

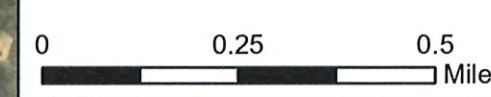
- ### Legend
- Proposed Access Road
  - Proposed Oil and Gas Location
  - Proposed Working Pad Surface
  - One Mile Buffer

- ### Soil Type
- 5--Ascalon-Eckley complex, 5 to 20 percent slopes
  - 15--Bankard-Glenberg complex, 0 to 3 percent slopes, moist, occasionally flooded
  - 24--Kim-Canyon loams, 5 to 35 percent slopes
  - 37--Sampson loam, 0 to 2 percent slopes
  - 38--Satanta loam, 0 to 3 percent slopes
  - 39--Satanta-Colby complex, 3 to 5 percent slopes

Source: Colorado Geological Survey  
 No faults, landslides, expansive soils, dikes, radioactive soils, earthquakes, floodplains, avalanches, or mudflows were evident in the area.

SOURCE: <https://cologeosurvey.maos.arcgis.com/apps/webappviewer/index.html?id=a6f816b35fb64d3da096e84af661f070>

Date Saved: 4/10/2023 6:34 PM



**WAVETECH HELIUM, INC.**  
**1 WAVETECH HOWARD 22-29**  
**SEC. 29 T13S R42W (SE/4 NW/4)**  
**CHEYENNE COUNTY, CO**  
**SURFACE: FEE**  
**SOILS**

Coordinate System: NAD 83 StatePlane  
 Colorado South FIPS 0503 Feet

Prepared By:

## Cheyenne County, Colorado

### 5—Ascalon-Eckley complex, 5 to 20 percent slopes

#### Map Unit Setting

*National map unit symbol:* 3557

*Elevation:* 4,200 to 6,500 feet

*Mean annual precipitation:* 13 to 19 inches

*Mean annual air temperature:* 46 to 57 degrees F

*Frost-free period:* 120 to 160 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Ascalon and similar soils:* 50 percent

*Eckley and similar soils:* 35 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Ascalon

##### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium and/or eolian deposits

##### Typical profile

*Ap - 0 to 6 inches:* sandy loam

*Bt - 6 to 19 inches:* sandy clay loam

*Bk - 19 to 35 inches:* sandy clay loam

*C - 35 to 60 inches:* sandy loam

##### Properties and qualities

*Slope:* 5 to 20 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high to high (0.60 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Moderate (about 8.3 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 6e

*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

## Description of Eckley

### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

### Typical profile

*A - 0 to 4 inches:* sandy loam  
*Bt - 4 to 16 inches:* gravelly sandy clay loam  
*2C - 16 to 60 inches:* very gravelly sand

### Properties and qualities

*Slope:* 5 to 20 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 5 percent  
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY063CO - Gravel Breaks  
*Hydric soil rating:* No

## Minor Components

### Manter

*Percent of map unit:* 15 percent  
*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Cheyenne County, Colorado  
Survey Area Data: Version 25, Aug 24, 2023



Cheyenne County, Colorado



Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		<i>Pct</i>
5—Ascalon-Eckley complex, 5 to 20 percent slopes						
Ascalon	R067BY024CO: Sandy Plains	2,500	1,600	800	Prairie sandreed	15
					Sideoats grama	10
					Western wheatgrass	10
					Needleandthread	10
					Sand bluestem	5
					Blue grama	—
Eckley	R067BY063CO: Gravel Breaks	1,400	900	600	Sideoats grama	30
					Little bluestem	20
					Needleandthread	10
					Prairie sandreed	5
					Sand bluestem	2
					Switchgrass	2
					Sand dropseed	2
					Blue grama	—

## Cheyenne County, Colorado

### 15—Bankard-Glenberg complex, 0 to 3 percent slopes, moist, occasionally flooded

#### Map Unit Setting

*National map unit symbol:* 2w4pg

*Elevation:* 3,800 to 5,890 feet

*Mean annual precipitation:* 14 to 16 inches

*Mean annual air temperature:* 50 to 54 degrees F

*Frost-free period:* 130 to 170 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Bankard, occasionally flooded, and similar soils:* 60 percent

*Glenberg, occasionally flooded, and similar soils:* 30 percent

*Minor components:* 10 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Bankard, Occasionally Flooded

##### Setting

*Landform:* Flood-plain steps, flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium

##### Typical profile

*A - 0 to 5 inches:* loamy sand

*Bw - 5 to 13 inches:* loamy sand

*Bk - 13 to 79 inches:* loamy sand

##### Properties and qualities

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Excessively drained

*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:* Occasional

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 5 percent

*Maximum salinity:* Nonsaline to slightly saline (0.5 to 5.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Moderate (about 6.4 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* A

*Ecological site:* R067BY031CO - Sandy Bottomland  
*Hydric soil rating:* No

## **Description of Glenberg, Occasionally Flooded**

### **Setting**

*Landform:* Flood-plain steps, flood plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

### **Typical profile**

*A - 0 to 5 inches:* sandy loam  
*AC - 5 to 15 inches:* sandy loam  
*C - 15 to 79 inches:* sandy loam

### **Properties and qualities**

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Somewhat excessively drained  
*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:* Occasional  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 5 percent  
*Maximum salinity:* Nonsaline (0.1 to 0.2 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 7.1 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 4c  
*Hydrologic Soil Group:* A  
*Ecological site:* R067BY031CO - Sandy Bottomland  
*Hydric soil rating:* No

## **Minor Components**

### **Haverson, occasionally flooded**

*Percent of map unit:* 10 percent  
*Landform:* Flood-plain steps, flood plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* R067BY036CO - Overflow  
*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: Cheyenne County, Colorado  
Survey Area Data: Version 24, Sep 1, 2022

Cheyenne County, Colorado						
Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		
						<i>Pct</i>
15—Bankard-Glenberg complex, 0 to 3 percent slopes, moist, occasionally flooded						
Bankard, occasionally flooded	R067BY031CO: Sandy Bottomland	2,400	1,850	1,200	Sand bluestem	30
					Prairie sandreed	25
					Switch grass	15
					Sand cherry	7
					Indiangrass	5
					Leadplant	5
					Sand sagebrush	3
					Hesperostipa comata ssp. comata	3
					Violet prairieclover	2
					Dotted gayfeather	2
					Narrowleaf penstemon	2
Glenberg, occasionally flooded	R067BY031CO: Sandy Bottomland	2,400	1,850	1,200	Sand bluestem	25
					Prairie sandreed	15
					Switchgrass	10
					Sand dropseed	5
					Indiangrass	5
					Sand sagebrush	5
					Blue grama	5
					Little bluestem	5
					Needleandthread	5
					Western wheatgrass	2
					Western sandcherry	2
					Tall dropseed	2

## Cheyenne County, Colorado

### 24—Kim-Canyon loams, 5 to 35 percent slopes

#### Map Unit Setting

*National map unit symbol:* 354b  
*Elevation:* 3,000 to 5,900 feet  
*Mean annual precipitation:* 13 to 19 inches  
*Mean annual air temperature:* 46 to 55 degrees F  
*Frost-free period:* 120 to 150 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Kim and similar soils:* 40 percent  
*Canyon and similar soils:* 25 percent  
*Minor components:* 35 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Kim

##### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium and/or eolian deposits

##### Typical profile

*A - 0 to 2 inches:* loam  
*C - 2 to 60 inches:* clay loam

##### Properties and qualities

*Slope:* 5 to 20 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 20 percent  
*Maximum salinity:* Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.6 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY008CO - Loamy Slopes

*Hydric soil rating:* No

## **Description of Canyon**

### **Setting**

*Landform:* Hills

*Landform position (three-dimensional):* Side slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Residuum

### **Typical profile**

*A - 0 to 3 inches:* loam

*C - 3 to 13 inches:* gravelly loam

*Cr - 13 to 17 inches:* weathered bedrock

### **Properties and qualities**

*Slope:* 5 to 35 percent

*Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high (0.20 to 0.60 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Very low (about 1.7 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* D

*Ecological site:* R067BY060CO - Limestone Breaks

*Hydric soil rating:* No

## **Minor Components**

### **Rock outcrop**

*Percent of map unit:* 10 percent

### **Satanta**

*Percent of map unit:* 10 percent

### **Stoneham**

*Percent of map unit:* 10 percent

**Colby**

*Percent of map unit: 5 percent*

**Data Source Information**

Soil Survey Area: Cheyenne County, Colorado

Survey Area Data: Version 24, Sep 1, 2022



Cheyenne County, Colorado						
Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		<i>Pct</i>
24—Kim-Canyon loams, 5 to 35 percent slopes						
Kim	R067BY008CO: Loamy Slopes	1,200	900	450	Western wheatgrass	30
					Needleandthread	10
					Sideoats grama	5
					Blue grama	—
Canyon	R067BY060CO: Limestone Breaks	1,200	900	500	Little bluestem	25
					Sideoats grama	25
					Miscellaneous perennial forbs	5
					Western wheatgrass	5
					Threadleaf sedge	5
					Miscellaneous shrubs	5
					Needleandthread	5
					Blue grama	—

## Cheyenne County, Colorado

### 37—Sampson loam, 0 to 2 percent slopes

#### Map Unit Setting

*National map unit symbol:* 354s  
*Elevation:* 3,800 to 5,100 feet  
*Mean annual precipitation:* 13 to 17 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 140 to 170 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Sampson and similar soils:* 75 percent  
*Minor components:* 25 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Sampson

##### Setting

*Landform:* Drainageways, swales  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Calcareous, medium-textured alluvium

##### Typical profile

*A - 0 to 5 inches:* loam  
*Bt - 5 to 30 inches:* clay loam  
*C - 30 to 78 inches:* loam

##### Properties and qualities

*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.8 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability classification (nonirrigated):* 3c  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY036CO - Overflow  
*Hydric soil rating:* No

### **Minor Components**

#### **Satanta**

*Percent of map unit: 10 percent*

#### **Goshen**

*Percent of map unit: 10 percent*

#### **Glenberg**

*Percent of map unit: 5 percent*

## **Data Source Information**

Soil Survey Area: Cheyenne County, Colorado

Survey Area Data: Version 23, Aug 31, 2021



Cheyenne County, Colorado



Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		<i>Pct</i>
37—Sampson loam, 0 to 2 percent slopes						
Sampson	R067BY036CO: Overflow	3,000	2,200	1,100	Western wheatgrass	35
					Green needlegrass	15
					Switchgrass	15
					Sideoats grama	5
					Fourwing saltbush	5
					Yellow indiagrass	5
					Blue grama	—

## Cheyenne County, Colorado

### 38—Satanta loam, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 354t  
*Elevation:* 3,000 to 6,500 feet  
*Mean annual precipitation:* 15 to 25 inches  
*Mean annual air temperature:* 45 to 57 degrees F  
*Frost-free period:* 130 to 200 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

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

#### Description of Satanta

##### Setting

*Landform:* Paleoterraces  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

##### Typical profile

*A - 0 to 8 inches:* loam  
*Bt - 8 to 16 inches:* clay loam  
*Bk - 16 to 60 inches:* loam

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Available water supply, 0 to 60 inches:* High (about 9.8 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY002CO - Loamy Plains  
*Hydric soil rating:* No

### **Minor Components**

#### **Ascalon**

*Percent of map unit: 5 percent*

#### **Kim**

*Percent of map unit: 5 percent*

## **Data Source Information**

Soil Survey Area: Cheyenne County, Colorado

Survey Area Data: Version 23, Aug 31, 2021



Cheyenne County, Colorado



Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		<i>Pct</i>
38—Satanta loam, 0 to 3 percent slopes						
Satanta	R067BY002CO: Loamy Plains	1,600	1,200	800	Western wheatgrass	15
					Needleandthread	10
					Green needlegrass	10
					Prairie sandreed	5
					Miscellaneous perennial forbs	5
					Blue grama	—

## Cheyenne County, Colorado

### 39—Satanta-Colby complex, 3 to 5 percent slopes

#### Map Unit Setting

*National map unit symbol:* 354v  
*Elevation:* 3,000 to 6,500 feet  
*Mean annual precipitation:* 12 to 25 inches  
*Mean annual air temperature:* 45 to 57 degrees F  
*Frost-free period:* 130 to 200 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Satanta and similar soils:* 50 percent  
*Colby and similar soils:* 20 percent  
*Minor components:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Satanta

##### Setting

*Landform:* Paleoterraces  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

##### Typical profile

*A - 0 to 8 inches:* loam  
*Bt - 8 to 16 inches:* clay loam  
*Bk - 16 to 60 inches:* loam

##### Properties and qualities

*Slope:* 3 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Available water supply, 0 to 60 inches:* High (about 9.8 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY002CO - Loamy Plains  
*Hydric soil rating:* No

## Description of Colby

### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Loess

### Typical profile

*A - 0 to 3 inches:* silt loam

*C - 3 to 60 inches:* silt loam

### Properties and qualities

*Slope:* 3 to 5 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high to high (0.57 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

*Available water supply, 0 to 60 inches:* High (about 10.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* B

*Ecological site:* R067BY002CO - Loamy Plains

*Hydric soil rating:* No

### Minor Components

#### Manter

*Percent of map unit:* 15 percent

#### Sampson

*Percent of map unit:* 15 percent

## Data Source Information

Soil Survey Area: Cheyenne County, Colorado

Survey Area Data: Version 23, Aug 31, 2021



Cheyenne County, Colorado



Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<i>Lb/ac</i>	<i>Lb/ac</i>	<i>Lb/ac</i>		<i>Pct</i>
39—Satanta-Colby complex, 3 to 5 percent slopes						
Satanta	R067BY002CO: Loamy Plains	1,600	1,200	800	Western wheatgrass	15
					Needleandthread	10
					Green needlegrass	10
					Miscellaneous perennial forbs	5
					Prairie sandreed	5
					Blue grama	—
Colby	R067BY002CO: Loamy Plains	1,600	1,100	600	Western wheatgrass	25
					Sideoats grama	10
					Green needlegrass	10
					Little bluestem	5
					Sand dropseed	5
					Needleandthread	5
					Blue grama	—