTS**

Oil and Gas Lease	9/27/1982	10/13/1982	834/904	Edna M. Bass, a widow	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 3 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	9/27/1982	10/13/1982	834/906	Gladys Bass, a widow	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 3 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	9/27/1982	10/13/1982	834/908	Mildred A. Bass, a widow	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 3 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	9/9/1982	10/13/1982	834/910	Llewellyn C. Bass, a widower	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 3 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	10/17/1986	11/14/1986	885/48	Gladys Bass, a widow	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 2 Years Royalty of 1/8  UNRELEASED

Vested Owner: See Ownership Report	Vesting Document(s): See Ownership Report	Assessed Acreage: 40.00	Taxes: \$34.44 Paid	Judgments and Liens: Yes
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Legal Description: The East Half of the East Half of the Southeast Quarter (E/2 E/2 SE/4) of Section Thirty (30), Township Three (3) North, Range Fifty-Five (55) West of 6th P. M

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Oil and Gas Lease	10/6/1986	11/14/1986	885/50	Llewellyn C. Bass, a widower	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 2 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	10/17/1986	11/14/1986	885/52	Mildred A. Bishop, f/k/a Mildred A. Bass, dealing in her sole and separate property	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 2 Years Royalty of 1/8  UNRELEASED
Oil and Gas Lease	10/17/1986	11/14/1986	885/54	Edna M. Bass, a widow	Winslow Resources, Inc.	SE/4 of Sec. 30-3N-55W	Primary Term of 2 Years Royalty of 1/8  UNRELEASED

**END OF EXCEPTIONS / REQUIREMENTS**



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface from the date of severance to present  
**Certification Period:** 1/1/1925-9/25/2023

### Property Description

**Parcel:** All **Acreage:** 657.76  
**County:** Morgan **State:** CO  
**S-T-R:** 31-3N-55W  
**Tax Amount:** \$533.68 **Tax Status:** Paid  
**Legal Description:** Lots 1-4, E/2W/2, E/2, ada all of Section 32-3N-55W of the 6th P.M.

### Subsurface Mineral Ownership

**Description:** Lots 1,2,3,4, E/2W/2 and E/2 (aka All) of Section 31, T3N, R55W of 6th P.M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Michael L. Dixon Family LLLP 10826 Hwy 71 Brush, CO 80723 (Circa; 2021, WD 937313)	0.50000	328.88000	Unleased	937313
Albert Wayne Teter 31625 County Road D Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Alvin Leroy Teter 921 Krista Kort Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Arnold Douglas Teter 4949 County Road 309 Parachute, CO 81635 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Nancy Marie Pottorff 8855 Beachwood Drive Windsor, CO 80550 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Carol Gayleen Gilliland 1546 S. Fraser Way Aurora, CO 80012 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Virginia Arlene Urbach 1961 Eppinger Blvd. Thornton, CO 80229 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Roger Lowell Teter 5750 20th Street #1 Greeley, CO 80634 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Roberta Kay Teter 161 45th Ave. Greeley, CO 80632 (Circa: 202, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Judith Ann Queen PO Box 403 Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	34.71511	Unleased	943306; 947463
Brian Koehler 5102 W. 11th Street Rd. Greeley, CO 80634 (Circa: 2022, MD 943306)	0.02500	16.44400	Unleased	943306
<b>TOTALS:</b>	1.0000	657.7600		

### Mortgages

**Instrument:** 937244  
**Corrected:** 937314  
**Date:** 12/8/2021  
**Mortgagor:** Michael L. Dixon Family LLLP  
**Mortgagee:** The Farmers State Bank of Brush  
**Amount:** \$1,140,000.00  
**Term:** 5 yrs

### Title Notes

**Note 1:**

Due to the passage of time and the lack of historical production data, we have assumed the following historical oil and gas leases have expired in their primary and/or extended term: 360849, 423649, 423650, 613122, 640763, 640764, 683956

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**Examined By: Jerri Turney**

**Reviewed By: Ashley Bone**

File/Order Number:	State: CO	County: Morgan	Parcel: 123331000001	Certification Dates: 1/1/1925 to 9/25/2023	Examiner: Jerri Turney
Vested Owner: See Ownership Report		Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 657.76	Taxes: Paid	Judgments and Liens: Yes

Legal Description: Lots 1-4, E/2W/2, E/2 (ada all) of Section 31, T3N, R55W of the 6th P.M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Patent	6/6/1916	N/A	P-532180	United States of America	Hattie A. Chandler	Lots 3, 4 and E/2SW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Patent	5/19/1916	N/A	P-529894	United States of America	May Chandler	SE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Patent	5/29/1918	N/A	P-632395	United States of America	Jens Nelson	Lots 1, 2 and E/2NW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Patent	6/7/1918	N/A	P-633941	United States of America	Edward M. Burris	NE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Warranty Deed	4/20/1925	4/23/1925	149982	Lars R. Larsen	Charles F. Kast	NE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Warranty Deed	4/20/1925	4/23/1925	149983	Lars R. Larsen	Charles F. Kast	Lots 1, 2 and E/2NW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Affidavit	3/22/1934	4/17/1934	230051	Lars R. Larsen	Public	NE/4, NW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Affiant states that he is one and the same person as L.R. Larsen as who received lands from Edward Burris in WD 153/249 and conveyed said lands in WD 215/310 (149982), and also received lands from Jens Nelson in WD 158/143 and conveyed said lands in WD 215/311 (149983).  DR 153/249 and 158/143 are prior to 1925 and are not available online. The names referenced in this document coincide with Patents issued for stated lands.
Right of Way	10/19/1937	10/20/1937	258166	Hattie A. Chandler Lowe	County of Morgan, State of Colorado	SW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Easement and Right of Way
Right of Way	1/27/1938	2/15/1938	260758	Charles F. Kast and Myrtle T. Kast	County of Morgan, State of Colorado	NW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Easement and Right of Way
Warranty Deed	8/22/1942	5/1/1944	309649	Hattie A. Chandler	Charles F. Kast and Myrtle T. Kast, husband and wife, as JT	Lots 3, 4 and E/2SW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M., less land sold for ROW	All RTI in stated lands
Warranty Deed	8/22/1942	5/1/1944	309650	May Chandler	Charles F. Kast and Myrtle T. Kast, husband and wife, as JT	SE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Deed	1/14/1949	2/8/1949	344446	Charles F. Kast and Myrtle T. Kast, husband and wife	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M., except ROW	All RTI in stated lands
Oil and Gas Lease	7/20/1950	9/16/1950	360849	Walter Weiss and Mayme L. Weiss, husband and wife Harry Weiss and Neda B. Weiss, husband and wife Alex Weiss and Minnie Weiss, husband and wife Carl Weiss and Marie Weiss, husband and wife	The Superior Oil Company	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, 5 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML



Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 657.76	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: Lots 1-4, E/2W/2, E/2 (ada all) of Section 31, T3N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Right of Way	10/17/1953	1/20/1954	393751	Walter Weiss, Harry Weiss, Aleck Weiss, Carl Weiss	Goodall Pipe Line Company	E/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Pipeline Easement ROW
Oil and Gas Lease	4/11/1956	5/16/1956	423649	Walter Weiss and Mayme Louise Weiss, his wife Harry Weiss and Neda B. Weiss, his wife Alex Weiss and Minnie Weiss, his wife Carl Weiss and Marie E. Weiss, his wife	The Pure Oil Company	E/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, Unknown yrs., 16.5% Royalty, No Pugh Well must be commenced by 4/11/57 or lease will terminate  Historical Unreleased OGML
Oil and Gas Lease	4/11/1956	5/16/1956	423650	Walter Weiss and Mayme Louise Weiss, his wife Harry Weiss and Neda B. Weiss, his wife Alex Weiss and Minnie Weiss, his wife Carl Weiss and Marie E. Weiss, his wife	The Pure Oil Company	Lots 1, 2, 3, 4 and E/2W/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, 2 yrs., 16.5% Royalty, No Pugh Well must be commenced by 4/11/57 or lease will terminate  Historical Unreleased OGML
Deed	11/25/1957	12/30/1957	439822	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	Harry Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Non Participating Royalty Deed	11/25/1957	12/30/1957	439823	Harry Weiss	Alex Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	An und 3/10 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439824	Harry Weiss	Walter Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	An und 1/5 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439825	Harry Weiss	Carl Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	An und 1/5 of 1/8 royalty NPRI
Certificate	1/28/1960	4/19/1960	467712	Morgan Soil Conservation District	Public	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	Notice of Certificate of Addition of lands to the Soil Conservation District
Deed	5/19/1967	6/5/1967	542893	Hattie A. Chandler Lowe, fka Hattie A. Chandler	Harry Weiss	Lots 3, 4 and E/2SW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Quit Claim Deed	12/9/1974	12/11/1974	591781	Carl Weiss and Walter Weiss	Harry Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	QCD as to all RTI in stated lands
Oil and Gas Lease	1/20/1977	5/26/1977	613122	Harry Weiss	CleveRock Energy Corporation	NE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, 3 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Oil and Gas Lease	3/14/1980	4/7/1980	640763	Harry Weiss and Neda Bell Weiss, his wife	John P. Ellbogen	E/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, 3 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Oil and Gas Lease	3/14/1980	4/7/1980	640764	Harry Weiss and Neda Bell Weiss, his wife	John P. Ellbogen	Lots 1, 2, 3, 4 and E/2W/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	OGML, 3 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Warranty Deed	5/17/1982	5/17/1982	661761	Harry Weiss	Teter Oil Field Construction Co., Inc.	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	All RTI in stated lands
Non Participating Royalty Deed	5/17/1982	5/17/1982	661762	Teter Oil Field Construction Co., Inc.	Harry Weiss	All of Section 31, Township 3N, Range 55W, of the 6th P.M.	An und 90% NPRI of Grantors interest OGML, 3 yrs., 1/8th Royalty, No Pugh
Oil and Gas Lease	7/30/1984	8/3/1984	683956	Teter Oil Field Construction Co., Inc.	BlueSky Oil & Gas, Inc.	SE/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Historical Unreleased OGML
Easement	3/28/2005	4/26/2005	826446	Teter Oil Field Construction Co., Inc.	Cheyenne Plains Gas Pipeline Company, LLC	NW/4 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Pipeline Easement ROW

Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 657.76	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: Lots 1-4, E/2W/2, E/2 (ada all) of Section 31, T3N, R55W of the 6th P.M.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Right of Way and Easement Agreement	11/17/2004	7/18/2005	828527	Teter Oil Field Construction Co., Inc.	Unocal Windy Hill Gas Storage, LLC	N/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Pipeline Easement ROW
Right of Way and Easement Agreement	11/17/2004	8/5/2005	829039	Teter Oil Field Construction Co., Inc.	Unocal Windy Hill Gas Storage, LLC	N/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Pipeline Easement ROW
Amendment of Right of Way and Easement Agreement	8/7/2006 Effective: 11/17/2004	8/18/2005	837450	Teter Oil Field Construction Co., Inc.	Unocal Windy Hill Gas Storage, LLC	N/2 of Section 31, Township 3N, Range 55W, of the 6th P.M.	Pipeline Easement ROW



## Subsurface Ownership Report

**Client Order/File No.:**  
**Scope of Search:** Subsurface from date of severance to present  
**Certification Period:** 1/1/1925-9/25/2023

### Property Description

**Parcel:** All **Acreage:** 640.00  
**County:** Morgan **State:** CO  
**S-T-R:** 32-3N-55W  
**Tax Amount:** \$533.76 **Tax Status:** Paid  
**Legal Description:** All of Section 32-3N-55W of the 6th P.M.

### Subsurface Mineral Ownership

**Description:** E/2 of Section 32-3N-55W of the 6th P.M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
United States Bureau of Land Management Address Unknown	1.00000	320.00000	Unleased	P-846889
<b>TOTALS:</b>	<b>1.0000</b>	<b>320.0000</b>		

### Subsurface Mineral Ownership

**Description:** W/2 of Section 32-3N-55W of the 6th P.M.

Owner:	Interest:	Net Acres:	Status:	Vesting Doc:
Michael L. Dixon Family LLLP 10826 Hwy 71 Brush, CO 80723 (Circa: 2021, WD 937313)	0.50000	160.00000	Unleased	937313
Albert Wayne Teter 31625 County Road D Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Alvin Leroy Teter 921 Krista Kort Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Arnold Douglas Teter 4949 County Road 309 Parachute, CO 81635 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Nancy Marie Pottorff 8855 Beachwood Drive Windsor, CO 80550 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Carol Gayleen Gilliland 1546 S. Fraser Way Aurora, CO 80012 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Virginia Arlene Urbach 1961 Eppinger Blvd. Thornton, CO 80229 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Roger Lowell Teter 5750 20th Street #1 Greeley, CO 80634 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Roberta Kay Teter 161 45th Ave. Greeley, CO 80632 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463

Judith Ann Queen P.O. Box 403 Brush, CO 80723 (Circa: 2023, MD 947463)	0.05278	16.88889	Unleased	943306; 947463
Brian Koehler 5102 W. 11th Street Road Greeley, CO 80634 (Circa: 2022, MD 943306)	0.02500	8.00000	Unleased	943306
<b>TOTALS:</b>	<b>1.0000</b>	<b>320.0000</b>		

### Mortgages

**Instrument:** 937244  
**Corrected:** 937314  
**Date:** 12/8/2021  
**Mortgagor:** Michael L. Dixon Family LLLP  
**Mortgagee:** The Farmers State Bank of Brush  
**Amount:** \$1,140,000.00  
**Term:** 5 yrs

### Title Notes

**Note 1:**

Due to the passage of time and the lack of historical production data, we have assumed the following historical oil and gas leases have expired in their primary and/or extended term: 360849, 366411, 423649, 446674, 470216, 613121, 640762, 683956

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**Examined By: Scott Turney**

**Reviewed By: Ashley Bone**

File/Order Number:	State: CO	County: Morgan	Parcel: 123332000001	Certification Dates: 1/1/1925 to 9/25/2023	Examiner: Scott Turney
Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306		Assessed Acreage: 640.00	Taxes: Paid	Judgments and Liens: Yes

Legal Description: All of Section 32, T3N, R55W of the 6th P.M.

Per the client and the scope of work, this report and provided documents reflects a subsurface severance to present search of the subject lands.

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**DEEDS / CHAIN OF TITLE**

Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Patent	6/26/1911	N/A	P-212951	United States of America	Lars R. Larsen	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2NW/4, W/2SW/4	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Patent	11/2/1917	N/A	P-606165	United States of America	Lars R. Larsen	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2W/2	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.
Patent	2/3/1922	N/A	P-846889	United States of America	Amos H. Ford	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2	All RTI in stated lands, subject to right of way for ditches and canals Note: Patents are dated prior to 1925 and not available online. Patents were found on BLM website.  <b>GRANTOR RESERVES ALL MINERALS</b>
There is a gap in tile from Amos H Ford to W.A. Vanwinkle as to the E/2 of Section 32. However this gap pertains only to the surface estate, as the United States of America retained all mineral interest in said lands.							
Warranty Deed	4/20/1925	4/23/1925	149982	Lars R. Larsen	Charles F. Kast	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	All RTI in stated lands
Warranty Deed	4/23/1931	7/8/1939	272821	W.A. Vanwinkle and Sarah E. Vanwinkle, his wife	Madge Norman	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2	All RTI in stated lands
Warranty Deed	4/24/1944	5/1/1944	309651	Madge Norman	Charles F. Kast and Myrtle T. Kast, husband and wife, as JT	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2	All RTI in stated lands
Deed	1/14/1949	2/8/1949	344446	Charles F. Kast and Myrtle T. Kast, husband and wife	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands
Oil and Gas Lease	7/20/1950	9/16/1950	360849	Walter Weiss and Mayme L. Weiss, husband and wife Harry Weiss and Neda B. Weiss, husband and wife Alex Weiss and Minnie Weiss, husband and wife Carl Weiss and Marie Weiss, husband and wife	The Superior Oil Company	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	OGML, 5 yrs., 1/8th Royalty, No Pugh  Historical Unreleased OGML
Oil and Gas Lease	2/1/1951	3/16/1951	366411	United States Department of the Interior Bureau of Land Management	Adah G. Macauley	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2	OGML, 5 yrs., 1/8th Royalty, No Pugh and other lands  Historical Unreleased OGML
Right of Way	10/17/1953	1/20/1954	393751	Walter Weiss, Harry Weiss, Aleck Weiss, Carl Weiss	Goodall Pipe Line Company	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- E/2	Pipeline Easement ROW
Oil and Gas Lease	4/11/1956	5/16/1956	423649	Walter Weiss and Mayme Louise Weiss, his wife Harry Weiss and Neda B. Weiss, his wife Alex Weiss and Minnie Weiss, his wife Carl Weiss and Marie Weiss, his wife	The Pure Oil Company	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- SW/4 and other lands	OGML, Unknown yrs., 16.5% Royalty, No Pugh Well must be commenced by 4/11/57 or lease will terminate  Historical Unreleased OGML

Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 640.00	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: All of Section 32, T3N, R55W of the 6th P.M.

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Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Deed	11/25/1957	12/30/1957	439818	Walter Weiss, Harry Weiss, Alex Weiss, Carl Weiss	Alex Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands
Non Participating Royalty Deed	11/25/1957	12/30/1957	439819	Alex Weiss	Harry Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	An und 3/10 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439820	Alex Weiss	Carl Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	An und 1/5 of 1/8 royalty NPRI
Non Participating Royalty Deed	11/25/1957	12/30/1957	439821	Alex Weiss	Walter Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	An und 1/5 of 1/8 royalty NPRI
Oil and Gas Lease	6/16/1960	7/6/1960	470216	Alex Weiss	Glenn A. Dow and Jerome P. McHugh	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2 and other lands	OGML, 1 yr., 1/8th Royalty, No Pugh Historical Unreleased OGML
Deed	5/25/1970	5/27/1970	559827	Alex Weiss	Harry Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands
Quit Claim Deed	12/9/1974	12/11/1974	591781	Carl Weiss and Walter Weiss	Harry Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	QCD as to all RTI in stated lands
Oil and Gas Lease	1/20/1977	5/26/1977	613121	Harry Weiss	CleveRock Energy Corporation	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- NW/4	OGML, 3 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Oil and Gas Lease	3/14/1980	4/7/1980	640762	Harry Weiss and Neda Bell Weiss, his wife	John P. Ellbogen	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2 and other lands	OGML, 3 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Warranty Deed	5/17/1982	5/17/1982	661761	Harry Weiss	Teter Oil Field Construction Co., Inc.	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands
Non Participating Royalty Deed	5/17/1982	5/17/1982	661762	Teter Oil Field Construction Co., Inc.	Harry Weiss	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2	An und 90% NPRI
Oil and Gas Lease	7/30/1984	8/3/1984	683956	Teter Oil Field Construction Co., Inc.	BlueSky Oil & Gas, Inc.	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- W/2 and other lands	OGML, 3 yrs., 1/8th Royalty, No Pugh Historical Unreleased OGML
Statement of Authority	12/8/2021	12/8/2021	937242	Michael Dixon, General Partner	Public	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	Statement of Authority as to the Michael L. Dixon Family LLLP Names and positions of each person authorized to execute instruments: Michael L. Dixon, General Partner Janice Dixon, Limited Partner Clarie E. Dixon, Limited Partner
Warranty Deed	12/8/2021	12/8/2021	937243	Teter Oil Field Construction Co., Inc.	Michael L. Dixon Family LLLP	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands. Grantor retains an und 1/2 of Grantors mineral interests and conveys 1/2 of Grantors mineral interest.
Deed of Trust	12/8/2021	12/8/2021	937244	Michael L. Dixon Family LLLP	The Farmers State Bank of Brush	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	DT, in the amount of \$1,140,000.00, maturing 12/8/2026
Warranty Deed	12/8/2021	12/10/2021	937313	Teter Oil Field Construction Co., Inc.	Michael L. Dixon Family LLLP	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All RTI in stated lands. Grantor retains an und 1/2 of Grantors mineral interests and conveys 1/2 of Grantors mineral interest. Corrects WD 937243 as to legal description of other lands

Vested Owner: See Ownership Report	Vesting Document(s): 937313, 947463, 943306	Assessed Acreage: 640.00	Taxes: Paid	Judgments and Liens: Yes
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Legal Description: All of Section 32, T3N, R55W of the 6th P.M.

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Instrument Type	Instrument Date	Recording Date	Recording Data	Grantor	Grantee	Description	Examiner's Remarks
	Month/Day/Year	Month/Day/Year	Volume/Instrument				
Deed of Trust	12/8/2021	12/10/2021	937314	Michael L. Dixon Family LLLP	The Farmers State Bank of Brush	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	DT, in the amount of \$1,140,000.00, maturing 12/8/2026  Corrects legal description in DT 937244
Statement of Authority	12/14/2021	12/14/2021	937388	Alvin Leroy Teter, President	Public	<u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	Statement of Authority as to the Teter Oil Field Construction Co., Inc. Name and position of person authorized to execute instruments: Alvin Leroy Teter, President
Mineral Deed	8/16/2022	8/17/2022	942273	Teter Oil Field Construction Co., Inc.	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Personal Representatives of the Estate of Virginia E. Teter, aka Virginia Teter, deceased, and Virginia Arlene Urbach and Alvin Leroy Teter, Co-Trustees of the Gale E. Teter Residuary Trust	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All of Grantors Mineral Interest in equal shares
Mineral Deed	10/20/2022	10/20/2022	943306	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Trustees of the Gale E. Teter Residuary Trust	Albert Wayne Teter Alvin Leroy Teter Arnold Douglas Teter Nancy Marie Bottorff Carol Gayleen Gilliland Virginia Arlene Urbach Roger Lowell Teter Roberta Kay Teter Judith Ann Queen Brian Koehler	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All of Grantors Mineral Interest in equal 1/10th shares
Personal Representative's Mineral Deed	8/2/2023	8/2/2023	947463	Virginia Arlene Urbach and Alvin Leroy Teter, Co-Personal Representatives of the Estate of Virginia E. Teter, aka Virginia Teter, deceased	Albert Wayne Teter Alvin Leroy Teter Arnold Douglas Teter Nancy Marie Pottorff Carol Gayleen Gilliland Virginia Arlene Urbach Roger Lowell Teter Roberta Kay Teter Judith Ann Queen	Parcel B: <u>T-3N, R-55W of 6th P.M.</u> Sec 32- All	All of Grantors Mineral Interest in equal 1/9th shares

**END OF DEEDS / CHAIN OF TITLE**

**Appendix N: Public Outreach Materials**





COME LEARN ABOUT THE  
ROADRUNNER ENERGY FARM

**March 26, 2024 between 4-7 PM**

Where:

The Jaycee Building, Brush Municipal Park  
500 Ellsworth Street  
Brush, CO

Details:

RAI Energy is proposing a solar energy and battery storage project in Morgan County. Neighbors are invited to the open house to meet our team and learn more about the Roadrunner Project .



Send questions and/or RSVP  
via website:  
[www.roadrunnerenergyfarm.com](http://www.roadrunnerenergyfarm.com)



Serving Snake Pit BBQ!

Figure 1: Flyer announcing Event. Posted in Brush Chamber and Morgan County Economic Dev. Corp. On premises and via Website / Facebook Pages

- **What: Open House for Roadrunner Energy Farm**
- **When: March 26, 2024 between 4-7 PM**
- **Where: The Jaycee Building, Brush Municipal Park, 500 Ellsworth St. Brush, CO**

#### **About:**

On March 26, 2024, RAI Energy hosted an open house to share details on the Proposed Roadrunner Energy Farm Project located about 5 miles south/southwest of Brush, CO to the east side of Highway 71. Specifically, we sought to create a forum for the close neighbors to come learn about the project, meet the team and ask questions in advance of our plan to submit a Special Use Permit application to Morgan County.

With this in mind, we chose a venue that was close and easy to reach and sent invitations to neighbors within half a mile of the project, as well as elected officials in Morgan County and the cities of Brush and Fort Morgan (See attachment 1 for the mailing list). Where we had phone numbers for neighbors, we also called to personally invite them.

In addition, we shared details of the event through our local partner networks within the Morgan County Economic Development Corporation and Brush Chamber of Commerce. RAI Energy / Roadrunner Energy Farm is a member of both organizations.

#### **Description of Event:**

For the Open House, RAI Energy created 6 large scale poster exhibits (see attachment 2 for images of the slides and set up), displayed around the edges of the room. Food was catered by Snake Pit BBQ – a local restaurant. Natalie from the Brush Chamber helped with event coordination and monitoring the food table to make sure things ran smoothly. Guests were invited to sign in, and the RAI Energy team made a point of engaging in one-on-one or small group discussions to share details about the project, answer questions, hear about concerns, and generally to learn more about the attendees and their perspectives.

One of the main concerns we heard in initial conversations with nearby neighbors in advance of this event centered on the delicate ecosystem and very sandy nature of the soil in the area. Fears of “sugar sand” blowing into neighbor’s yards if the solar plant is poorly managed during construction and operational phases of the project were echoed in many conversations. Based on these concerns, RAI Energy has engaged with H2 Enterprises, a highly respected environmental reclamation company headquartered in Keenesburg, CO to create a “Best Management Practice” plan that can be deployed during pre-construction, construction and the operation phases of the project to mitigate this issue. A representative from H2-E attended the event to respond directly to these concerns and contributed an educational flyer on the topic. See attachment 3 for this handout.

#### **RAI Energy Team**

- Kristina Jansen, Project Development Manager for RAI Energy
- Mark Juergensen, VP Development for RAI Energy

- Scott Lesikar, Permitting Lead – Westwood (permitting consultant for RAI Energy)
- Kelsey Singleton, Environmental Coordinator – H2 Enterprises (environmental restoration consultant for RAI Energy)
- John McKnight, Stirling Renewable Resources (land consultant for RAI Energy)

**Attendance:**

The event had 33-35 people from the surrounding area stop in over the course of the evening, with the majority being very close neighbors, and a few from interested stakeholder groups including the Morgan Community College and Farm to Power and Brush Chamber of Commerce (see attachment 4 for images of the Event in progress).

**Main Takeaways:**

Overall, the event was well attended and facilitated many fruitful and engaging conversations with community members. Key concerns our team heard about the most included:

- Blowing sands/site stabilization/revegetation
- Traffic during construction (some were concerned with the Fortress Solar Farm being constructed approximately the same time & truck traffic on SH 71).
- Road wear and maintenance
- Property values
- Setbacks from residences
- Noise

**Attachment 1: Mailing List**

Name	Full Address	Parcel Number	Address 1	Address 2	SITUS	District	Precinct	Zoning	Account No.	City	State	Zipcode	Street No.	Street Name
FRAZIER, CODY W	30475 CO RD O, BRUSH, CO 80723	123319000005		30475 CO RD O		3	16	A	R018538	BRUSH	CO	80723		
JANZEN, DUSTIN & ASHLEY	14156 HWY 71, BRUSH, CO 80723	123124000009		14156 HWY 71	14156 HWY 71	3	16	A	R004620	BRUSH	CO	80723	14156	HWY 71
COLBURN, MARTHA E	14998 HWY 71, BRUSH, CO 80723	123124000010		14998 HWY 71		3	16	A	R003475	BRUSH	CO	80723		
FELZIEN, RONALD L & KITTA L	14395 CO RD 30, BRUSH, CO 80723	123124000011		14395 CO RD 30	14395 CO RD 30	3	16	A	R003476	BRUSH	CO	80723	14395	CO RD 30
LEE, JOHN W & KATHY	12702 E VIA DE PALMAS, CHANDLER, AZ 85249	123125000007		12702 E VIA DE PALMAS		3	16	A	R003606	CHANDLER	AZ	85249		
BAUGHMAN, KATHRYN A TRUST	4855 W COUGAR ROCK TRAIL, PRESCOTT, AZ 86305	123318000001		4855 W COUGAR ROCK TRAIL		3	16	A	R002788	PRESCOTT	AZ	86305		
COLBURN, MARTHA	14998 HWY 71, BRUSH, CO 80723	123113000009		14998 HWY 71	14998 HWY 71	3	16	A	R003915	BRUSH	CO	80723	14998	HWY 71
STUTZMAN, TIMOTHY J & LANA J	19798 CO RD 23, FORT MORGAN, CO 80701	123318000002		19798 CO RD 23	30630 CO RD Q	3	16	A	R019869	FORT MORGAN	CO	80701	30630	CO RD Q
MORROW, TOM E & MERRIGWEN	30489 CO RD N, BRUSH, CO 80723	123330000013		30489 CO RD N	30489 CO RD N	3	16	A	R018959	BRUSH	CO	80723	30489	CO RD N
TADOLINI, SHAWN R & MARTA	30215 CO RD N, BRUSH, CO 80723	123330000014		30215 CO RD N	30215 CO RD N	3	16	A	R018962	BRUSH	CO	80723	30215	CO RD N
BASS, WESLEY A	30517 CO RD N, BRUSH, CO 80723	123330001001		30517 CO RD N	30517 CO RD N	3	16	A	R017575	BRUSH	CO	80723	30517	CO RD N
BASS, BRUCE B & MARGARET A	30621 CO RD N, BRUSH, CO 80723	123330001002		30621 CO RD N	30589 CO RD N	3	16	A	R017535	BRUSH	CO	80723	30589	CO RD N
BASS, BRUCE B & MARGARET A	30621 CO RD N, BRUSH, CO 80723	123330001003		30621 CO RD N	30621 CO RD N	3	16	A	R003442	BRUSH	CO	80723	30621	CO RD N
BASS, BRUCE B & MARGARET A	30621 CO RD N, BRUSH, CO 80723	123330001004		30621 CO RD N	30651 CO RD N	3	16	A	R017537	BRUSH	CO	80723	30651	CO RD N
CHURCHWELL, JANIE M & EDWARD A	30309 CO RD N, BRUSH, CO 80723	123330000007		30309 CO RD N	30309 CO RD N	3	16	A	R018530	BRUSH	CO	80723	30309	CO RD N
BASS, BRUCE B FAMILY LLLP	P O BOX 685, BRUSH, CO 807230685	123330000009		P O BOX 685		3	16	A	R003441	BRUSH	CO	807230685		
BOOTH LAND & LIVESTOCK LLC	P O BOX 72, LUCERNE, CO 80646	123333000001		P O BOX 72		3	16	A	R002775	LUCERNE	CO	80646		
CURTIS, JUSTIN P	11626 HWY 71, BRUSH, CO 80723	128704000002		11626 HWY 71		3	16	A	R002869	BRUSH	CO	80723		
MICHAEL L DIXON FAMILY LLLP	10826 HWY 71, BRUSH, CO 80723	128706000001		10826 HWY 71		3	16	A	R003589	BRUSH	CO	80723		
BASS, JERRY L & BARBARA E	11943 HWY 71, BRUSH, CO 80723	128901000007		11943 HWY 71	11943 HWY 71	3	16	A	R016537	BRUSH	CO	80723	11943	HWY 71
HELLYER, MARY ELLEN	811 WALNUT ST, FORT MORGAN, CO 80701	123330000010		811 WALNUT ST		3	16	A	R016473	FORT MORGAN	CO	80701		
BLAKE, TRAVIS	30033 CO RD N, BRUSH, CO 80723	123330000012		30033 CO RD N	30033 CO RD N	3	16	A	R004614	BRUSH	CO	80723	30033	CO RD N
STATE OF COLORADO	1313 SHERMAN ST - RM 620, DENVER, CO 80203	123316000900	BOARD OF LAND COMMISSIONERS	1313 SHERMAN ST - RM 620		3	16	A	R802711	DENVER	CO	80203		
BASS, BRUCE B FAMILY LLLP	P O BOX 685, BRUSH, CO 807230685	123317000001		P O BOX 685		3	16	A	R002944	BRUSH	CO	807230685		
FRAZIER, BONNIE	30475 CO RD O, BRUSH, CO 80723	123319000001		30475 CO RD O		3	16	A	R003466	BRUSH	CO	80723		
FRAZIER, BONNIE	30475 CO RD O, BRUSH, CO 80723	123319000002		30475 CO RD O		3	16	A	R002789	BRUSH	CO	80723		
FRAZIER, BONNIE	30475 CO RD O, BRUSH, CO 80723	123319000003		30475 CO RD O	30475 CO RD O	3	16	A	R003490	BRUSH	CO	80723	30475	CO RD O
FRAZIER, CODY W	30475 CO RD O, BRUSH, CO 80723	123319000004		30475 CO RD O		3	16	A	R003524	BRUSH	CO	80723		
FRAZIER, CODY W & CRYSTAL D	P O BOX 156, BRUSH, CO 80723-0156	123319000006		P O BOX 156	30289 CO RD O	3	16	A	R015227	BRUSH	CO	80723-0156	30289	CO RD O
BASS, BRUCE B FAMILY LLLP	P O BOX 685, BRUSH, CO 807230685	123320000001		P O BOX 685		3	16	A	R002943	BRUSH	CO	807230685		
BOOTH LAND & LIVESTOCK LLC	P O BOX 72, LUCERNE, CO 80646	123320000002		P O BOX 72		3	16	A	R002769	LUCERNE	CO	80646		
BOOTH LAND & LIVESTOCK LLC	P O BOX 72, LUCERNE, CO 80646	123321000001		P O BOX 72		3	16	A	R002770	LUCERNE	CO	80646		
COLBURN, MARTHA	14998 HWY 71, BRUSH, CO 80723	123124000001		14998 HWY 71		3	16	A	R003467	BRUSH	CO	80723		
GRIPPIN, STANLEY W	14540 HWY 71, BRUSH, CO 80723	123124000002		14540 HWY 71	14540 HWY 71	3	16	A	R003612	BRUSH	CO	80723	14540	HWY 71
FLORIAN, KEITH D & JUDY R	29699 CO RD O.5, BRUSH, CO 80723	123124000003		29699 CO RD O.5	29699 CO RD O.5	3	16	A	R003488	BRUSH	CO	80723	29699	CO RD O.5
BOOTH LAND & LIVESTOCK LLC	P O BOX 72, LUCERNE, CO 80646	123328000001		P O BOX 72	32609 CO RD N	3	16	A	R002773	LUCERNE	CO	80646	32609	CO RD N
BOOTH LAND & LIVESTOCK LLC	P O BOX 72, LUCERNE, CO 80646	123329000001		P O BOX 72		3	16	A	R002774	LUCERNE	CO	80646		
HELLYER, MARY ELLEN	811 WALNUT ST, FORT MORGAN, CO 80701	123329000002		811 WALNUT ST		3	16	A	R002740	FORT MORGAN	CO	80701		
PARDUN, RICHARD A	31717 CO RD N, BRUSH, CO 80723	123329000003		31717 CO RD N	31717 CO RD N	3	16	A	R015218	BRUSH	CO	80723	31717	CO RD N
BASS, BRUCE B FAMILY LLLP	P O BOX 685, BRUSH, CO 807230685	123330000001		P O BOX 685		3	16	A	R003445	BRUSH	CO	807230685		
SMITH, CHARLES L & SHAUNA J	P O BOX 621, BRUSH, CO 80723	123330000002		P O BOX 621	30478 CO RD O	3	16	A	R015228	BRUSH	CO	80723	30478	CO RD O
WALKER, JILL &	13138 HWY 71, BRUSH, CO 80723	123125001003	KOLMAN, JOSHUA	13138 HWY 71	13138 HWY 71	3	16	A	R018968	BRUSH	CO	80723	13138	HWY 71
FITZGERALD, LISA M	13142 HWY 71, BRUSH, CO 80723	123125001004		13142 HWY 71	13142 HWY 71	3	16	A	R018969	BRUSH	CO	80723	13142	HWY 71
BASS, BRUCE O & PAULETTE C	30490 CO RD O, BRUSH, CO 80723	123330000011		30490 CO RD O	30490 CO RD O	3	16	A	R018226	BRUSH	CO	80723	30490	CO RD O
MICHAEL L DIXON FAMILY LLLP	10826 HWY 71, BRUSH, CO 80723	123331000001		10826 HWY 71		3	16	A	R003590	BRUSH	CO	80723		
WEITZEL LAND LLC	28271 CO RD L, BRUSH, CO 80723	123136000001		28271 CO RD L	12633 HWY 71	3	16	A	R003543	BRUSH	CO	80723	12633	HWY 71
BASS, LLEWELLYN W	11107 HWY 71, BRUSH, CO 80723	128901000001		11107 HWY 71	11107 HWY 71	3	16	A	R003444	BRUSH	CO	80723	11107	HWY 71
DIXON, MICHAEL L FAMILY LLLP	10826 HWY 71, BRUSH, CO 80723	128706000002		10826 HWY 71		3	16	A	R003570	BRUSH	CO	80723		
MICHAEL L DIXON FAMILY LLLP	10826 HWY 71, BRUSH, CO 80723	123332000001		10826 HWY 71		3	16	A	R002939	BRUSH	CO	80723		
CURTIS, JUSTIN P	11626 HWY 71, BRUSH, CO 80723	128705000001		11626 HWY 71		3	16	A	R002870	BRUSH	CO	80723		
CURTIS, JUSTIN P	11626 HWY 71, BRUSH, CO 80723	128705000001		11626 HWY 71		3	16	A	R002870	BRUSH	CO	80723		
MICHAEL L DIXON FAMILY LLLP	10826 HWY 71, BRUSH, CO 80723	128705000002		10826 HWY 71		3	16	A	R002934	BRUSH	CO	80723		
LUDGATE, TIMOTHY & CRYSTAL	31437 CO RD K, BRUSH, CO 80723	128705000004		31437 CO RD K	31437 CO RD K	3	16	A	R019789	BRUSH	CO	80723	31437	CO RD K
CURTIS, JUSTIN P &	11626 HWY 71, BRUSH, CO 80723	128706000004	WESTHOFF-CURTIS, JILL C	11626 HWY 71	11626 HWY 71	3	16	A	R015640	BRUSH	CO	80723	11626	HWY 71
BASS, BRUCE B FAMILY LLLP	P O BOX 685, BRUSH, CO 807230685	123330000008		P O BOX 685		3	16	A	R017536	BRUSH	CO	807230685		
PHELPS, JORDAN R & VIRGINIA M	13134 HWY 71, BRUSH, CO 80723	123125001002		13134 HWY 71	13134 HWY 71	3	16	A	R018967	BRUSH	CO	80723	13134	HWY 71
PADILLA, MATHEW & JULIE	12641 HWY 71, BRUSH, CO 80723	123136000002		12641 HWY 71	12641 HWY 71	3	16	A	R021745	BRUSH	CO	80723	12641	HWY 71
FRAZIER, CODY W	30475 CO RD O, BRUSH, CO 80723	123319000008		30475 CO RD O		3	16	A	R021242	BRUSH	CO	80723		
HANNAN, HEIDI E & LUKE R	11652 HWY 71, BRUSH, CO 80723	128706000005		11652 HWY 71	11652 HWY 71	3	16	A	R020729	BRUSH	CO	80723	11652	HWY 71

CURTIS, JUSTIN P	11626 HWY 71, BRUSH, CO 80723	128706000003		11626 HWY 71		3	16	A	R003535	BRUSH	CO	80723	11634	HWY 71
SCHRANZ, LILLIAN	2252 MEADOW ST, LONGMONT, CO 80501	128706000006		2252 MEADOW ST	11634 HWY 71	3	16	A	R022226	LONGMONT	CO	80501	11634	HWY 71

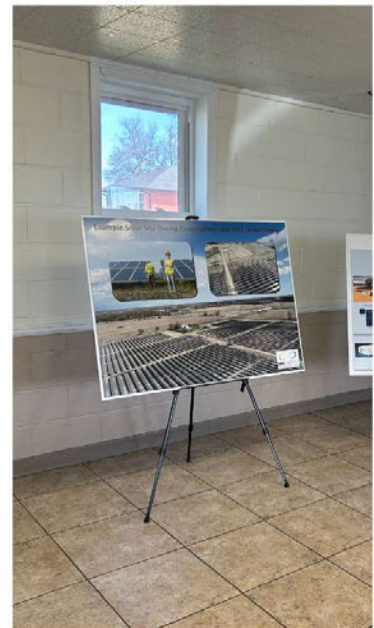
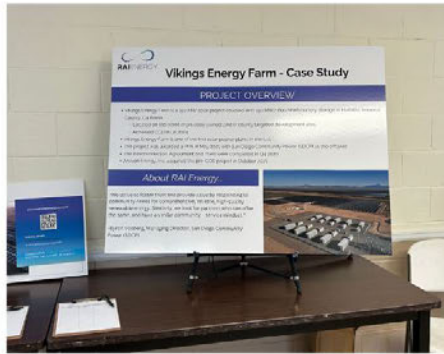
Morgan County Board of Commissioners	Address	Phone Number
Mark Arndt, District 1	218 W. Kiowa, P.O. Box 596 Fort Morgan, CO 80701	970-542-3500
Jon Becker, District 2		
Gordon Westhoff, District 3		

Morgan County Planning Commissioners	Address
Nathan Troutd, Chairman	Morgan County Administration Building, 231 Ensign Street, Fort Morgan, CO in the Commissioners' Assembly Room – Floor B
Robert Pennington, Vice Chairman	
Pete Mercer	
Clayton Miller	
Erik Mohrlang	
Rob Chilson	
Dave Musgrave	
Allyn Wind (Alternate)	

Brush City Council Members	Phone Number
Mayor Dana Sherman	970-467-1454
Alison Gorrell	970-370-3944
Nathan Tyree	970-441-0299
Daniel R. Scalise	970-768-3971
David Basil	303-999-5632
Mayor Pro-Tem Larry Lundstrom	970-370-3003
Justin Spradlin	970-380-9371

Fort Morgan City Council Members	Phone Number
Mayor Kevin Lindell	970-867-7549
Douglas Schossow	970 867-8984
Jeff Morford	970-380-3434
Jon Kaper	970 380-6336
Bill Garcia	970 380-8751
James Parks	970 380-9419
Loren Boyett	970 590-5921

## Attachment 2: Images of Posters and Event

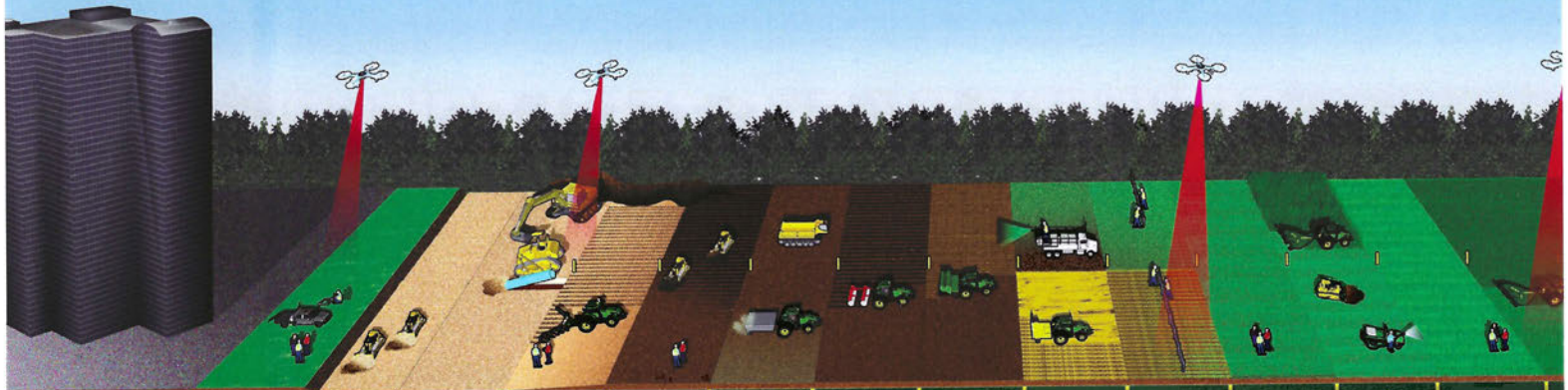




**Attachment 3: Handout on Best management Practices of Successful Reclamation**

# Best Management Practices for SUCCESSFUL RECLAMATION

(IN SEQUENCE)



PLANNING

SITE CHARACTERIZATION

CLEARING / GRADING

CONSTRUCTION

SUB-SOIL DECOMPACTION

TOPSOIL RETURN

AMENDMENTS

SEED-BED PREP

SEEDING

MULCHING

FINAL CONSTRUCTION

MONITORING

PUNCHLIST

PERMIT RELEASE

The goal for Rec-Tech-Science is that every project is prosperous for generations to come through considerations of environmental impacts ensuring the land thrives and the ecosystems are stable and sustainable.

## HEADQUARTERS

4626 CR 65  
Keenesburg, CO 80643  
303.732.9300





## POWERED BY REC-TECH-SCIENCE

H2 Enterprises is, a family owned, environmental restoration & reclamation contractor focused on integrating innovative solutions in science & technology within the reclamation process. Utilizing our Rec-Tech-Science best management practices we can detect potential soil hazards and help you prevent further erosions or slips, restore soil fertility, and stabilize the soil to hold it in place. This cost-effective approach improves ecosystems and increases financial, regulatory, and social exchanges within environmental management.

### R RECLAMATION

Over the past 30 years, H2 has successfully reclaimed 2.2 million acres in 45 states rallying knowledge and expertise in various regional terrains, climates, soil types, and ecosystems. Services provided include:

- Reclamation Design
- Environmental Services
- Region Specific Equipment
- Pre/Post Pile Erosion Control
- Pre/Post Pile Monitoring
- Civil Earthwork

### T TECHNOLOGY

H2's aerial analytics experts analyze data to identify key areas within projects where clients need to focus efforts and resources. Our technology is formulated to specifically predict and help prevent unexpected occurrences utilizing the following models:

- Volumetric Quantities
- Stormwater Management analyzes the asset for stormwater runoff, soil loss, & proper placement of erosion controls
- Vegetation Analysis monitors the coverage of vegetation on the asset for compliance and healthy ground cover
- Change Detection analytics navigates key areas within the project identifying changes such as encroachments, excavation & progress monitoring

### S SCIENCE

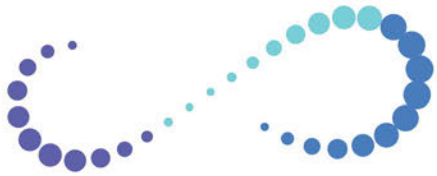
Our soil scientists, geochemists, hydrology, and vegetation specialists analyze on-site ecosystems to develop custom reclamation plans tailored to environmental conditions of the site.

Our approach is rooted in: tested methodologies and geochemical, soil science, and agronomic research. With a deep understanding of regulations and associated environmental challenges, H2 provides site-specific, accurate and adaptable environmental solutions that reduce cost, time to acquire and close out a permit, and divestment of legacy property.

- Site Specific Analyses
- Soil Suitability Analyses
- Seed Mix Design
- Agronomic research

Attachment 4: Images from the Event





# RAIENERGY

## WHO WE ARE

RAI Energy, founded in 2016, is based in San Jose, CA.

We develop both community and utility scale renewable energy with a focus on the Western United States.

RAI Energy has developed more than 750 MW of utility scale and distributed generation solar and storage projects.

## SUSTAINABLE TECHNOLOGIES



### SOLAR POWER

It's the most abundant renewable energy source and as costs drop, it's the fastest growing new energy being built. Our utility solar pipeline continues to grow as offtakers increasingly seek decarbonization solutions.



### INTEGRATED RENEWABLES

Combining solar and storage technologies together onsite offers the benefits of clean power into the evening when the sun is not shining.



### ENERGY STORAGE

Batteries help balance energy needs and allow more clean energy on the grid among other benefits.



### FRONTIER TECHNOLOGIES

Interest is growing in green fuels, produced through electrolysis powered by solar, that can address many energy uses that will be expensive to electrify.



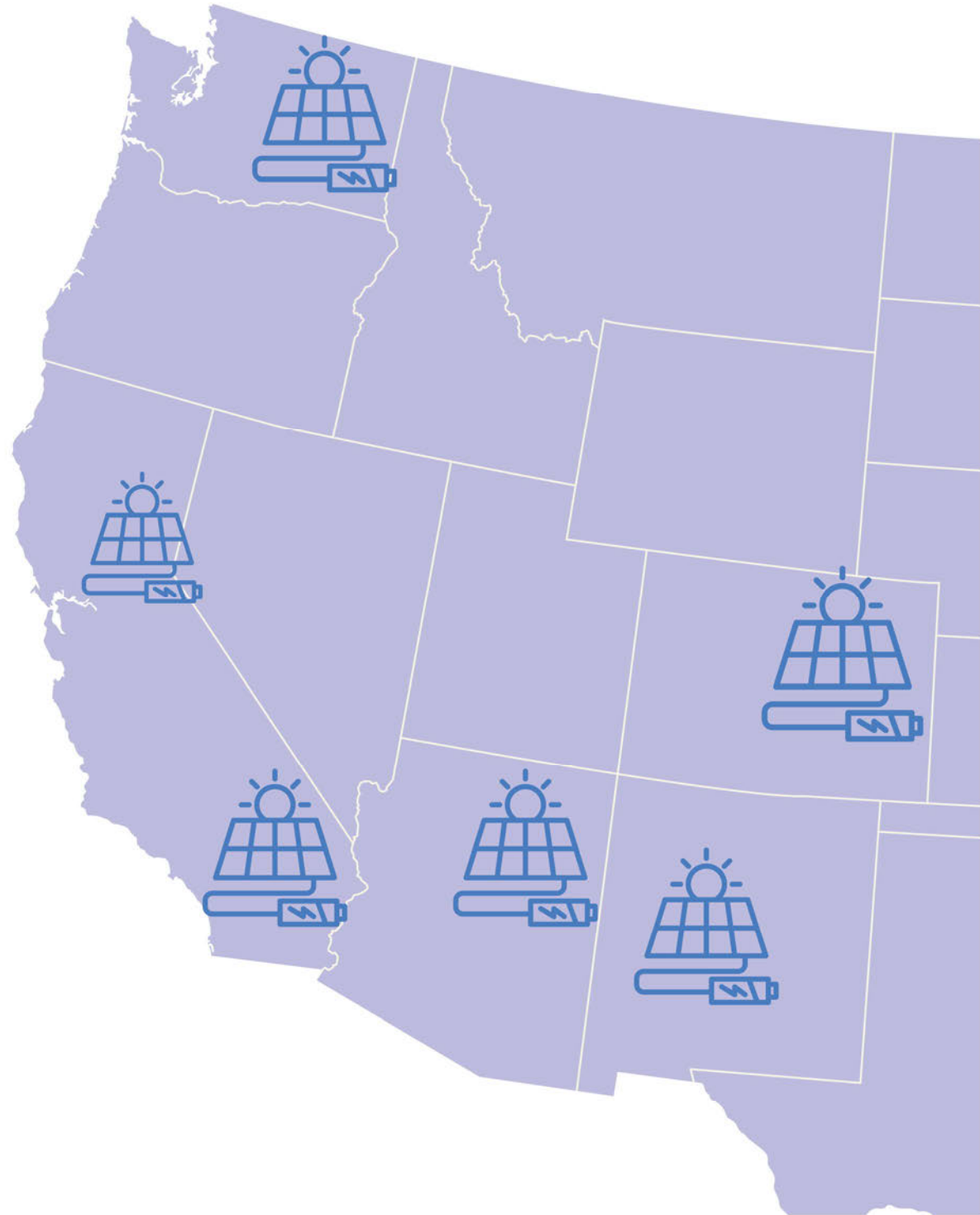
COMMUNITIES. CLIMATE. CHANGE.  
BUILDING THE FUTURE OF ENERGY.

# MARKET FOCUS

Dedicated to decarbonizing communities, with a focus on the American West.

The company's current portfolio of projects includes 3 GW of renewable energy in the WECC market

RAI Energy has projects in Arizona, California, Colorado, New Mexico and Washington.



**RAI**ENERGY

# Vikings Energy Farm - Case Study

## PROJECT OVERVIEW

- Vikings Energy Farm is a 150 MW solar project coupled with 150 MW/ 600 MWh battery storage in Holtville, Imperial County, California.
  - Located on 610 acres of privately owned land in county targeted development area
  - Achieved COD in Q1 2024
- Vikings Energy Farm is one of the first solar peaker plants in the U.S.
- The project was awarded a PPA in May 2021 with San Diego Community Power (SDCP) as the offtaker
- The Interconnection Agreement and TSRs were completed in Q4 2020
- Arevon Energy, Inc. acquired the pre-COD project in October 2021

## *About RAI Energy...*

“We strive to foster trust and provide value by responding to community needs for comprehensive, reliable, high-quality renewable energy. Similarly, we look for partners who can offer the same, and have a similar community – service mindset.”

-Byron Vosberg, Managing Director, San Diego Community Power (SDCP)





## Contact Information

[www.roadrunnerenergyfarm.com](http://www.roadrunnerenergyfarm.com)



**Kristina Jansen**

Project Development Manager

[kristina.jansen@raienergy.com](mailto:kristina.jansen@raienergy.com)

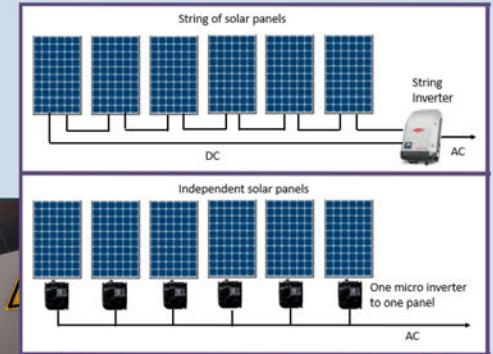
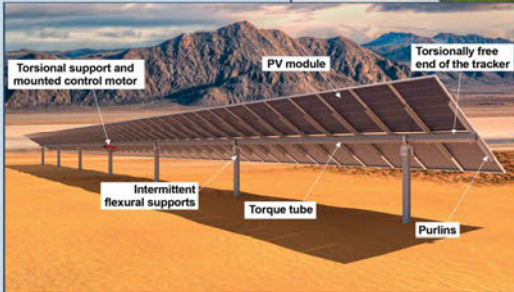
COMMUNITIES. CLIMATE. CHANGE.  
BUILDING THE FUTURE OF ENERGY



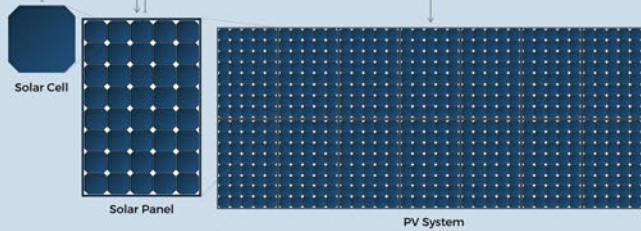
# Example Solar Site During Construction and Post-Construction



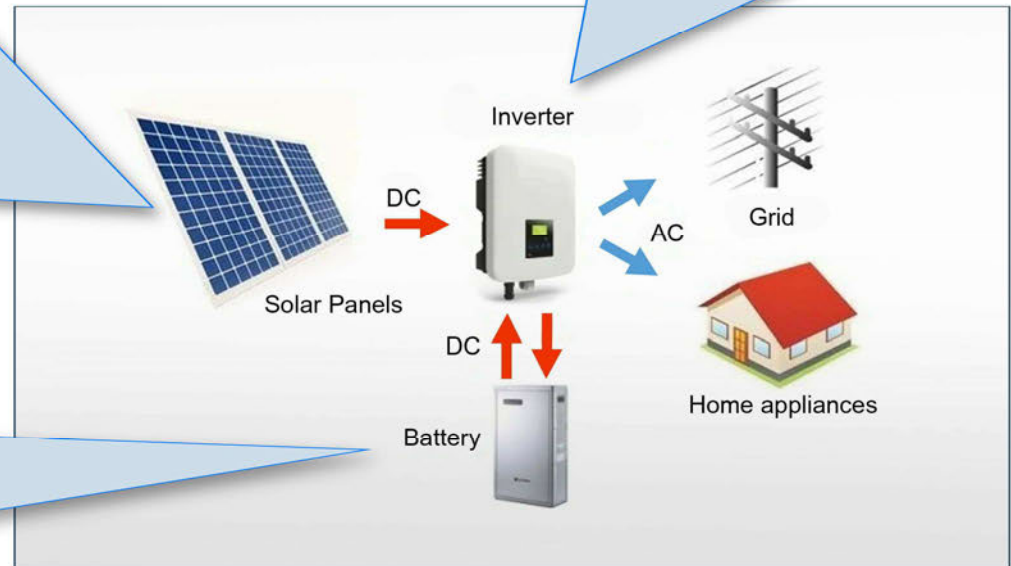
# Example Solar Farm System and Components



From a Solar Cell to a PV System



Electricity Meter | AC Isolator | Fusebox Inverter | Battery | Charge Controller  
 Generation Meter | DC Isolator | Cabling | Mounting | Tracking System



September 19, 2024

ATTN: Nicole Hay  
Morgan County Planning  
Zoning & Building Department  
231 Ensign, P.O. Box 596  
Fort Morgan, CO 80701

Re: Roadrunner Energy Farm Special Use Permit  
Applications  
File R0046541.00.00

Dear Nicole:

On behalf of Roadrunner Energy Farm, LLC (“Applicant”), Westwood Professional Services (“Westwood”) is providing responses to the submittal review comments pertaining to the Roadrunner Energy Farm Project (“Project”) Special Use Permit (“SUP”) Applications (“Applications”) initially submitted by the Applicant on May 2, 2024. Responses are being provided for the review comments produced by Morgan County (“County”), as well as its referral agencies, on August 13 and 20, 2024. Review comments and corresponding responses are grouped throughout this memorandum by agency, with comments denoted in bold italics and responses immediately subsequent.

## Colorado Department of Transportation

***We have had a couple meetings with the applicant already regarding their TIS and the need for TIS revisions and we’re waiting on their revision to see how many access permits are required and if any highway improvements will be warranted? If you have any questions or if the county has any concerns about this project please let us know.***

This has been acknowledged by the Applicant and a revised Traffic Study is currently being prepared by Kimley-Horn. The revised traffic analysis will be provided upon completion.

## City of Fort Morgan

***Could you please add our new Public Works Director Tom Acre to future emails like this. He will be overseeing Planning & Zoning. His email is [REDACTED]. I will forward this one to him.***

Cheryl Brindisi with Morgan County Planning & Zoning responded to this request via email on August 8, 2024, confirming that Tom Acre will be included in referral agency correspondence going forward.

## Western Area Power Administration

***The only concern we may have is if high profile trucks will be crossing under our lines to get to the construction area. If we can find our [sic] their intended route then we can respond accurately.***

Cheryl Brindisi with Morgan County Planning & Zoning provided WAPA with the proposed haul route map, as well as an excerpt from the Application detailing the proposed public road use and haul routes.

***It looks like they're going to be crossing under our facilities in two different locations as well as possibly change the grade of the road, both of which could affect our transmission. They'll need to work with us while in the planning phase to see if a temporary permit is necessary.***

This has been acknowledged by the Applicant, who has committed to coordinating with WAPA to determine whether a temporary permit is necessary. On September 18, 2024, the Applicant reached out to Tracy Rogers to discuss potential impacts and approvals. As of the date of this letter, no response has been received.

## Bureau of Reclamation

***Cheryl: From the looks of the map you have, it appears the facility will be south of Ft. Morgan. Is that correct? What other impacts do you think will have to the community and area? Reclamation has 5 tracts in the Ft. Morgan area, but they are all north of Hwy 34 and 76 (see attached).***

Cheryl Brindisi with Morgan County Planning & Zoning provided the following response to this request via email on August 7, 2024:

This proposed facility will actually run adjacent to the east side of the Highway 71 corridor south of Brush for approximately 5 miles. This facility will be one of the largest proposed so far for Morgan County. It is expected to bring further economic benefits to the community such as, stimulate local businesses, and generate additional tax revenue for Morgan County. I am responsible or sending out referral letters for the Morgan County Planning and Zoning Department and I wanted to make sure that I notified agencies that may have an interest to weigh in with comments or that may have no conflict of interest. From the map that you have attached to this email, it appears that there will be no foreseen conflict for the Bureau of Reclamation?

Patrick McCusker with the Bureau of Reclamation thanked Cheryl for this response and for the opportunity to look at this Project. Therefore, it appears that there are no conflicts or concerns with the proposed Project.

## Washington County Planning & Zoning

***Received, thank you. We will be in touch if we have any questions.***

This has been acknowledged by the Applicant, and no further action is required.

## Public Service Company of Colorado dba Xcel Energy

***Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the plan for Roadrunner Energy Farm- Solar and BESS and currently has no apparent conflict. As a safety precaution, PSCo would like to remind the developer to call the Utility Notification Center by dialing 811 for utility locates prior to construction.***

This has been acknowledged by the Applicant, who has committed to calling the Utility Notification Center prior to commencement of construction.

## Colorado Parks and Wildlife

***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, per CPW's "Fencing with Wildlife in Mind" brochure.***

Surrounding the solar facility, the Applicant will incorporate 8-foot-tall fencing, installed six inches above natural ground, which will allow for uninhibited ingress and egress of animals including small and medium mammals, birds, reptiles, and amphibians. The fence will have smooth top wire, with no barbed wire at all, which cannot impale animals. Other fencing features that follow the "Fencing with wildlife in mind" brochure and are practicable to incorporate will be considered. As required, fencing surrounding electrical facilities will also be NEC compliant.

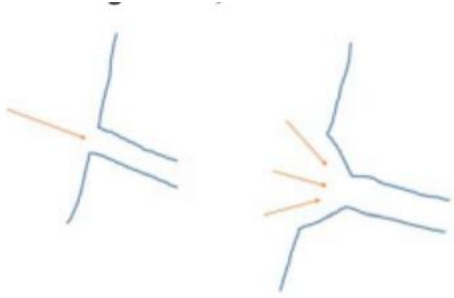
***CPW recommends Greater Prairie Chicken surveys be conducted for two years prior to construction and that survey results be shared with us.***

The Applicant plans to conduct targeted lek surveys beginning in the spring of 2025, for at least one year in advance of construction. Following completion of the 2025 surveys, the Applicant will coordinate with CPW to share survey results and continue to discuss next step as necessary.

***Although this Solar Project is located outside of HPH and Beaver Creek and the associated floodplain to the west, the biggest impact from this Solar Project will be the loss of open space and the fragmentation of existing and accessible big game habitats. Therefore, CPW recommends incorporating at least one east-to-west movement corridor in the final site plans by using creative siting solutions without compromising MWs. Note, 250 feet should be considered the bare minimum width, and the longer the proposed corridor, the wider the corridor should be.***

The Applicant plans to incorporate one east-to-west movement corridor that will bisect the Project Area. This corridor is planned to be 0.5-mile wide, significantly exceeding the 250-foot minimum width recommended by CPW.

***Furthermore, corridor entrances should not be 90-degree angles, but more of an inviting funnel, as shown below in the right image.***



The Applicant will incorporate angled entrances to create funnels at the entrances to the wildlife corridor.

***CPW recommends that the solar facility is checked weekly, either remotely or in person (or escape structures are installed inside the fenced area), to allow animals to escape if they become trapped within the facility. Please immediately report mortalities, trapped or injured wildlife, or other reportable incidents to the local District Wildlife Manager (Robert Emanuel 970-466-0501). Please document and report these findings to CPW annually.***

The Project will be monitored remotely by professional operations and maintenance teams 24/7/365 to identify any potentially trapped animals, such as deer or Pronghorn. On-site, regular maintenance will also be conducted at the Project. Results will be reported at least once annually to CPW.

***CPW recommends that the Project Area not be lit at night to minimize wildlife attraction to project infrastructure and limit impacts to hunting, migration, or other nocturnal activities of wildlife.***

The Applicant will utilize wildlife friendly lighting options and limit lighting at night to the extent feasible.

***CPW recommends transmission lines 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 Applicant will conduct raptor stick nest surveys prior to construction start. If nests are identified, the Applicant will consider implementing up to a 0.5-mile buffer, dependent on the species. Additionally, the Applicant will utilize APLIC standards, as feasible, in designing transmission lines, including the use of bird diverters within ¼-mile of lakes, drainages, riparian areas, and raptor nest buffers if necessary.

## **Harris Engineering Consultants, Inc.**

***Based on my initial review, water resources, drainage and stormwater runoff are mentioned in Sections 3.7, 3.8, 4.3, and 4.6 of the narrative but appear to be anecdotally presented without technical basis with respect to site hydrology and hydraulics. I would recommend the Planning Department request the applicant to provide a preliminary hydrologic and hydraulic analysis that includes an evaluation of both pre-development and post-development site conditions so that the***

***Department may review and assess potential impacts to area drainage as a result of the proposed development as anticipated by an engineered analysis.***

A Hydrologic & Hydraulic Assessment was completed by Sierra Overhead Analytics, with a report dated September 16, 2024. In this analysis, pre- and post-construction runoff was calculated using the NRCS Runoff Equation. Using the average pre- and post-construction curve numbers for the site outline—62.6 and 67.2, respectively—and the National Oceanic and Atmospheric Administration Atlas 14 100-year 24-hour precipitation depth (4.46 inches), pre-construction runoff depth was 1.16 inches, and post-construction runoff depth was 1.46 inches.

Potential pile scour depth was calculated using the methods of Chapter 7 of the HEC 18 Scour Manual. K1, K2, and K3 were calculated to be 1.1, 1.3, and 1.1, respectively, and a box pile of dimensions  $a=1/3$ " and  $L=1/2$ " were used. For simplicity, the angle of attack was assumed to be zero for all piles.

During the 100-year 24-hour pre-construction storm event, on-site flow depths reached approximately 6.2 feet in a depression in the northeast area of the site outline. The highest on-site velocity—approximately 3.4 feet per second—occurred in the southwest area of the site outline, just east of the Heartland Expressway. Flow velocities were, on average, less than one foot per second across the remainder of the site. The highest on-site pile scour potential—approximately 1.2 feet—occurred in the same area where velocity was highest but were, on average, less than 0.75 feet across the rest of the site.

During the 100-year 24-hour post-construction storm event, on-site flow depths reached approximately 7.4 feet in a depression in the south-central area of the site outline. On average, depths in the site outline were less than one foot. The highest on-site velocity—approximately 3.8 feet per second—occurred near the site outline's southwest border, east of the Heartland Expressway. Flow velocities were, on average, less than one foot per second across the remainder of the site outline. The highest on-site pile scour potential—approximately 1.25 feet—occurred where post-construction velocities were highest but were, on average, less than 0.75 feet.

Refer to the full Hydrologic & Hydraulic Assessment in Appendix H of the Application for more information.

## **Morgan Conservation District**

***The Morgan Conservation District has reviewed the Roadrunner Energy Farm, LLC Special Use Permits. The District would like to make the recommendation of the implementation of a tree windbreak to assist with wind and soil erosion.***

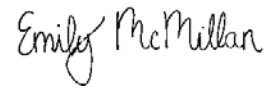
***Furthermore, the District would like to recommend that the applicant manage and eradicate all noxious weeds on the property, in accordance with the Colorado Noxious Weed Act. The District can assist with the planning and recommendation of a tree windbreak if needed, as well as directing the applicant to noxious weed management resources.***

The Applicant will take Morgan Conservation District's recommendations for a tree windbreak and noxious weed management into consideration and will implement these recommendations if deemed practicable.

Please contact me if you have any questions.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES

A handwritten signature in black ink that reads "Emily McMillan". The signature is written in a cursive style with a large initial "E".

Emily Mcmillan, Permitting Specialist  
*Enclosed: Referral Agency Correspondence*



**Westwood**

**Colorado Department of Transportation**



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

## Special Use Application- Roadrunner Energy Farm- Solar and BESS

Shepherd - CDOT, Robert (Mike) [REDACTED]

Thu, Aug 8, 2024 at 9:12 AM

To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Cc: Allyson Young - CDOT [REDACTED], Rose Valdes - CDOT [REDACTED], Timothy Bilobran - CDOT [REDACTED]

Good morning Cheryl,

We have had a couple meetings with the applicant already regarding their TIS and the need for TIS revisions and we're waiting on their revision to see how many access permits are required and if any highway improvements will be warranted? If you have any questions or if the county has any concerns about this project please let us know.

[Mike Shepherd](#)

Assistant Access Manager / Utility Permits



P [REDACTED]  
10601 West 10th Street, Greeley, CO 80634  
[REDACTED] | <http://codot.gov/> | [www.cotrip.org](http://www.cotrip.org)

[Quoted text hidden]

--  
Thank you,

**Allyson Young**  
Region 4  
Access Manager - Traffic



P [REDACTED]  
10601 West 10th Street, Greeley, CO 80634  
[REDACTED] | <http://codot.gov/> | [www.cotrip.org](http://www.cotrip.org)

---

**Referral Memo PC-Roadrunner.pdf**  
96K

**Westwood**

**City of Fort Morgan**



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

## Special Use Application- Roadrunner Energy Farm- Solar and BESS

Brenda Guggenmos [REDACTED]

Thu, Aug 8, 2024 at 8:18 AM

To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Cheryl,

Could you please add our new Public Works Director Tom Acre to future emails like this. He will be overseeing Planning & Zoning. His email is [REDACTED]

I will forward this one to him.

Thank you...

Brenda J. Guggenmos

Administrative Assistant

### City of Fort Morgan

Office of Planning & Zoning and Building

110 Sherman St., PO Box 100

Fort Morgan, CO 80701

Phone: [REDACTED] Fax: (970) 867-3039

Email [REDACTED]

**From:** Cheryl Brindisi <cbrindisi@co.morgan.co.us>

**Sent:** Wednesday, August 7, 2024 2:27 PM

**To:** Tammy Leonard [REDACTED]

**Cc:** Tad Anderson [REDACTED]; Kinder Morgan - Jeff Voltattorni

<[REDACTED]>; Bruce Bas [REDACTED]; David Martin

<[REDACTED]>; James Rehn [REDACTED]; John Goodman

<[REDACTED]>; MCREA - Kevin Martens [REDACTED]; Danette Martin

<[REDACTED]>; MCQW - Kent Pflager [REDACTED]; Tim Amen

<[REDACTED]>; MCQW - Kay Zarbock [REDACTED]; Mel Bustos

<[REDACTED]>; Mikaela Noe [REDACTED]; Soil Conservation Dist - Danielle French

<[REDACTED]>; Brent Kliesen [REDACTED]; Monty Torres

<[REDACTED]>; Tyler Purvis <[REDACTED]>; Roger Doll [REDACTED]

Bilobran - CDOT, Timothy [redacted]; Century Link - Brian Vance  
 [redacted]; Ciocanu, Violeta [redacted]; McCusker, Patrick D  
 [redacted] Hice-Idler - CDOT Contractor, Gloria  
 [redacted] Brent Nation [redacted]  
 Brenda Guggenmos [redacted]; Jeff Lawrence [redacted]  
 Julie Murphy [redacted] Rachel Turner  
 [redacted]; Jeri Leingang [redacted] Ryan Abfalter  
 [redacted] Trae Boehm [redacted] Town of Hillrose  
 [redacted] Elissa Groves [redacted]  
 [redacted] Rogers, Tracy (CONTR) [redacted]  
 [redacted] Wendy Figueroa - DNR [redacted]; Marette - DNR, Brandon  
 [redacted]; Liam Cummings [redacted]; Allyson Young - CDOT  
 [redacted]; Kramer - CDPHE, Thaine [redacted]; Nicole Hay  
 [redacted]; Jenafer Santos <[jsantos@co.morgan.co.us](mailto:jsantos@co.morgan.co.us)>

**Subject:** [EXTERNAL] Re: Special Use Application- Roadrunner Energy Farm- Solar and BESS

**Warning**

This message originated from outside of the City of Fort Morgan. Do not click any links or open any attachments unless you trust the sender and you are expecting this message.

[Quoted text hidden]

Links contained in this email have been replaced. If you click on a link in the email above, the link will be analyzed for known threats. If a known threat is found, you will not be able to proceed to the destination. If suspicious content is detected, you will see a warning.



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

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## Special Use Application- Roadrunner Energy Farm- Solar and BESS

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Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Thu, Aug 8, 2024 at 8:25 AM

To: Brenda Guggenmos [REDACTED]

Will do, thanks for letting me know.

**Thank you**

**Cheryl Brindisi, Planning and Zoning Administrative Assistant**

***Morgan County Planning and Zoning***

***231 Ensign St.***

***PO Box 596***

***Fort Morgan, CO 80701***

***970-542-3526***

[CBrindisi@co.morgan.co.us](mailto:CBrindisi@co.morgan.co.us)

[Quoted text hidden]

**Westwood**

**Western Area Power Administration**



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

### Special Use Application- Roadrunner Energy Farm- Solar and BESS

Rogers, Tracy (CONTR) [REDACTED]  
To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Wed, Aug 7, 2024 at 3:20 PM

Hi Cheryl,

The only concern we may have is if high profile trucks will be crossing under our lines to get to the construction area. If we can find out their intended route then we can respond accurately.

Thanks,

#### Tracy Rogers | Lands Realty Technician

Wyandotte Services on contract to

Western Area Power Administration | Rocky Mountain Region | Loveland, CO

(O) [REDACTED] (M) [REDACTED] [REDACTED]



**From:** Cheryl Brindisi <cbrindisi@co.morgan.co.us>  
**Sent:** Wednesday, August 7, 2024 12:47 PM  
**To:** Tad Anderson [REDACTED] Kinder Morgan - Jeff Voltattorni [REDACTED]; Bruce Bass [REDACTED]; David Martin [REDACTED] James Rehn [REDACTED]; John Goodman [REDACTED]; MCREA - Kevin Martens [REDACTED]; Danette Martin [REDACTED]; MCQW - Kent Pflager [REDACTED]; Tim Amen [REDACTED]; MCQW - Kay Zarbock [REDACTED]; Mel Bustos [REDACTED]; Mikaela Noe [REDACTED]; Soil Conservation Dist - Danielle French [REDACTED]; Brent Kliesen [REDACTED]; Monty Torres [REDACTED]; Tyler Purvis [REDACTED]; Roger Doll [REDACTED]; Bilobran - CDOT, Timothy [REDACTED] Century Link - Brian Vance [REDACTED]; Ciocanu, Violeta [REDACTED]; McCusker, Patrick D [REDACTED] Hice-Idler - CDOT Contractor, Gloria [REDACTED] Brent Nation [REDACTED] Jeff Lawrence [REDACTED]; Julie Murphy [REDACTED] Rachel Turner [REDACTED]; Jeri Leingang [REDACTED]; Ryan Abfalter [REDACTED]; Trae Boehm [REDACTED]; Town of Hillrose [REDACTED] Elissa Groves [REDACTED]; Rogers, Tracy (CONTR) [REDACTED]; Tammy Leonard [REDACTED] Wendy Figueroa - DNR [REDACTED]; Marette - DNR, Brandon [REDACTED] Liam Cummings [REDACTED]; Allyson Young - CDOT [REDACTED]; Kramer - CDPHE, Thaine [REDACTED]

**Cc:** Nicole Hay [REDACTED] Jenafer Santos <jsantos@co.morgan.co.us>  
**Subject:** [EXTERNAL] Special Use Application- Roadrunner Energy Farm- Solar and BESS



**EXTERNAL E-MAIL: Before you click a link or open an attachment... STOP and THINK.**  
Forward any suspicious e-mail to [spam@wapa.gov](mailto:spam@wapa.gov), or call WITCC at (720) 962-7111.

[Quoted text hidden]



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

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## Special Use Application- Roadrunner Energy Farm- Solar and BESS

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Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Wed, Aug 7, 2024 at 3:42 PM

To: "Rogers, Tracy (CONTR)" [REDACTED]

Please see the attached Exhibit 6, Haul Route map and also the portion of the application 2.7.1 Public Roads and Haul Routes.

**Thank you**

**Cheryl Brindisi, Planning and Zoning Administrative Assistant**

*Morgan County Planning and Zoning*

*231 Ensign St.*

*PO Box 596*

*Fort Morgan, CO 80701*

*970-542-3526*

[CBrindisi@co.morgan.co.us](mailto:CBrindisi@co.morgan.co.us)

[Quoted text hidden]

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**2 attachments**



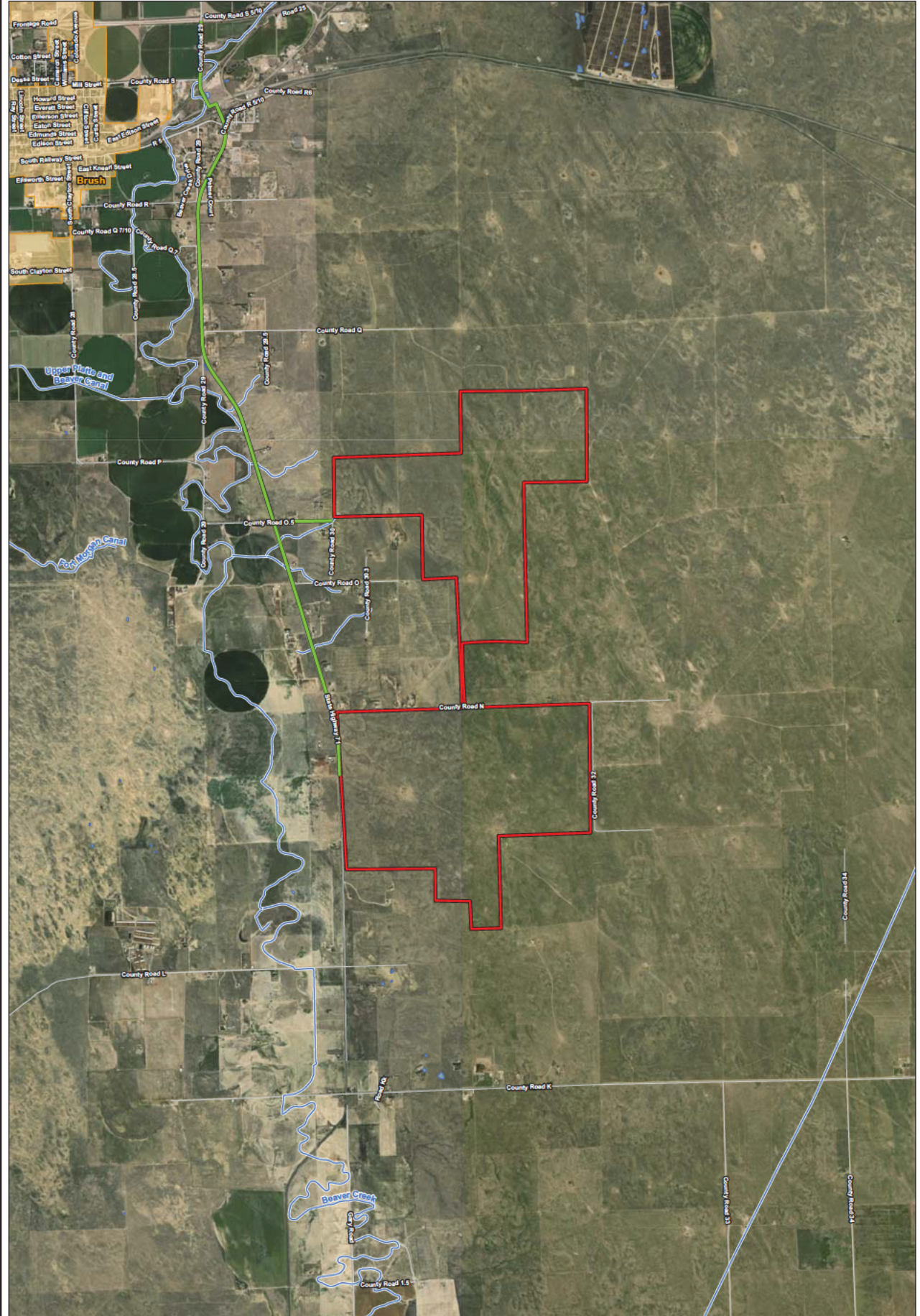
**2.7.1 Haul Routes.pdf**

70K



**Haul Route Map-Exhibit 6.pdf**

669K



Data Sources: Westwood (2024); ESRI WMS World Imagery Basemap (Accessed 2024); U.S. Census Bureau (2022); OpenStreetMap (Accessed 2023); NHD (2022)

**Westwood**  
 Toll Free (888) 637-5150 westwoodps.com  
 Westwood Professional Services, Inc.

**Legend**

	Haul Route	NHD Waterbody
Project Area	NHD Flowline	Local Road
Municipal Boundary		

**Roadrunner Energy Farm**  
 Morgan County, Colorado

**Haul Route Map**

EXHIBIT 6 of 8

## 2.6 Anticipated Permit Timeframe

According to Section 4-845 of the Solar Facility Zoning Regulations, a use permit for a principal ground-mounted solar collector facility is valid for three years from the date of approval. The Applicant may seek an extension of the approval period from the appropriate decision-making authority by demonstrating a need for an extension and filing an application with the County Planning Department in conjunction with the appropriate fee as established by the Board of County Commissioners. Renewals may be requested in one-, two-, or three-year terms, with no extensions to extend the total approval period beyond six years from the date of the original approval of the use permit. To ensure adequate time for equipment procurement, permit authorizations, and Project construction, the Applicant respectfully requests a three-year extension of the anticipated permit approval period.

## 2.7 Required Public Improvements

### 2.7.1 Public Roads and Haul Routes

Prior to construction, the Applicant will coordinate with applicable local and state road authorities to ensure that the weights being introduced to area roads are acceptable and to obtain all relevant permits. It is anticipated that a combination of state and local roads will need to be widened or otherwise modified to ensure deliveries and to protect existing transportation infrastructure. Such modifications may include installing longer culverts to accommodate a temporary widening of roadways, fortifying road shoulders, widening intersections for larger turning radii, widening or improving bridges where applicable, and increasing aggregate thickness of road surfaces. Applicant will also coordinate with applicable road authorities regarding public road closures. At the time of Application submittal, haul routes are anticipated to include Interstate Highway 76 to State Highway 71, as well as County Road O.5. Potential haul routes, road surface material, measures for dust control, traffic plan, and proposed road maintenance schedules or programs will be identified in a Haul Route Plan/Traffic Impact Analysis, as well as any applicable Road Use Agreements. All public improvement obligations are dependent upon final design and will be defined by the EPC contractor prior to construction.

On July 8, 2024, Westwood Professional Services completed a Trip Generation Analysis memorandum for the Project in support of this Application. This memorandum included estimates of total vehicle trips per day and peak hour volumes generated by the proposed development. Trip generation estimates were developed for each construction phase based on the anticipated number of construction employees and truck deliveries:

- Maximum number of employees on-site per day:
  - Phase 1: 130
  - Phase 2: 480
  - Phase 3: 40
- Proposed work schedule:
  - 6:00 AM – 3:00 PM
- Maximum number of deliveries per day:
  - Phase 1: 72
  - Phase 2: 252
  - Phase 3: 20
- Daily Passenger Car Equivalent trips:
  - Phase 1: 274
  - Phase 2: 984

- Phase 3: 80

Refer to the Trip Generation Analysis memorandum, dated July 8, 2024, for more information.

### **2.7.2 Water Supply**

During construction, water used for dust control measures will be sourced from permitted off-site commercial suppliers. Refer to **Section 3.2** for more information on dust mitigation measures.

Up to twice a year during operation of the Facility, the solar panels may need to be washed. If necessary, the required water input would be sourced off-site and delivered to the Facility. Due to the infrequency of such water supply, the Project will have negligible impacts on water quantity and will not strain local water supplies. Therefore, the Project will require no additional water facilities.

### **2.7.3 Sanitary Sewer**

The proposed Project is not anticipated to adversely impact local sewage demands and would not necessitate additional wastewater facilities. During construction, site personnel will utilize portable sanitary units. During operations, the Facility will be unmanned and remotely monitored. As such, the proposed use of the Project will not require septic services at the site and will not release wastewater during any phase of the Project.

### **2.7.4 Utility Location and Crossing Agreements**

Prior to construction, Applicant and its contractors will use the Colorado Diggers Hotline to identify all utilities within the path of construction, including electric, gas, communications, water, and sewer to avoid impacts to those services. Applicant will also coordinate directly with applicable utility owners well in advance of Project construction to obtain any required crossing agreements.

### **2.7.5 Drainage Ditches**

A desktop assessment identified no drainage or irrigation ditches within the Project Area. If ditches are identified in the field at a later date, this Application will be amended accordingly.

## **2.8 Compliance with the Morgan County Comprehensive Plan**

As part of the Morgan County Comprehensive Plan's goal to preserve both the man-made and natural environment in an effort to enhance the quality of life in the region, Morgan County encourages the use of renewable resources in its land use planning efforts (Morgan County 2008). According to the Morgan County Comprehensive Plan, the zoning around Brush ranges from industrial to commercial to residential and planned development.

The area to the south of Brush consists of estate residential, rural residential, mobile home, commercial, and light industrial uses. County zoning to the south of the city of Brush mainly consists of agriculture. Certain pertinent goals for these land use planning areas include maintaining open space buffers near livestock areas, preservation of agricultural production land, and encouraging developers to obtain letter of map amendment or letter of map revision to remove some areas from floodplain areas. For utilities planning in the region, it is a goal of the Morgan County Comprehensive Plan to ensure that all developments in Morgan County have sufficient infrastructure and plans to expand utilities in the region for future growth.



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

---

## Special Use Application- Roadrunner Energy Farm- Solar and BESS

---

**Rogers, Tracy (CONTR)** [REDACTED]  
To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Thu, Aug 8, 2024 at 9:29 AM

Thank you Cheryl ,for pulling that from the application for me! I truly appreciate your help!

It looks like they're going to be crossing under our facilities in two different locations as well as possibly change the grade of the road, both of which could affect our transmission. They'll need to work with us while in the planning phase to see if a temporary permit is necessary.

Can you please add the above comment to your records? My contact info is below for their convenience.

Have a great day!

[Quoted text hidden]

[Quoted text hidden]



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

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## Special Use Application- Roadrunner Energy Farm- Solar and BESS

---

Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Thu, Aug 8, 2024 at 10:08 AM

To: "Rogers, Tracy (CONTR)" [REDACTED]

I will get this added to the records and I will pass this along to the applicant.

**Thank you**

**Cheryl Brindisi, Planning and Zoning Administrative Assistant**

*Morgan County Planning and Zoning*

*231 Ensign St.*

*PO Box 596*

*Fort Morgan, CO 80701*

*970-542-3526*

[CBrindisi@co.morgan.co.us](mailto:CBrindisi@co.morgan.co.us)

[Quoted text hidden]

**Westwood**

**Bureau of Reclamation**





Cheryl Brindisi &lt;cbrindisi@co.morgan.co.us&gt;

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**SUP**

3 messages

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**McCusker, Patrick D** [REDACTED]  
To: "CBrindisi@co.morgan.co.us" <CBrindisi@co.morgan.co.us>

Wed, Aug 7, 2024 at 1:20 PM

Cheryl: From the looks of the map you have, it appears the facility will be south of Ft. Morgan. Is that correct?

What other impacts do you think will have to the community and area? Reclamation has 5 tracts in the Ft. Morgan area, but they are all north of Hwy 34 and 76 (see attached).

Thanks, Pat

Patrick McCusker  
Natural Resource Specialist  
Bureau of Reclamation  
Eastern Colorado Area Office  
[11056 W. County Rd. 18E](#)  
Loveland, Colorado 80537  
[REDACTED]

PACE: Positive Attitudes Change Everything

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 **Narrows tracts 7\_17\_14.pdf**  
738K

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**Cheryl Brindisi** <cbrindisi@co.morgan.co.us>  
To: "McCusker, Patrick D" [REDACTED]

Wed, Aug 7, 2024 at 2:27 PM

This proposed facility will actually run adjacent to the east side of the Highway 71 corridor south of Brush for approximately 5 miles. This facility will be one of the largest proposed so far for Morgan County. It is expected to bring further economic benefits to the community such as, stimulate local businesses, and generate additional tax revenue for Morgan County. I am responsible for sending out referral letters for the Morgan County Planning and Zoning Department and I wanted to make sure that I notified agencies that may have an interest to weigh in with comments or that may have no conflict of interest. From the map that you have attached to this email, it appears that there will be no foreseen conflict for the Bureau of Reclamation?

**Thank you**

**Cheryl Brindisi, Planning and Zoning Administrative Assistant**  
*Morgan County Planning and Zoning*  
*231 Ensign St.*  
*PO Box 596*  
*Fort Morgan, CO 80701*  
*970-542-3526*

[CBrindisi@co.morgan.co.us](mailto:CBrindisi@co.morgan.co.us)

[Quoted text hidden]

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**McCusker, Patrick D** <[REDACTED]>  
To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Wed, Aug 7, 2024 at 2:28 PM

Thanks Cheryl:

I appreciate the opportunity to look at this project.

Pat

Patrick McCusker  
Natural Resource Specialist  
Bureau of Reclamation  
Eastern Colorado Area Office  
[11056 W. County Rd. 18E](#)  
Loveland, Colorado 80537  
[REDACTED]

PACE: Positive Attitudes Change Everything

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**From:** Cheryl Brindisi <cbrindisi@co.morgan.co.us>  
**Sent:** Wednesday, August 7, 2024 2:27 PM  
**To:** McCusker, Patrick D <[REDACTED]>  
**Subject:** [EXTERNAL] Re: SUP

**This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.**

[Quoted text hidden]

Exhibit B



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

**Westwood**

**Washington County Planning & Zoning**



Cheryl Brindisi <cbrindisi@co.morgan.co.us>

### Special Use Application- Roadrunner Energy Farm- Solar and BESS

**Tammy Leonard** [redacted] Wed, Aug 7, 2024 at 1:11 PM

To: Cheryl Brindisi <cbrindisi@co.morgan.co.us>

Cc: Tad Anderson [redacted] Kinder Morgan - Jeff Voltattorni  
 [redacted] Bruce Bass [redacted] David Martin [redacted], James  
 Rehn [redacted] John Goodman [redacted] MCREA - Kevin Martens  
 [redacted] Danette Martin [redacted] MCQW - Kent Pflager [redacted] Tim  
 Amen [redacted] MCQW - Kay Zarbock [redacted] Mel Bustos [redacted]  
 Mikaela Noe [redacted] Soil Conservation Dist - Danielle French [redacted]  
 Brent Klieser [redacted] Monty Torres [redacted] Tyler Purvis [redacted]  
 Roger Doll [redacted] "Bilobran - CDOT, Timothy" [redacted] Century Link - Brian  
 Vance [redacted] "Ciocanu, Violeta" [redacted] "McCusker, Patrick D"  
 [redacted] "Hice-Idler - CDOT Contractor, Gloria"  
 [redacted], Brent Nation [redacted]  
 [redacted] Jeff Lawrence [redacted] Julie Murphy  
 [redacted] Rachel Turner [redacted] Jeri Leingang  
 [redacted] Ryan Abfalter [redacted] Trae Boehm [redacted]  
 Town of Hillrose [redacted] Elissa Groves [redacted]  
 [redacted] "Rogers, Tracy (CONTR)" [redacted]  
 Kent.Peppler@usda.gov, Wendy Figueroa - DNR <wendy.figueroa@state.co.us>, "Marette - DNR, Brandon"  
 [redacted], Liam Cummings [redacted] Allyson Young - CDOT  
 [redacted] "Kramer - CDPHE, Thaine" [redacted] Nicole Hay  
 [redacted] Jenafer Santos <jsantos@co.morgan.co.us>

Received, thank you. We will be in touch if we have any questions.

Thank you,  
 Tammy Leonard  
 Washington County Planning & Zoning  
 [redacted]

[Quoted text hidden]

**Westwood**

**Public Service Company of Colorado dba Xcel  
Energy**



Right of Way & Permits

1123 West 3<sup>rd</sup> Avenue  
Denver, Colorado 80223  
Telephone: [REDACTED]  
[REDACTED]

August 19, 2024

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

Attn: Cheryl Brindisi, Nicole Hay, Jenafer Santos

**Re: Roadrunner Energy Farm- Solar and BESS**

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the plan for **Roadrunner Energy Farm- Solar and BESS** and currently has **no apparent conflict**.

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

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

**Westwood**

**Colorado Parks and Wildlife**





# COLORADO

## Parks and Wildlife

Department of Natural Resources

Northeast Region  
6060 Broadway  
Denver, CO 80216  
P 303.291.7227

August 16, 2024

Morgan County Planning & Zoning  
Attn: Cheryl Brindisi  
Administrative Assistant  
231 Ensign St, PO Box 596, Fort Morgan, CO 80701  
[cbrindisi@co.morgan.co.us](mailto:cbrindisi@co.morgan.co.us)

Re: CPW referral letter for Special Use Application- Roadrunner Energy Farm- Solar and BESS

Dear Cheryl,

Thank you for the opportunity for Colorado Parks and Wildlife (CPW) to submit formal comments on RAI Energy's proposed Roadrunner Energy Farm, including a 500-megawatt (MW) photovoltaic solar facility and the Roadrunner Energy Farm 500 megawatt ("MW") battery energy storage system ("BESS") located on 2,886 acres of private land. The Roadrunner Energy Farm will be located approximately 3.5 miles southeast of the Town of Brush in unincorporated Morgan County on existing agricultural lands.

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. One way we achieve this goal is by responding to referral comment requests.

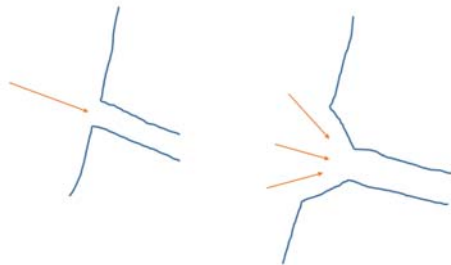
CPW appreciates this early consultation from RAI Energy and Morgan County because it can lead to a responsibly developed project that works toward achieving state solar goals while protecting sensitive wildlife species, habitats, and time frames. We recognize renewable energy development is important to meeting the State's greenhouse gas reduction goals and improving our climate resiliency.

Jeff Davis, Director, Colorado Parks and Wildlife  
Parks and Wildlife Commission: Dallas May, Chair · Richard Reading, Vice-Chair · Karen Bailey, Secretary · Jessica Beaulieu  
Marie Haskett · Jack Murphy · Gabriel Otero · Duke Phillips, IV · James Jay Tutchtton · Eden Vardy



CPW appreciates that the developer planned the project outside of High Priority Habitat. CPW also encourages the following recommendations for this solar project based on CPW's Solar BMPs:

- 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, per CPW's "[Fencing with Wildlife in Mind](#)" brochure.
- CPW recommends Greater Prairie Chicken surveys be conducted for two years prior to construction and that survey results be shared with us.
- Although this Solar Project is located outside of HPH and Beaver Creek and the associated floodplain to the west, the biggest impact from this Solar Project will be the loss of open space and the fragmentation of existing and accessible big game habitats. Therefore, CPW recommends incorporating at least one east-to-west movement corridor in the final site plans by using creative siting solutions without compromising MWs. Note, 250 feet should be considered the bare minimum width, and the longer the proposed corridor, the wider the corridor should be.
- Furthermore, corridor entrances should not be 90-degree angles, but more of an inviting funnel, as shown below in the right image.



- CPW recommends that the solar facility is checked weekly, either remotely or in person (or escape structures are installed inside the fenced area), to allow animals to escape if they become trapped within the facility. Please immediately report mortalities, trapped or injured wildlife, or other reportable incidents to the local District Wildlife Manager (Robert Emanuel 970-466-0501). Please document and report these findings to CPW annually.
- CPW recommends that the Project Area not be lit at night to minimize wildlife attraction to project infrastructure and limit impacts to hunting, migration, or other nocturnal activities of wildlife.
- CPW recommends transmission lines are installed according to Avian Power Line Interaction Committee (APLIC) standards and outside the raptor nesting season. Also, please install bird diverters within 1/4-mile of any lake, drainage, or riparian area and within the raptor nesting buffer for occupied nests.

CPW looks forward to further working with RAI Energy on this project. If you have any additional questions regarding wildlife concerns for this property, please contact Robert Emanuel, District Wildlife Manager at [REDACTED] or by phone at (970) 466-0501.

Respectfully,



Mark Leslie, Northeast Regional Manager

Cc: Robert Emanuel, District Wildlife Manager - [REDACTED]  
Lexi Hamous, NE Land Use Coordinator - [REDACTED]  
Wendy Figueroa, Area 3 Wildlife biologist - [REDACTED]  
Todd Cozad, Area 3 Wildlife Manager - [REDACTED]

**Westwood**

**Harris Engineering Consultants, Inc.**

August 15, 2024

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

Re: Site Drainage and Stormwater Runoff Review  
Roadrunner Solar Project

I have reviewed the documentation provided by your office for the proposed Roadrunner Solar site located several miles southeast of the City of Brush, consisting exclusively of the *Special Use Permit Application* [SUPA] dated May 1, 2024 which included a narrative and preliminary site plans.

Based on my initial review, water resources, drainage and stormwater runoff are mentioned in Sections 3.7, 3.8, 4.3 and 4.6 of the narrative but appear to be anecdotally presented without technical basis with respect to site hydrology and hydraulics. I would recommend the Planning Department request the applicant to provide a preliminary hydrologic and hydraulic analysis that includes an evaluation of both pre-development and post-development site conditions so that the Department may review and assess potential impacts to area drainage as a result of the proposed development as anticipated by an engineered analysis.

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

Sincerely,



Matthew C. Harris, PE  
CO PE #49409

**Westwood**

**Morgan Conservation District**



Morgan Conservation District Est. 1955

200 West Railroad Avenue, Fort Morgan, CO 80701  
970-427-3358 • [morganconservationdistrict@gmail.com](mailto:morganconservationdistrict@gmail.com)  
[www.morganconservationdistrict.com](http://www.morganconservationdistrict.com)

Morgan County Planning & Building Department  
231 Ensign Street  
Fort Morgan, CO 80701

To Whom in May Concern:

The Morgan Conservation District has reviewed the Roadrunner Energy Farm, LLC Special Use Permits.

The District would like to make the recommendation of the implementation of a tree windbreak to assist with wind and soil erosion. Furthermore, the District would like to recommend that the applicant manage and eradicate all noxious weeds on the property, in accordance with the Colorado Noxious Weed Act. The District can assist with the planning and recommendation of a tree windbreak if needed, as well as directing the applicant to noxious weed management resources.

Please let us know if you have any questions or concerns.

Sincerely,

Madeline Morrison  
District Manager