



Aota Technical, LLC
Twin Bridges Resources LLC
Red Rocks 35-15
Soil Unit Map
 Las Animas County
 NW1/4NE1/4 Sec. 35, T29S 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

Buried Helium Gas Flowline

NRCS Soil Survey

- CC: Chacuaco-Capulin loams, 1 to 4 percent slopes
- DaE: Dalerose-Rock outcrop complex, 3 to 25 percent slopes
- VT: Villedry-Travessilla complex, 1 to 8 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

Daleroose 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.

Kimera and similar soils

Composition: About 5 percent

Landscape: Plains

Landform: Hills, ridges

Position on landform: Head slope, side slope

Slope: 3 to 7 percent

Aspect: All aspects

Shape (down/across): Convex/linear

Drainage class: Well drained

Ecological site: Sandy

Distinguishing characteristics: These soils have more than 18 percent clay content and less sand.

Blown-out land

Composition: About 1 percent

Landscape: Plains

Landform: Hills

Position on landform: Rise

Slope: 3 to 6 percent

Aspect: All aspects

Shape (down/across): Concave/concave

Drainage class: Excessively drained

Distinguishing characteristics: Blowouts consist of areas of extreme wind erosion that leave areas devoid of topsoil and subsoil.

Major Uses

Rangeland, wildlife habitat

VT—Villedry-Travessilla complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 69

Elevation: 4,500 to 6,000 feet (1,372 to 1,829 meters)

Mean annual precipitation: 12 to 14 inches (305 to 356 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 northeast part of the county.

Map Unit Composition

Villedry and similar soils: 50 percent

Travessilla and similar soils: 40 percent

Minor components: 10 percent

Component Descriptions

Villedry soils

Landscape: Canyonlands

Landform: Interfluves

Position on landform: Rise

Parent material: Loess over residuum weathered from sandstone

Slope: 1 to 8 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 6.6 inches (moderate)

Shrink-swell potential: About 2.4 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 5 (slightly sodic)

Ecological site: Loamy

Potential native vegetation: blue grama, western wheatgrass, galleta, fourwing saltbush, sand dropseed, sideoats grama, winterfat, green needlegrass, American vetch

Land capability subclass (irrigated): 3e

Land capability subclass (nonirrigated): 6c

Typical Profile:

A—0 to 4 inches; silt loam

BA—4 to 7 inches; silt loam

Bt—7 to 15 inches; silty clay loam

Btk—15 to 25 inches; silty clay loam

Bk1—25 to 33 inches; clay loam

2Bk2—33 to 38 inches; gravelly loam

R—38 to 60 inches; bedrock

Travessilla soils

Landscape: Canyonlands

Landform: Scarps

Position on landform: Crest

Parent material: Slope alluvium over residuum weathered from sandstone

Slope: 1 to 8 percent

Aspect: All aspects

Shape (down/across): Convex/linear

Surface fragments: About 7 percent subangular gravel

Depth class: Very shallow and shallow

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

Drainage class: Well drained

Slowest permeability: 2.0 to 6.0 in/hr (moderately rapid)

Available water capacity: About 1.6 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:

Common trees: Rocky Mountain juniper, twoneedle pinyon

Other plants: sideoats grama, blue grama, little bluestem, big bluestem, black grama, needleandthread, prairie sandreed, sand dropseed, western

wheatgrass, mountain mahogany, skunkbush sumac, yellow Indiangrass,
oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:

A—0 to 5 inches; sandy loam
AC—5 to 11 inches; sandy loam
Bk—11 to 14 inches; sandy loam
R—14 to 60 inches; bedrock

Minor Components

Almagre and similar soils

Composition: About 8 percent

Landscape: Canyonlands

Landform: Interfluves

Slope: 1 to 4 percent

Aspect: All aspects

Shape (down/across): Linear/linear

Depth to restrictive feature: 40 to 60 inches to bedrock, lithic

Drainage class: Well drained

Ecological site: Loamy

Distinguishing characteristics: These soils are 40 to 60 inches deep to sandstone bedrock.

Rock outcrop

Composition: About 2 percent

Landscape: Canyonlands

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.

Major Uses

Rangeland, wildlife habitat

VtC—Valent fine sand, 2 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 67

Elevation: 5,000 to 5,700 feet (1,524 to 1,737 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 east of Kim to the Baca County line.

Map Unit Composition

Valent and similar soils: 85 percent

Minor components: 15 percent