ACY

Re:

3B Enterprises, llc

Sand, Gravel & Rock Products
1200 E. 1st Street – P.O. Box 1665
Craig, CO 81626 - 970-824-0225

December 29. 2015

RECEIVED
DEC 30 2015
DIVISION OF RECLAMATION
MINING AND SAFETY

Amy Yeldell
Div. Reclamation Mining & Safety
Grand Junction, CO

Re: Deakins pit inspection
M-2001-060

Amy,

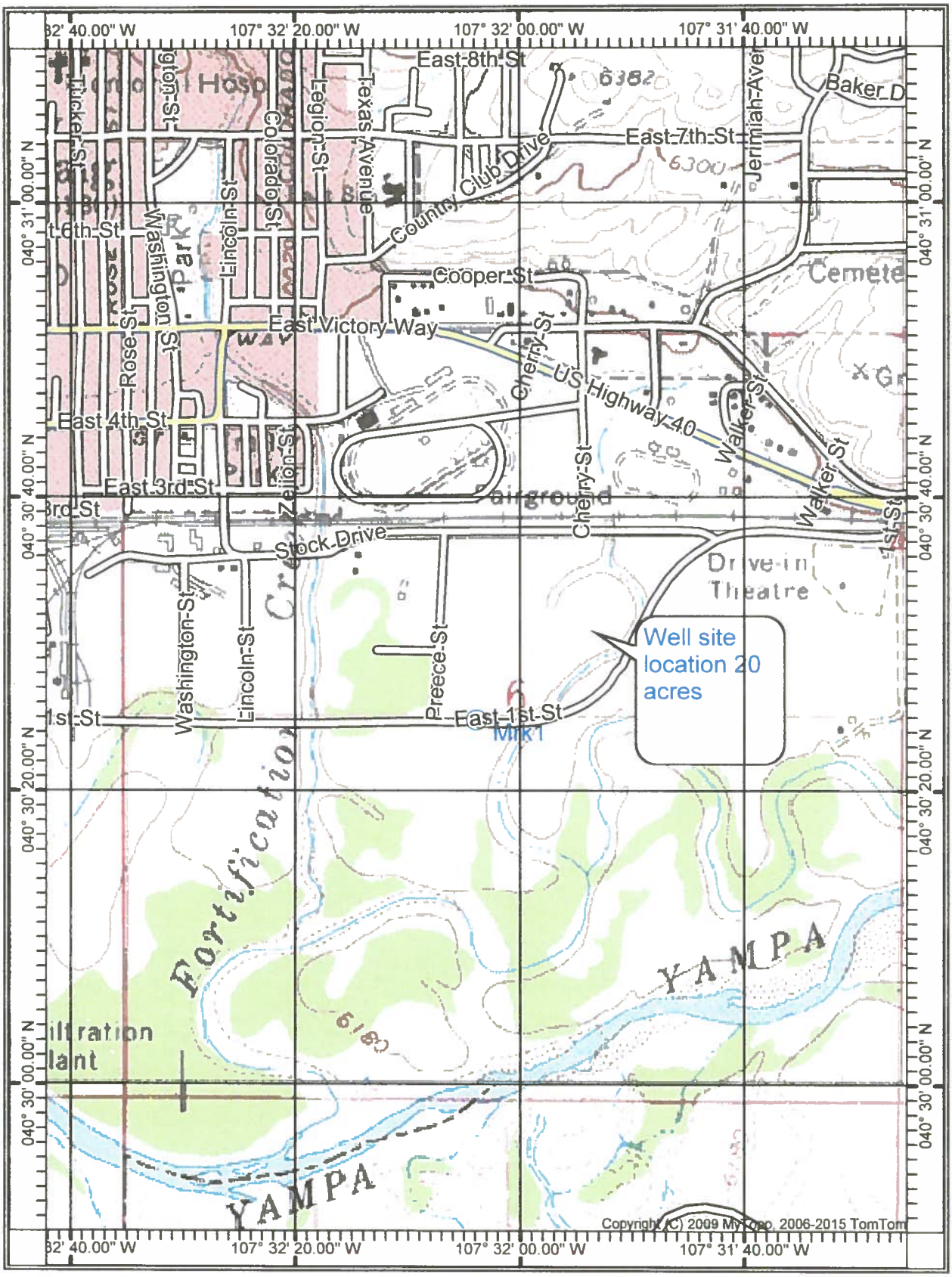
1)In response to your inspection dated 9/9/2015, enclosed please find the application for the well permit in west pit of the Deakins pit.

2)In response to your inspection dated 9/9/2015, enclosed please find the original weed management plan for the Deakins pit. We have implemented a new contractor for this work.
M-2015-034

Please let me know if there is anything else.

Sincerely,

Steve Baker
(970) 326-7356 (cell)



4

N

SCALE 1:12000

0 1000 2000 3000

FEET

P.O. Box 1665

Craig, CO 81626

970-824-0225

3B Enterprises

Deakins Pit

location map

3B ENTERPRISES
Sand * Gravel llc

P.O. Box 1665 – Craig, Colorado 81626
Telephone (970) 824–0225
Fax (970) 824–0225

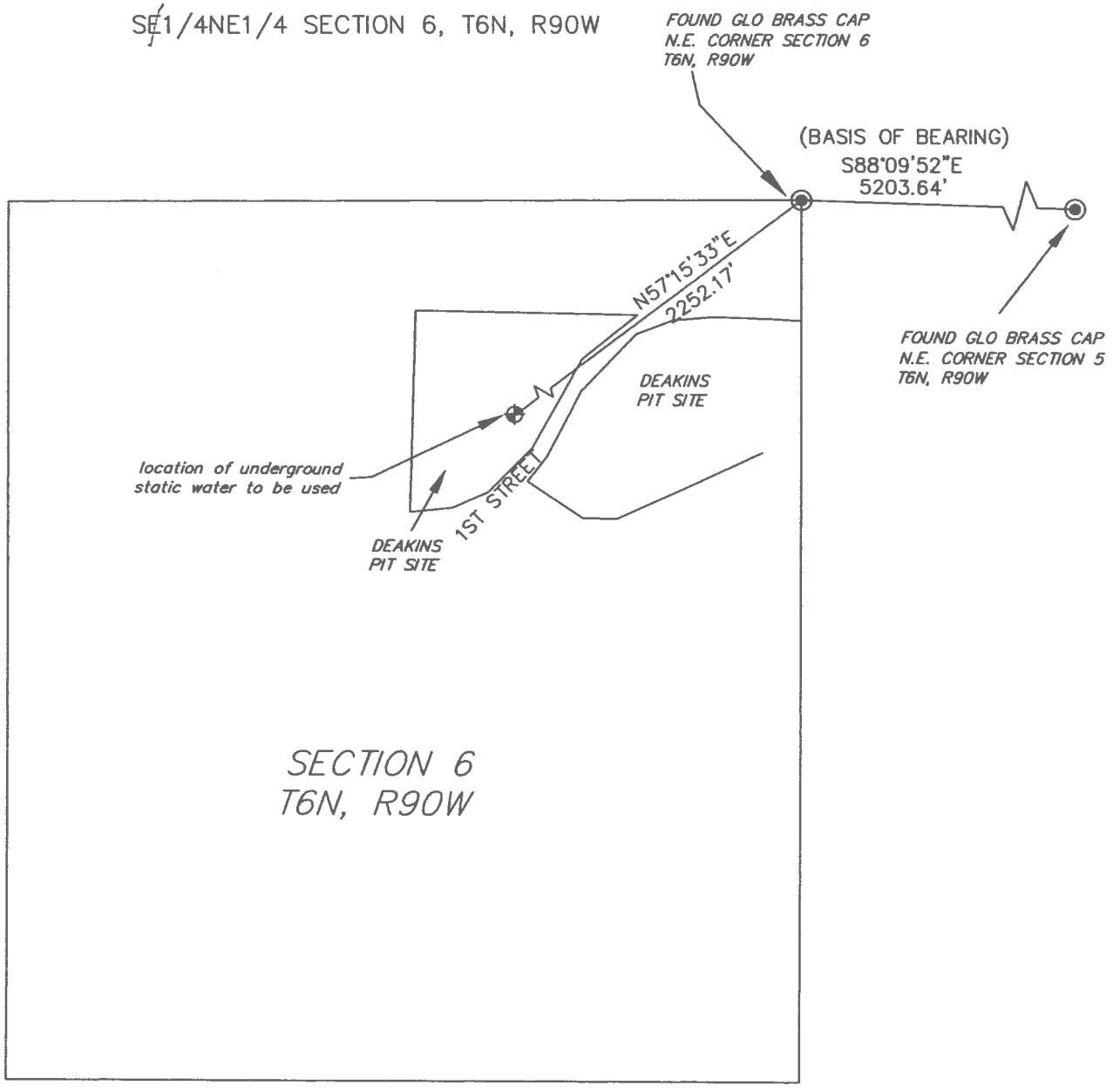
N

SCALE: 1"=1000'

PHASE II – WELL PERMIT

3B ENTERPRIZES – DEAKINS PIT

SE1/4NE1/4 SECTION 6, T6N, R90W



12-15-15

Amy Yeldell
DRMS
Grand Junction, CO

Re: in response to your letter dated 12/10/15 concerning the Vermillion creek barrow area File No. 2015-027

6.3.1

1) Location of the main entrance to the site is N40*46'13.8463" and W108*50'42.2821".

6.3.2

A) BLM has been contacted and we are waiting for a reply about the existing vegetation currently on site.
B) There is a stockyard fence on located within 200 feet of the boundary of the site owned by permit applicant John Raftopoulos.
C) Description of Vermillion creek and it's alignment running through the permit area is under consideration of the Army Corps of engineers and is currently in the process of a 404 permit scheduled for completion approx. January of 2016.

6.3.3

A) Proposed start date of reclamation is December of 2015 or upon approval of permit proposed date of completion is June of 2016. Reclamation will be completed over the entire 3.5 acre site upon approval of the 404 permit currently under consideration of the Army Corps. Of Engineers.
B) No material was salvaged during original disturbance. If any topsoil is needed to complete the reclamation it will be obtained from private property off site. No topsoil will be stockpiled on site.
E) The road depicted on the map was existing and the bridge shown replaced a culvert that was existing. No other structures were built on the site.
F) The dimensions of the permitted area covers the barrow area plus any area that was filled with barrow area material for the bridge abutments.
G) The existing road being used being used and there was a bridge constructed to replace an existing culvert. Vermillion creek was realigned and will be restored under a pending 404 permit from the Army Corps of Engineers.
I) Any impacts from the realignment of Vermillion creek will be addressed with the 404 permit from the Army Corp of Engineers.
J) Army Corps of Engineers 404 permit is pending and work in the riparian area will not commence until permit approval.

N) Dirt was mined prior to getting the DRMS permit and was used for the bridge abutments.

6.3.4

A) BLM has been contacted and we are waiting for a response for there stipulations concerning the reclamation. Work in the barrow area will be done upon approval of DRMS permit, any work in the riparian area will be done only after approval of AOCE 404 permit.

B) .

C) (i) No plant medium was salvaged at time of excavation if any extra topsoil is needed for the reclamation then it will be imported from an offsite private property source. Riparian areas will be treated in accordance with the ACOE 404 permit that is pending. No soil sampling is intended at this time.

(ii) Seeding will be done in accordance with BLM stipulations, that are pending. Discing of soil prior to seeding will be done. Fertilizer will be used to promote plant growth.

(iii) BLM has been contacted and we are waiting on their recommendations for seeding. Seed for the riparian areas will be determined by the ACOE 404 permit that is pending.

(v) BLM has been contacted and seeding will be done under their recommendations.

D) Access road into site will be reduced to the original two track. The bridge will be removed and replaced with the original culvert once the creek is realigned to specifications of the ACOE.

E) Any silt fence or other erosion control materials will be removed upon completion of reclamation. Creek realignment and riparian area reclamation will be done under the direction of the ACOE and the EPA under approved 404 permit that is currently pending and will be provided to the DRMS upon approval. Weed spraying will occur throughout the reclamation.

2)

a) Push distances are calculated at approximately 100' – 200'. Discing of seed bed will be performed at a cost of $1200. Topsoil will be replaced at a depth of 6" and any extra topsoil that is not on site will come from private property.

b) Cost of the bridge demo is $2000. Estimated yards for realigning Vermillion creek is 500 cu.yds. although this is very hard to determine for the fact that we don't know what the ACOE is going to require.

United States Department of Agriculture

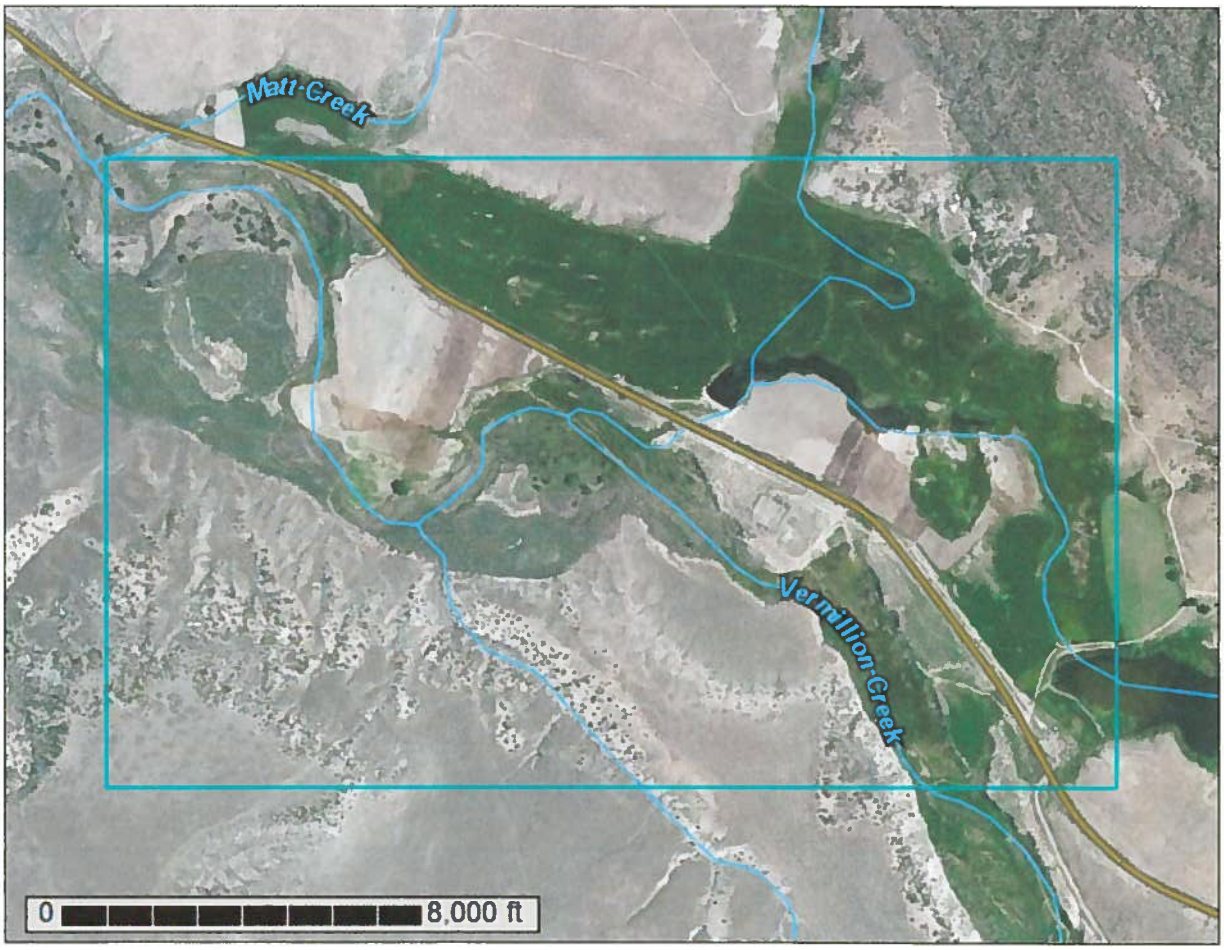
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Moffat County Area, Colorado

Vermillion Creek Barrow Area M-2015-027



December 15, 2015

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

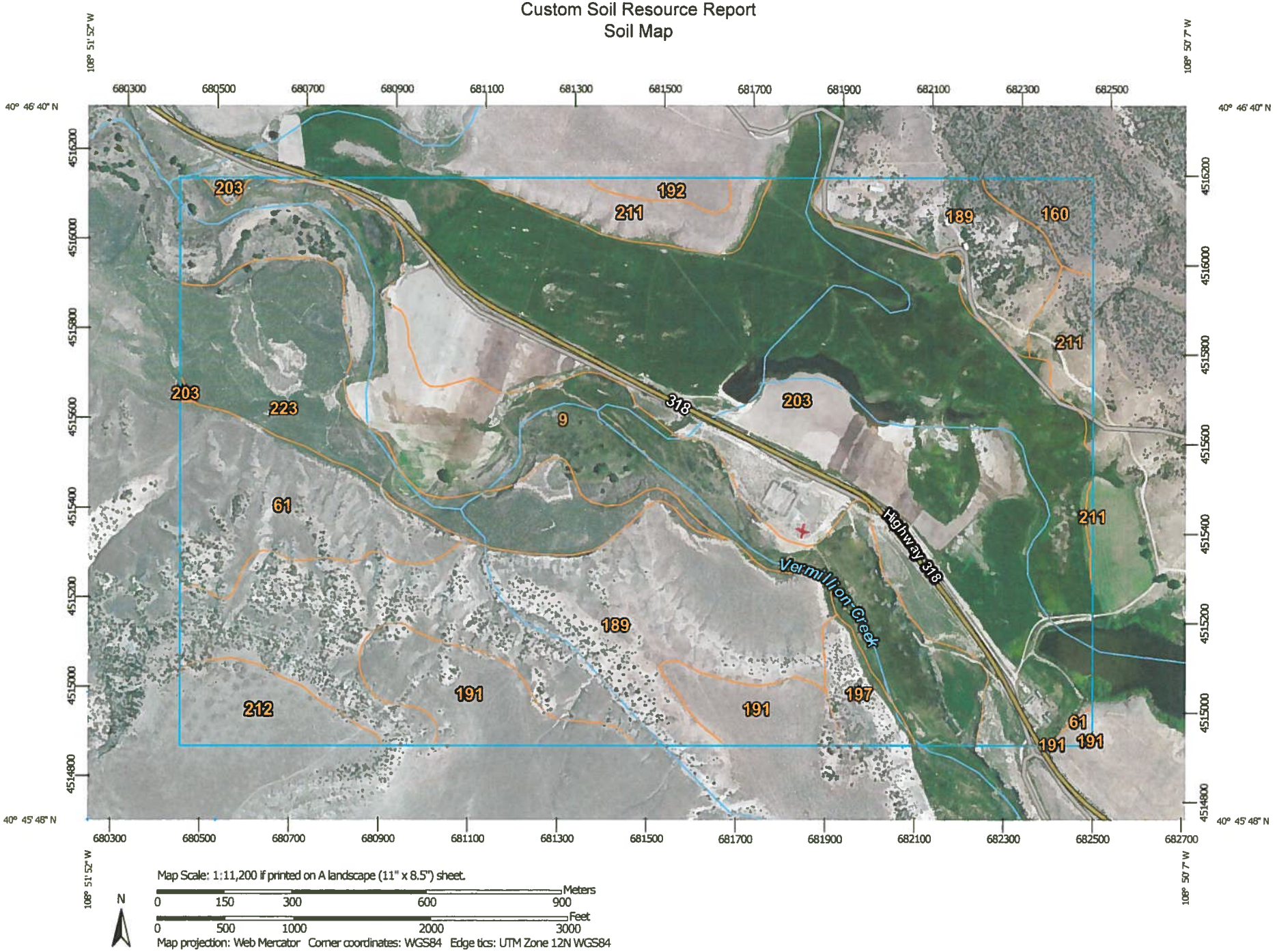
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:31,700.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Moffat County Area, Colorado
Survey Area Data: Version 8, Sep 22, 2014

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

Date(s) aerial images were photographed: Jun 27, 2010—Jun 28, 2010

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

Moffat County Area, Colorado (CO686)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
9	Baroid-Eghelm complex, 0 to 3 percent slopes	97.7	15.2%
61	Ecklund-Tipperary complex, 1 to 12 percent slopes	37.7	5.9%
160	Rock outcrop-Torriorthents complex, 50 to 75 percent slopes	7.8	1.2%
189	Tipper-Crustown complex, 10 to 40 percent slopes	131.8	20.5%
191	Tipperary loamy fine sand, 3 to 12 percent slopes	32.5	5.1%
192	Tipperary-Willwood complex, 1 to 12 percent slopes	3.9	0.6%
197	Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes	8.1	1.3%
203	Turzo loam, saline, 1 to 8 percent slopes	232.2	36.1%
211	Willwood-Tipperary complex, 12 to 40 percent slopes	23.0	3.6%
212	Willwood-Tipperary, cobbly substratum complex, 1 to 12 percent slopes	15.2	2.4%
223	Youngston loam, well drained, 0 to 3 percent slopes	53.0	8.2%
Totals for Area of Interest		**643.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be

made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Moffat County Area, Colorado

9—Baroid-Eghelm complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: jpfz
Elevation: 5,300 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Baroid and similar soils: 55 percent
Eghelm and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baroid

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf, rise, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 47 inches: stratified fine sand to fine sandy loam
H3 - 47 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very 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: About 60 to 84 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: A
Ecological site: Cold Desert Overflow (R034XY421CO)

Description of Eghelm

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf, rise, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 4 inches: fine sandy loam
H2 - 4 to 21 inches: stratified fine sandy loam to sandy clay loam
H3 - 21 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural 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: About 60 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: A
Ecological site: Cold Desert Overflow (R034XY421CO)

61—Ecklund-Tipperary complex, 1 to 12 percent slopes

Map Unit Setting

National map unit symbol: jpdz
Elevation: 5,400 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Ecklund and similar soils: 50 percent
Tipperary and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ecklund

Setting

Landform: Plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum and eolian deposits derived from sandstone

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 24 inches: loamy fine sand
H3 - 24 to 36 inches: gravelly fine sand
H4 - 36 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Excessively drained
Runoff class: High
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 in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Sandy Cold Desert (R034XY428CO)

Description of Tipperary

Setting

Landform: Plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from mixed sources

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 60 inches: loamy fine sand

Properties and qualities

Slope: 1 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Cold Desert (R034XY428CO)

160—Rock outcrop-Torriorthents complex, 50 to 75 percent slopes

Map Unit Setting
National map unit symbol: jp99
Elevation: 5,900 to 8,000 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 42 to 48 degrees F
Frost-free period: 75 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition
Rock outcrop: 70 percent
Torriorthents and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting
Landform: Hills, cliffs
Landform position (two-dimensional): Backslope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex

Typical profile
H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities
Slope: 75 to 100 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

Description of Torriorthents

Setting
Landform: Mountainsides, hillslopes

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium and residuum derived from sandstone and shale

Typical profile

H1 - 0 to 2 inches: channery sandy loam
H2 - 2 to 14 inches: very channery sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 4 to 30 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
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 in profile: 10 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

189—Tipper-Crustown complex, 10 to 40 percent slopes

Map Unit Setting

National map unit symbol: jpb9
Elevation: 5,400 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Tipper and similar soils: 55 percent
Crustown and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tipper

Setting

Landform: Hills
Landform position (two-dimensional): Toeslope, footslope, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Local alluvium and residuum derived from sandstone

Typical profile

H1 - 0 to 1 inches: loamy fine sand
H2 - 1 to 28 inches: loamy sand, loamy fine sand
H2 - 1 to 28 inches: weathered bedrock
H3 - 28 to 32 inches:

Properties and qualities

Slope: 10 to 40 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Excessively 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 in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Semidesert Juniper (R034XY329CO)

Description of Crustown

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum derived from sandstone

Typical profile

H1 - 0 to 1 inches: loamy fine sand
H2 - 1 to 10 inches: loamy fine sand
H3 - 10 to 14 inches: weathered bedrock

Properties and qualities

Slope: 10 to 40 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Excessively 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 in profile: 10 percent

Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Semidesert Juniper (R034XY329CO)

191—Tipperary loamy fine sand, 3 to 12 percent slopes

Map Unit Setting

National map unit symbol: jpbd
Elevation: 5,400 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Tipperary and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tipperary

Setting

Landform: Hills, plateaus
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits and alluvium derived from sandstone

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 60 inches: loamy fine sand

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Cold Desert (R034XY428CO)

192—Tipperary-Willwood complex, 1 to 12 percent slopes

Map Unit Setting

National map unit symbol: jpbf
Elevation: 5,400 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Tipperary and similar soils: 50 percent
Willwood and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tipperary

Setting

Landform: Hills, plateaus
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits and alluvium derived from sandstone

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 60 inches: loamy fine sand

Properties and qualities

Slope: 1 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Limy Cold Desert (R034XY423CO)

Description of Willwood

Setting
Landform: Hills, fan terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope, tread, riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone

Typical profile
H1 - 0 to 16 inches: loamy fine sand
H2 - 16 to 60 inches: extremely channery loamy fine sand

Properties and qualities
Slope: 1 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Limy Cold Desert (R034XY423CO)

197—Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes

Map Unit Setting
National map unit symbol: jpbl
Elevation: 6,000 to 11,280 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 42 to 48 degrees F
Frost-free period: 75 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Goslin and similar soils: 60 percent
Rock outcrop: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goslin

Setting

Landform: Mountainsides, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, base slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Colluvium derived from sandstone and/or residuum weathered from sandstone

Typical profile

A - 0 to 3 inches: sandy loam
C1 - 3 to 37 inches: gravelly sandy loam
C2 - 37 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 25 to 75 percent
Depth to restrictive feature: 39 to 51 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
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 in profile: 12 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Loamy Breaks (R048AY300CO)

Description of Rock Outcrop

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

203—Turzo loam, saline, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: jpbv
Elevation: 5,600 to 6,200 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Turzo, saline, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turzo, Saline

Setting

Landform: Alluvial fans, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 18 inches: loam
H3 - 18 to 34 inches: clay loam
H4 - 34 to 60 inches: loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 10 percent
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: Alkaline Slopes (R034XY297CO)

211—Willwood-Tipperary complex, 12 to 40 percent slopes

Map Unit Setting

National map unit symbol: jpc4
Elevation: 5,300 to 5,600 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Willwood and similar soils: 55 percent
Tipperary and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Willwood

Setting

Landform: Escarpments
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 2 inches: very cobbly loamy fine sand
H2 - 2 to 11 inches: very gravelly loamy fine sand
H3 - 11 to 60 inches: extremely cobbly sand

Properties and qualities

Slope: 12 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Medium
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 in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Cold Desert Breaks (R034XY420CO)

Description of Tipperary

Setting

Landform: Escarpments
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived form mixed sources

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 60 inches: loamy fine sand

Properties and qualities

Slope: 12 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Medium
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 in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Cold Desert Breaks (R034XY420CO)

212—Willwood-Tipperary, cobbly substratum complex, 1 to 12 percent slopes

Map Unit Setting

National map unit symbol: jpc5
Elevation: 5,400 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Willwood and similar soils: 60 percent
Tipperary, cobbly substratum, and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Willwood

Setting

Landform: Structural benches
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 10 inches: loamy fine sand
H2 - 10 to 60 inches: extremely cobbly sand

Properties and qualities

Slope: 1 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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 in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Cold Desert (R034XY428CO)

Description of Tipperary, Cobbly Substratum

Setting

Landform: Structural benches
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over alluvium derived from mixed sources

Typical profile

H1 - 0 to 4 inches: loamy fine sand
H2 - 4 to 36 inches: loamy fine sand
H3 - 36 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 1 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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 in profile: 4 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Cold Desert (R034XY428CO)

223—Youngston loam, well drained, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: jpck
Elevation: 5,700 to 6,300 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 105 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Youngston, well drained, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Youngston, Well Drained

Setting
Landform: Terraces, flood plains
Landform position (three-dimensional): Dip, talf, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile
H1 - 0 to 3 inches: loam
H2 - 3 to 60 inches: stratified very fine sandy loam to clay loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
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: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 4 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: Foothill Swale (R034XY285CO)

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features (Vermillion Creek Barrow Area M-2015-027 Soil Report)

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial

subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features–Moffat County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
		In	*In*		*In*	*In*			
9—Baroid-Eghelm complex, 0 to 3 percent slopes									
Baroid		—	—		0	—	Low	High	Moderate
Eghelm		—	—		0	—	Low	High	Moderate
61—Ecklund-Tipperary complex, 1 to 12 percent slopes									
Ecklund	Lithic bedrock	20-36-40	—	Indurated	0	—	Low	Moderate	Low
Tipperary		—	—		0	—	Low	Moderate	Low
160—Rock outcrop-Torriorthents complex, 50 to 75 percent slopes									
Rock outcrop	Lithic bedrock	0	—	Indurated	0	—	None		
Torriorthents	Lithic bedrock	4-14-30	—	Indurated	0	—	Moderate	Moderate	Low
189—Tipper-Crustown complex, 10 to 40 percent slopes									
Tipper	Paralithic bedrock	20-28-40	—	Weakly cemented	0	—	Low	Moderate	Moderate
Crustown	Paralithic bedrock	10-10-20	—	Weakly cemented	0	—	Low	Low	Low

Soil Features–Moffat County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
191—Tipperary loamy fine sand, 3 to 12 percent slopes									
Tipperary		—	—		0	—	Low	Moderate	Low
192—Tipperary-Willwood complex, 1 to 12 percent slopes									
Tipperary		—	—		0	—	Low	Moderate	Low
Willwood		—	—		0	—	Low	Moderate	Low
197—Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes									
Goslin	Lithic bedrock	39-47-51	—	Indurated	0	—	Moderate	Moderate	Low
Rock outcrop		—	—		0	—			
203—Turzo loam, saline, 1 to 8 percent slopes									
Turzo, saline		—	—		0	—	Low	High	High
211—Willwood-Tipperary complex, 12 to 40 percent slopes									
Willwood		—	—		0	—	Low	Moderate	Low
Tipperary		—	—		0	—	Low	Moderate	Low

Soil Features–Moffat County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
212—Willwood-Tipperary, cobbly substratum complex, 1 to 12 percent slopes									
Willwood		—	—		0	—	Low	Moderate	Low
Tipperary, cobbly substratum		—	—		0	—	Low	Moderate	Low
223—Youngston loam, well drained, 0 to 3 percent slopes									
Youngston, well drained		—	—		0	—	Low	High	Moderate

Vegetative Productivity

This folder contains a collection of tabular reports that present vegetative productivity data. The reports (tables) include all selected map units and components for each map unit. Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses, productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition (Vermillion Creek Barrow Area M-2015-027 Vegitation)

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

This table shows, for each soil that supports vegetation, the ecological site, plant association, or habitat type; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in the table follows.

An *ecological site, plant association, or habitat type* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site, plant association, or habitat type is typified by an association of species that differs from that of other ecological sites, plant associations, or habitat types in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service (NRCS). Descriptions of plant associations or habitat types are available from local U.S. Forest Service offices.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make

growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic vegetation (the grasses, forbs, shrubs, and understory trees that make up most of the potential natural plant community on each soil) is listed by common name. Under *rangeland composition and forest understory*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The percentages are by dry weight for rangeland. Percentages for forest understory are by either dry weight or canopy cover. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the "National Range and Pasture Handbook," which is available in local offices of NRCS or on the Internet.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National range and pasture handbook.

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year		Rangeland	Forest understory	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
9—Baroid-Eghelm complex, 0 to 3 percent slopes								
Baroid	Cold Desert Overflow (R034XY421CO)	3,000	2,000	1,000	Great Basin wildrye	20	—	—
					common reed	10		
					other shrubs	5		
					other perennial forbs			
					alkali sacaton			
					other perennial grasses			
					western wheatgrass			
Eghelm	Cold Desert Overflow (R034XY421CO)	3,000	2,000	1,000	Great Basin wildrye	20	—	—
					reed	10		
					alkali sacaton	5		
					inland saltgrass			
					western wheatgrass			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**		**Rangeland**	**Forest understory**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
61—Ecklund-Tipperary complex, 1 to 12 percent slopes								
Ecklund	Sandy Cold Desert (R034XY428CO)	725	650	525	needleandthread	20	—	—
					bottlebrush squirreltail	10		
					Indian ricegrass	5		
					shadscale saltbush			
					Nevada bluegrass			
					other shrubs			
					other perennial forbs			
					other perennial grasses			
					plains pricklypear			
					spiny hopsage			
					streambank wheatgrass			
					Wyoming big sagebrush			
Tipperary	Sandy Cold Desert (R034XY428CO)	725	650	525	needleandthread	20	—	—
					spiny hopsage	15		
					Indian ricegrass	10		
					shadscale saltbush	5		
					bottlebrush squirreltail			
					Nevada bluegrass			
					plains pricklypear			
					Wyoming big sagebrush			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**		**Rangeland**	**Forest understory**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
160—Rock outcrop-Torriorthents complex, 50 to 75 percent slopes								
Rock outcrop	—	—	—	—	—	—	—	—
Torriorthents	—	350	275	175	Wyoming big sagebrush	15	—	—
					bottlebrush squirreltail	10		
					Indian ricegrass	5		
					saltbush	—		
					needleandthread			
					shadscale			
					bud sagebrush			
					western wheatgrass			
189—Tipper-Crustown complex, 10 to 40 percent slopes								
Tipper	Semidesert Juniper (R034XY329CO)	—	—	—	big sagebrush	—	15	—
					needleandthread	10		
					Indian ricegrass	5		
					other perennial forbs			
					other perennial grasses			
					spiny hopsage			
Crustown	Semidesert Juniper (R034XY329CO)	—	—	—	needleandthread	—	15	—
					Utah juniper	10		
					Wyoming big sagebrush	5		
					Indian ricegrass			
					spiny hopsage			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**		**Rangeland**	**Forest understory**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
191—Tipperary loamy fine sand, 3 to 12 percent slopes								
Tipperary	Sandy Cold Desert (R034XY428CO)	725	650	525	needleandthread	20	—	—
					spiny hopsage	15		
					Indian ricegrass	10		
					shadscale saltbush	5		
					bottlebrush squirreltail			
					Nevada bluegrass			
					plains pricklypear			
					Wyoming big sagebrush			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year		Rangeland	Forest understory	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
192—Tipperary-Willwood complex, 1 to 12 percent slopes								
Tipperary	Limy Cold Desert (R034XY423CO)	725	650	525	winterfat	30	—	—
					Indian ricegrass	10		
					needleandthread	5		
					shadscale saltbush			
					streambank wheatgrass			
					bottlebrush squirreltail			
					Wyoming big sagebrush			
Willwood	Limy Cold Desert (R034XY423CO)	725	650	525	winterfat	35	—	—
					other shrubs	15		
					Indian ricegrass	10		
					bottlebrush squirreltail	5		
					needleandthread			
					other perennial forbs			
					other perennial grasses			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year		Rangeland	Forest understory	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
197—Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes								
Goslin	Loamy Breaks (R048AY300CO)	800	500	400	western wheatgrass	15	—	—
					antelope bitterbrush	10		
					forb	5		
					grass			
					other shrubs			
					Sandberg bluegrass			
					Wyoming big sagebrush			
					yellow rabbitbrush			
					bluebunch wheatgrass			
					needleandthread			
					true mountain mahogany			
Rock outcrop	—	—	—	—	—	—	—	—
203—Turzo loam, saline, 1 to 8 percent slopes								
Turzo, saline	Alkaline Slopes (R034XY297CO)	700	550	400	big sagebrush	15	—	—
					bottlebrush squirreltail	10		
					galleta	5		
					greasewood			
					shadscale saltbush			
					bud sagebrush			
					Gardner's saltbush			
					western wheatgrass			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**		**Rangeland**	**Forest understory**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
211—Willwood-Tipperary complex, 12 to 40 percent slopes								
Willwood	Cold Desert Breaks (R034XY420CO)	600	450	350	needleandthread	20	—	—
					Wyoming big sagebrush	15		
					bottlebrush squirreltail	10		
					Indian ricegrass	5		
					other perennial grasses			
					shadscale saltbush			
					other shrubs			
Tipperary	Cold Desert Breaks (R034XY420CO)	600	450	350	needleandthread	25	—	—
					Wyoming big sagebrush	15		
					bottlebrush squirreltail	10		
					Indian ricegrass	5		
					shadscale saltbush			
					winterfat			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year		Rangeland	Forest understory	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
212—Willwood-Tipperary, cobbly substratum complex, 1 to 12 percent slopes								
Willwood	Sandy Cold Desert (R034XY428CO)	725	650	525	needleandthread	25	—	—
					Indian ricegrass	10		
					other perennial grasses	5		
					shadscale saltbush	3		
					spiny hopsage	2		
					bottlebrush squirreltail			
					other shrubs			
					Wyoming big sagebrush			
					sand dropseed			
					Nevada bluegrass			
Tipperary, cobbly substratum	Sandy Cold Desert (R034XY428CO)	725	650	525	needleandthread	25	—	—
					bottlebrush squirreltail	10		
					Indian ricegrass	5		
					shadscale saltbush			
					sand dropseed			
					spiny hopsage			
					Wyoming big sagebrush			

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Moffat County Area, Colorado								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year		Rangeland	Forest understory	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	*Pct cover*
223—Youngston loam, well drained, 0 to 3 percent slopes								
Youngston, well drained	Foothill Swale (R034XY285CO)	2,500	1,800	1,000	Great Basin wildrye	30	—	—
					basin big sagebrush	10		
					streambank wheatgrass	5		
					western wheatgrass			
					winterfat			

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