



Aota Technical, LLC
Twin Bridges Resources LLC
Red Rocks 1-13
Soil Unit Map
 Las Animas County
 NW1/4NW1/4 Sec. 1, T30S R55W 6th P.M.
 Date
 6/30/21

Legend

- Dry & Abandoned O&G Well
- Conventional Vertical Helium Gas Well
- Oil and Gas Location
- Working Pad Surface
- Skid-mounted Helium Purification Unit

NRCS Soil Survey

- Buried Helium Gas Flowline
- CC: Chacuaco-Capulin loams, 1 to 4 percent slopes
- DaE: Dalerose-Rock outcrop complex, 3 to 25 percent slopes
- WC: Plughat-Villegreen complex, 1 to 4 percent slopes

Data Sources:
 COGCC GIS Online
 Natural Resources Conservation Service

Las Animas County Area, Colorado, Parts of Huerfano and Las Animas Counties

WC—Plughat-Villegreen complex, 1 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2tqxn
Elevation: 4,900 to 5,800 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: Prime farmland if irrigated

Map Unit Composition

Plughat and similar soils: 43 percent
Villegreen and similar soils: 41 percent
Minor components: 16 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plughat

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over residuum weathered from sandstone

Typical profile

A - 0 to 3 inches: silt loam
Bt1 - 3 to 6 inches: silty clay loam
Bt2 - 6 to 13 inches: silty clay loam
Btk - 13 to 27 inches: silty clay loam
Bk1 - 27 to 34 inches: silt loam
2Bk2 - 34 to 48 inches: loam
2R - 48 to 79 inches: bedrock

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: 43 to 51 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 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: 40 percent
Gypsum, maximum content: 2 percent

Maximum salinity: Nonsaline to very slightly saline (0.5 to 3.0 mmhos/cm)

Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Ecological site: R067BY002CO - Loamy Plains

Hydric soil rating: No

Description of Villegreen

Setting

Landform: Interfluves

Landform position (two-dimensional): Shoulder, summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loess over residuum weathered from sandstone

Typical profile

A - 0 to 6 inches: loam

BA - 6 to 9 inches: silty clay loam

Bt - 9 to 15 inches: silty clay loam

Btk - 15 to 24 inches: silty clay loam

2Bk - 24 to 32 inches: channery loam

2R - 32 to 79 inches: bedrock

Properties and qualities

Slope: 1 to 4 percent

Depth to restrictive feature: 30 to 33 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 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: 30 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Nonsaline to very slightly saline (0.5 to 3.0 mmhos/cm)

Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4c

Hydrologic Soil Group: C

Ecological site: R067BY002CO - Loamy Plains

Hydric soil rating: No

Minor Components

Baca

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

Wiley

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

Boxcanyon

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

Rock outcrop

Percent of map unit: 1 percent
Landform: Scarps
Down-slope shape: Linear
Across-slope shape: Linear

Data Source Information

Soil Survey Area: Las Animas County Area, Colorado, Parts of Huerfano and Las Animas Counties

Survey Area Data: Version 23, Jun 5, 2020

Slope: 2 to 5 percent

Aspect: All aspects

Shape (down/across): Concave/concave

Depth class: Very deep

Drainage class: Poorly drained

Slowest permeability: .001 to .06 in/hr (very slow)

Available water capacity: About 9.8 inches (high)

Shrink-swell potential: About 7.5 percent (high)

Flooding hazard: Occasional

Seasonal high water table depth: About 12 to 18 inches

Calcium carbonate maximum: About 1 percent

Gypsum maximum: None

Salinity maximum: About 0 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Mountain Meadow

Potential native vegetation: tufted hairgrass, Nebraska sedge, slender wheatgrass, water sedge, Baltic rush, willow, shrubby cinquefoil, Rocky Mountain iris

Land capability subclass (irrigated): 4w

Land capability subclass (nonirrigated): 4w

Typical Profile:

Oi—0 to 2 inches; peat

Ag—2 to 10 inches; clay

Bg—10 to 60 inches; silty clay

Minor Components

Histic Cryaquolls and similar soils

Composition: About 10 percent

Landscape: Mountains

Landform: Fans

Position on landform: Rise

Slope: 2 to 5 percent

Aspect: All aspects

Shape (down/across): Concave/linear

Drainage class: Poorly drained

Ecological site: Mountain Meadow

Distinguishing characteristics: These soils have a layer of peat on the surface with sand, gravel, and cobbles in the substratum.

Major Uses

Rangeland, pasture, wildlife habitat

DaE—Dalerose-Rock outcrop complex, 3 to 25 percent slopes

Map Unit Setting

Major Land Resource Area: 70, 67

Elevation: 5,000 to 6,000 feet (1,524 to 1,828 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 50 to 53 degrees F. (10.0 to 11.7 degrees C.)

Frost-free period: 125 to 155 days

Note: Located in the eastern half of the county from Branson to the Baca County line.

Map Unit Composition

Daleroose and similar soils: 75 percent
 Rock outcrop: 15 percent
 Minor components: 10 percent

Component Descriptions

Daleroose soils

Landscape: Plains, canyonlands

Landform: Scarps

Position on landform: Head slope

Parent material: Slope alluvium and residuum weathered from sandstone

Slope: 3 to 25 percent

Aspect: All aspects

Shape (down/across): Convex/convex

Surface fragments: About 2 percent subrounded cobbles, about 3 percent subrounded medium and coarse gravel

Depth class: Very shallow and shallow

Depth to restrictive feature: 6 to 20 inches to bedrock, lithic

Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 1.0 inches (very low)

Shrink-swell potential: About 1.5 percent (low)

Calcium carbonate maximum: About 15 percent

Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Sandstone Breaks

Potential native vegetation: little bluestem, prairie sandreed, sideoats grama, blue grama, sand bluestem, needleandthread, big bluestem, chokecherry, golden currant, prairie junegrass, purple prairieclover, western wheatgrass, spreading buckwheat

Land capability subclass (nonirrigated): 7s

Typical Profile:

A—0 to 5 inches; gravelly fine sandy loam

Bk—5 to 10 inches; gravelly loam

R—10 to 60 inches; bedrock

Rock outcrop

Description: Rock outcrop consists of areas of exposed Dakota sandstone.

Landscape: Plains, canyonlands

Landform: Scarps

Parent material: Sandstone

Slope: 3 to 25 percent

Aspect: All aspects

Depth to restrictive feature: 0 inches to bedrock, lithic

Land capability subclass (nonirrigated): 8s

Minor Components

Chacuaco and similar soils

Composition: About 10 percent

Landscape: Plains

Landform: Interfluves, ridges

Position on landform: Rise
Slope: 3 to 7 percent
Aspect: All aspects
Shape (down/across): Linear/linear
Depth to restrictive feature: 20 to 40 inches to bedrock, lithic
Drainage class: Well drained
Ecological site: Loamy (formerly Loamy Plains)
Distinguishing characteristics: These soils are 20 to 40 inches deep to sandstone bedrock.

Major Uses

Rangeland, wildlife habitat

De—Davtone loam, 3 to 9 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 9,000 to 9,700 feet (2,743 to 2,957 meters)
Mean annual precipitation: 22 to 26 inches (559 to 660 millimeters)
Mean annual air temperature: 37 to 42 degrees F. (3.0 to 5.6 degrees C.)
Frost-free period: 60 to 75 days
Note: Located along drainageways on the Fishers Peak Mesa.

Map Unit Composition

Davtone and similar soils: 85 percent
 Minor components: 15 percent

Component Descriptions

Davtone soils

Landscape: Lava plateaus
Landform: Drainageways, fans
Position on landform: Rise, dip
Parent material: Loamy alluvium
Slope: 3 to 9 percent
 Aspect: All aspects
 Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in/hr (moderate)
Available water capacity: About 7.2 inches (moderate)
Shrink-swell potential: About 2.1 percent (low)
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 0 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Subalpine Loam
Potential native vegetation: Thurber's fescue, Parry's danthonia, Arizona fescue, western wheatgrass, elk sedge, mountain brome, mountain muhly, shrubby cinquefoil, slender wheatgrass, showy cinquefoil, fringed sagewort
Land capability subclass (nonirrigated): 6e

CC—Chacuaco-Capulin loams, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 67

Elevation: 5,000 to 6,000 feet (1,524 to 1,828 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 50 to 53 degrees F. (10.0 to 11.7 degrees C.)

Frost-free period: 130 to 155 days

Note: Located in the south-central part of the county north of Branson.

Map Unit Composition

Chacuaco and similar soils: 50 percent

Capulin and similar soils: 40 percent

Minor components: 10 percent

Component Descriptions

Chacuaco soils

Landscape: Plains

Landform: Plains

Position on landform: Rise

Parent material: Eolian deposits over residuum weathered from sandstone

Slope: 1 to 4 percent

Aspect: All aspects

Shape (down/across): Linear/linear

Depth class: Moderately deep

Depth to restrictive feature: 20 to 40 inches to bedrock, lithic

Drainage class: Well drained

Slowest permeability: 0.2 to 0.6 in/hr (moderately slow)

Available water capacity: About 4.8 inches (low)

Shrink-swell potential: About 2.2 percent (low)

Calcium carbonate maximum: About 40 percent

Gypsum maximum: About 2 percent

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 2 (slightly sodic)

Ecological site: Loamy (formerly Loamy Plains)

Potential native vegetation: blue grama, western wheatgrass, green needlegrass, fourwing saltbush, winterfat, bottlebrush squirreltail, little bluestem, sand dropseed, American vetch, purple prairieclover, scarlet globemallow, sideoats grama

Land capability subclass (irrigated): 3e

Land capability subclass (nonirrigated): 4e

Typical Profile:

A—0 to 8 inches; loam

AB—8 to 12 inches; clay loam

Bt—12 to 19 inches; clay loam

Btk—19 to 26 inches; clay loam

Bk—26 to 32 inches; gravelly loam

R—32 to 60 inches; bedrock

Capulin soils

Landscape: Plains

Landform: Plains

Position on landform: Talf

Parent material: Alluvium derived from basalt and sedimentary rock

Slope: 1 to 4 percent

Aspect: All aspects

Shape (down/across): Convex/convex

Depth class: Very deep

Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 9.5 inches (high)

Shrink-swell potential: About 2.1 percent (low)

Calcium carbonate maximum: About 25 percent

Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 1 (slightly sodic)

Ecological site: Loamy (formerly Loamy Plains)

Potential native vegetation: blue grama, western wheatgrass, fourwing saltbush, green needlegrass, sideoats grama, winterfat, American vetch, bottlebrush squirreltail, yucca

Land capability subclass (irrigated): 2e

Land capability subclass (nonirrigated): 4c

Typical Profile:

A—0 to 8 inches; loam

Bt1—8 to 17 inches; clay loam

Bt2—17 to 32 inches; clay loam

Bk1—32 to 38 inches; clay loam

Bk2—38 to 60 inches; gravelly loam

Minor Components

Dalerose and similar soils

Composition: About 9 percent

Landscape: Plains

Landform: Scarps

Position on landform: Crest

Slope: 2 to 4 percent

Aspect: All aspects

Shape (down/across): Convex/convex

Depth to restrictive feature: 6 to 20 inches to bedrock, lithic

Drainage class: Well drained

Ecological site: Sandstone Breaks

Distinguishing characteristics: These soils are less than 20 inches to sandstone bedrock.

Rock outcrop

Composition: About 1 percent

Landscape: Plains

Landform: Scarps

Slope: 2 to 4 percent

Aspect: All aspects

Depth to restrictive feature: 0 inches to bedrock, lithic

Distinguishing characteristics: Rock outcrop consists of areas of exposed Dakota sandstone.