Aquatic Resources Delineation Report

Bridge J-14-C Survey

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Stanley Consultants INC.
A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

Executive Summary

Stanley Consultants, Inc. (Stanley) has prepared an aquatic resources delineation for the proposed replacement of a treated timber bridge on Colorado State Highway (CO) 9 south of Guffey, Colorado, known as the J-14-C Bridge Replacement Project (Project). The purpose of the delineation is to identify any potential waters of the U.S. (WOTUS) and/or wetlands, with the potential to be impacted by Project activities. The delineation was conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0) (USACE 2010).

This delineation reports on the finding at the CDOT bridge J-14-C surveyed area (4.12 acres), where the OHWM for Louis Gulch (R4SBA: 0.03 acres and 115 linear ft) was delineated. This tributary to Currant Creek is an ephemeral drainage with an OHWM that transitions to a swale upstream and downstream of the bridge, indicating infrequent and relatively low flows. No wetlands were found within the area of potential Project impacts.

The delineation findings presented in this report will be used to assess potential Project impacts to surface water resources. The findings may be used to develop Project designs that minimize or avoid impacts to surface waters resources or, if impacts to these resources are unavoidable, to understand the total anticipated impacts that would need to be approved or permitted by the USACE. Depending on the level of impacts, the Project would likely require permitting under the Nationwide Permit (NWP) program. The NWP program is available for projects with relatively minor impacts (the exact nature of the impacts and acreage thresholds depend on the applicable NWP), while Individuals Permits (IPs) are required for projects with larger impacts and can involve a lengthy permitting process.

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Acronyms and Abbreviations

BLM	Bureau of Land Management
CO	Colorado State Highway
CDOT	Colorado Department of Transportation
CWA	Clean Water Act
IP	Individual Permit
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWP	Nationwide Permit
NWPL	National Wetland Plant List
OHWM	ordinary high water mark
PIA	Potential Impact Area
PSS	palustrine scrub-shrub
ROW	right-of-way
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WOTUS	water of the United States

1. Introduction

On behalf of the Colorado Department of Transportation (CDOT), Stanley Consultants, Inc. (Stanley) has prepared an aquatic resources delineation for the proposed replacement of a concrete box culvert on Colorado State Highway (CO) 9 south of Guffey, Colorado, known as the J-14-C Bridge Replacement Project (Project). The purpose of the delineation is to identify any potential waters of the U.S. (WOTUS) and/or wetlands, present within the area of potential Project impacts.

The presence of wetlands and other waters were assessed within the vicinity of the proposed Project construction. The boundaries of potential WOTUS were then delineated to determine the extent of waters subject to regulation under the Clean Water Act within the area of potential Project impacts. The purpose of this delineation report is to facilitate efforts to:

- Avoid or minimize impacts to aquatic resources during the design process.
- Document aquatic resource boundary determinations for review by regulatory authorities.

Field investigations were conducted on August 30, 2020, by wetland biologists for Stanley Consultants, Inc.

Contact Information for the Applicant and Land Owner are as follows:

Applicant	**Land Owner**
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2. Location and Project Description

2.1 Location

The surveyed Potential Impact Area (the PIA) is approximately 4.12 acres and is located entirely on Bureau of Land Management (BLM) land along CO 9 (Appendix A, Figures 1 and 2). The timber bridge is approximately 2.5 miles south of the town center of Guffey in Park County, Colorado (38.722203/-105.515615), in Section 25 of Township 15 South, Range 75 West (6^{th} Principal Base and Meridian). The PIA includes the CDOT right-of-way (ROW), an existing timber bridge that currently allows traffic to cross the ephemeral Louis Gulch, and an extra buffer south of the bridge for a proposed temporary traffic bypass. A map of the PIA is located in the Aquatic Resources Delineation Map in Appendix A.

2.2 Purpose and Need

The treated timber stringer bridge at J-14-C was constructed in 1934 along CO 9, a key corridor connecting residents and tourists from southern Colorado to the recreational activities in the Rocky Mountains. The structure is in poor condition, requiring frequent inspections and repairs due to movement of the abutments, rotten and bowed timber backing planks, and numerous split and spliced girders.

This bridge is well past its replacement life, is not up to current construction and safety standards, and must be replaced to prevent potential failure.

2.3 Project Description

The CDOT Region 2 Bridge Bundle Design Build Project consists of the replacement of a total of nineteen (19) structures bundled together as a single design-build project. These structures are rural bridges on essential highway corridors (U.S. Highway [US] 350, US 24, CO 239 and CO 9) in southeastern and central Colorado. These key corridors provide rural mobility, intra- and interstate commerce, movement of agricultural products and supplies, and access to tourist destinations. The design build project has two funding sources; Bridge J-14-C will be jointly funded by the USDOT FHWA Competitive Highway Bridge Program grant and the Colorado Bridge Enterprise (Project No. 23558).

Bridge J-14-C is located on CO 9 at milepost 20.107, approximately 2.5 miles southeast of Guffey, Colorado (Figure 1). The bridge is comprised of a two-span treated timber stringer (24 feet [ft] wide, 46 ft long) structure that crosses over an ephemeral wash known as the Louis Gulch. The Project will replace this bridge with a similarly sized box culvert or bridge.

As stated by the CDOT grant application, the roadway shall not be closed for construction. The preferred traffic design alternative involves building a one-lane shoofly on one side of the bridge with a temporary pipe placed for under the road for drainage. This alternative will require a temporary easement from the BLM if the shoofly extends outside of the

CDOT ROW. More information on traffic detour options can be found in the Traffic Design Memorandum for this structure.

Once the bridge is complete and ready for use, the shoofly will be removed and any disturbed areas from bridge construction or the temporary roadway will be restored to original contours and reseeded.

2.4 Directions to the Site

The PIA is accessible from Colorado Springs, Colorado, by taking US 24 west towards Florissant, Colorado for approximately 24 miles. In Florissant, turn left onto Teller County Road 1 and continue south for approximately 9 miles before turning right on County Road 11 to continue south for another 9 miles until County Road 11 ends at Teller Count Road/CO Road 102. Turn right onto Teller Count Road/CO Road 102 and take is for approximately 16 miles to CO 9. Turn left (south) onto CO 9 for approximately 1 mile before reaching the Project bridge. There is a ranch road pullout located on the northeast side of the bridge that provides sufficient space for parking.

3. Methods

3.1 Regulatory Context

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into WOTUS and is administered by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA). The definition of WOTUS has been in flux in recent years, with the latest definition published by the EPA in the Navigable Waters Protection Rule, which went into effect on June 22, 2020, in 49 states. Due to an injunction issued by a federal court in Colorado, the Navigable Waters Protection Rule has not gone into effect in Colorado, and instead the state remains under the post-*Rapanos v. United States* (Rapanos) guidance (USACE and EPA 2008). The potential for waters of the U.S. within the PIA therefore will be evaluated per the definition in the the Rapanos guidance. Since the WOTUS definition under Rapanos is more expansive than the Navigable Waters Protection Rule, assessing the PIA under Rapanos ensures that no additional revaluation is likely to be required in the event CWA applicability changes in Colorado during the period of Project construction.

The Rapanos guidance defines waters of the U.S. as traditional navigable waters (TNWs), relatively permanent waters, and their adjacent wetlands.[1] Additionally, the Rapanos guidance includes all tributaries with a bed and bank or ordinary highwater mark (OHWM) that have a significant nexus to a Traditionally Navigable Water, as well as wetlands, ponds, impoundments, and lakes located adjacent to said tributaries. Under Section 404 of the CWA, the OHWM defines the lateral extent of federal jurisdiction in non-tidal WOTUS (absent adjacent wetlands) (33 U.S.C. 1251). Per the regional guidance developed by the Corps (Mersel and Lichvar 2014), OHWM in Colorado is considered to be the "physical and biological signature established and maintained at the boundaries of

[1] Adjacent is defined as "bordering, contiguous, or neighboring" in the Rapanos guidance.

the active channel." Mersel and Lichvar (2014) state the OHWM identification in non-perennial streams is based on three primary physical or biological indicators—topographic break in slope, change in sediment characteristics, and change in vegetation characteristics.

3.2 Wetland Delineation

The wetland delineation was conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the Regional Supplement to the *Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010). The entire PIA was assessed by the biologists to determine the presence or absence of wetland features. Any location that contained some potential as a wetland based on the National Wetland Inventory (NWI) mapping (Appendix B) or observed surface conditions, such as the presence of dominant hydrophytic vegetation or surface hydrology, was investigated more closely with a sampling point containing a soil pit that was recorded in a delineation field form with photo documentation (Appendix C).

Sources of information used in this investigation include:

- Web Soil Survey (USDA/NRCS 2020) – See Appendix B, Custom Soil Resource Report.
- Aerial photography of the PIA from the National Agriculture Imagery Program (NAIP) taken in 2017, and from aerial drone photography collected by Stanley.
- National Wetland Plant List, version 3.4 (USACE 2018)
- Munsell Soil-Color Charts (Munsell Color 2009)
- NWI Map (U.S. Fish and Wildlife Service [USFWS] 2020) – See Appendix B, NWI Mapping

3.3 Non-Wetland Waters Delineation

The PIA was examined for any potential OHWM supporting features, such as root exposure, water staining, silt deposits, litter removal, etc. (Mersel and Lichvar 2014, USACE 2005), that might provide information interpreting recent flow levels (e.g., drift/wrack deposits or headcutting) or that might eliminate or reinforce potential OHWM locations. Stanley also examined aerial photography and hydrologic data to support the Section 404 CWA assessment. The boundaries of any non-wetland water features were identified by the OHWM indicators and recorded using a Trimble sub-meter GPS antenna connected to a tablet or smart phone and were also surveyed using the same sub-meter GPS unit.

4. Existing Conditions

4.1 Topography

The PIA is located within the valley containing Currant Creek, surrounded by mountain hillsides and the river terraces and slopes. The elevation at the site is approximately 8,300 feet (ft) above mean sea level (AMSL).

Land use in the vicinity of the PIA predominantly consists of the CO 9 transportation corridor, rural roads, and ranching activities. The area immediately surrounding the Project consists of a mixture of BLM and privately-owned lands. No other structures or residences are located in the vicinity of the PIA.

4.2 Climate

The PIA is located approximately half way between the two nearest weather stations at Canon City and Hartsel, Colorado (30 miles and 27 miles, respectively). Due to the distance to each station and the differences in elevation between the stations, climate data from both locations is presented here.

Canon City, Colorado, has an average maximum temperature of 67°F and average minimum temperature of 37°F (U.S. Climate Data 2020a). The average annual precipitation is 13.47 inches of rain and 42 inches of snowfall (U.S. Climate Data 2020a). The monthly precipitation average for August is 2.23 inches; however, this August the rainfall was measured at 2.54 inches (Weather Underground 2020b), which is slightly above normal.

Hartsel, Colorado, has an average maximum temperature of 53° F and average minimum temperature of 17° F (U.S. Climate Data 2020b). The average annual precipitation is 10.86 inches of rain and 46 inches of snowfall (U.S. Climate Data 2020b). The monthly precipitation average for August is 2.42 inches; however, during this past August (when field surveys were conducted) the rainfall was measured at 0.83 inches, which is well below normal (Weather Underground 2020a).

4.3 NWI Mapping

The National Wetlands Inventory (NWI) has mapped the drainage crossing under the Project bridge as riverine (R4SBA). See Appendix B, Supporting Maps, NWI Mapping.

4.4 Plant Communities

The plant community in the drainage in the PIA consists primarily of herbaceous vegetation distributed in sparse to dense concentrations throughout the channel. This herbaceous layer is dominated Baltic rush (*Juncus balticus*) with occasional shrubby cinquefoil (*Dasiphora fruticose*) and great mullein (*Verbascum thapsus*). Mature pine trees

(*Pinus* sp.) are located within and adjacent to the channel (see Appendix C – Photo Inventory).

4.5 Hydrology

The dominant hydrological feature in the PIA is Louis Gulch, an ephemeral drainage that discharges into Currant Creek, which extends parallel to CO 9 downstream of the PIA. Flows from Current Creek travel south until the stream's confluence with Tallahassee Creek, which discharges soon after into the Arkansas River. From there, the Arkansas River flows approximately east and then southeast to the Mississippi River and south to the Gulf of Mexico.

The primary hydrology input in the PIA is stormwater flows from Louis Gulch, with other minor inputs comprised of sources such as groundwater and surface runoff from the adjacent hillsides and the highway.

Although potential fens are mapped approximately 0.45 miles northwest of the PIA, the features have been recorded as confirmed non-fens (OTIS 2020). No fens are located within the vicinity of the PIA.

4.6 Soils

Four soils were identified in the PIA (see Appendix B, Soil Resource Report; also see Table 1). All of the soils are considered to be predominantly nonhydric or nonhydric (NRCS 2020). Soils observed in the test soils pits sampled during field survey were all nonhydric as well.

Table 1. NRCS Soils Mapped within PIA

Soil Map Unit Name	Potentially Hydric?
Adderton loam, 2 to 6 percent slopes	Predominantly Nonhydric
Cathedral-Rock outcrop complex, 20 to 60 percent slopes	Nonhydric
Edloe very gravelly sandy loam, 20 to 55 percent slopes	Nonhydric
Quander-Bushpark very gravelly loams, 5 to 40 percent slopes complex	Predominantly Nonhydric

5. Aquatic Resource Results

Delineation results reflect the conditions as observed at the time of investigation and were used to determine the OHWM boundaries shown in Appendix A (Figure 2). Associated photos of the sample points can be found in Appendix C. The following subsection summarize the results of the delineation, including a description of the delineated OHWM and justification for the boundaries Feature details are summarized in Table 2 (Aquatic Resources within the PIA).

Table 2. Aquatic Resources within the PIA

Name	Cowardin Classification	Location (Lat/Long)	Size (ac)	Length (ft)
Non-wetland Waters				
Louis Gulch	R4SBA	38.722203/-105.515615	0.03	115
		Totals	**0.03**	**115**

All portions of the PIA were examined for their potential to support wetlands. The dominant vegetation observed within the PIA is Baltic rush, a FACW species within the Western Mountains, Valleys, and Coast Region. However, the hydrology indictors were limited to secondary indicators (geomorphic position and the FAC-Neutral Test) and the soil test pits revealed dry, sandy soils that, while dark, did not contain redox and did not qualify as hydric soils.

5.1 Louis Gulch

Louis Gulch is an ephemeral drainage (115 linear ft, 0.03 acres) that discharges into Currant Creek approximately 600 ft downstream (south) of the bridge. The upstream extent of the OHWM begins approximately 50 ft upstream from the bridge; above this point, the drainage consists of a swale with no visible OHWM. The downstream extent of the OHWM ends near the CDOT ROW, after which drainage patterns transition into a swale with no distinct OHWM present. The Louis Gulch OHWM within the PIA is primarily characterized by a change in plant community (from upland species to Baltic rush within the channel) and changes in the character of the soil (such as the deposition of large cobbles within the OHWM).

Wetland vegetation and secondary indicators of hydrology were present within the PIA; however, test pits taken within the lowest points of the PIA with the most soil moisture and densest concentration of Baltic rush were found to contain nonhydric soils. Photographic documentation of Louis Gulch is presented in Appendix C – Photo Inventory.

6. Interstate Commerce

Federal authority to regulate waters within the United States is primarily derived from the Commerce Clause, which gives Congress the power to regulate interstate commerce. Section 404 of the Clean Water Act defines the limits of jurisdiction as encompassing navigable waters and waters of the U.S. including, among other water bodies, “waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce” (40 CFR § 120.2(1)(i)).

The section of the drainage intersecting the PIA is ephemeral and does not appear to support interstate commerce. In the event that it does support interstate commerce, however, the replacement of the existing bridge with an updated structure to meet CDOT standards will not affect water flows or alter the ability of the stream to support any future interstate commerce.

7. Summary

One tributary (totaling 0.03 acres and 115 linear feet) was identified and delineated within the PIA. No wetlands were identified within the PIA.

7.1 Anticipated Impacts

In the event that the selected Project design will impact any potential waters of the U.S. delineated in this report, the impacts to these resources would need to be approved or permitted by the USACE. Depending on the level of impacts, the Project would likely require permitting under the Nationwide Permit (NWP) program or through an Individual Permit. The NWP program is available for projects with relatively minor impacts (the exact nature of the impacts and acreage thresholds depend on the applicable NWP), while Individual Permits are required for projects with larger impacts and can involve a lengthy permitting process.

7.2 Avoidance and Mitigation Measures

Measures to avoid, minimize, or mitigate for potential impacts to wetlands and other WOTUS include:

- Tailoring design to avoid or minimize impacts as much as possible given structural constraints.
- Having construction methods and equipment that can avoid or minimize temporary impacts by reducing footprint of machines used or accessing work from roadway fill or other uplands.
- Developing compensatory mitigation measures, if permanent impacts are not avoidable. These measures would be a part of the permitting process with USACE or would be conducted through CDOT, depending on the final jurisdiction determination.
- Developing a detailed and thorough construction plan which includes best management practices. An example is a Stormwater Pollution Prevention Plan that incorporates measures to protect sensitive resources such as stormwater run-off, pollutants, etc. due to construction activities.

8. References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, U.S. Department of the Interior, FWS/OBS-79/31.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experimental Station, Vicksburg, MS.

Mersel, Matthew K. and Robert W. Lichvar. 2014. "A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States." ERDC/CRREL TR-13-14. Hanover, NH: U.S. Army Engineer Research and Development Center, Wetlands Regulatory Assistance Program.Munsell Color. 2009. Munsell Soil-Color Charts. Grand Rapids, MI.

OTIS. 2020. CDOT Online Transportation Information System [Online database map]. Accessed November 3, 2020. https://dtdapps.coloradodot.info/MapViewext/

U.S. Army Corps of Engineers (USACE). 2005. Regulatory Guidance Letter: Ordinary High Water Mark Identification. RGL-05-05. December 7, 2005.

_____. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

_____. 2017 Regional Conditions to Nationwide Permits in the State of Colorado. U.S. Army Corps of Engineers, Albuquerque District, Omaha District, and Sacramento District. January 11, 2017.

_____. 2018. National Wetland Plant List, version 3.4. http://wetland_plants.usace.army.mil/. U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH.

U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA). 2008. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States. December 02, 2008.

U.S. Climate Data. 2020a. Climate Canon City – Colorado. https://www.usclimatedata.com/climate/canon-city/colorado/united-states/usco0054. Accessed December 8, 2020.

_____. 2020b. Climate Hartsel – Colorado. https://www.usclimatedata.com/climate/hartsel/colorado/united-states/usco0563. Accessed November 4, 2020.

U. S. Fish and Wildlife Service (USFWS). 2020. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands/. Accessed September 21, 2020.

Weather Underground. 2020a. Aspen-Pitken County Airport Monthly History for August 2020. https://www.wunderground.com/history/monthly/us/co/aspen/KASE/date/2020-8. Accessed November 4, 2020.

_____. 2020b. City of Colorado Springs Municipal Airport Station Monthly History for August 2020. https://www.wunderground.com/history/monthly/us/co/colorado-springs/KCOS/date/2020-8. Accessed December 8, 2020.

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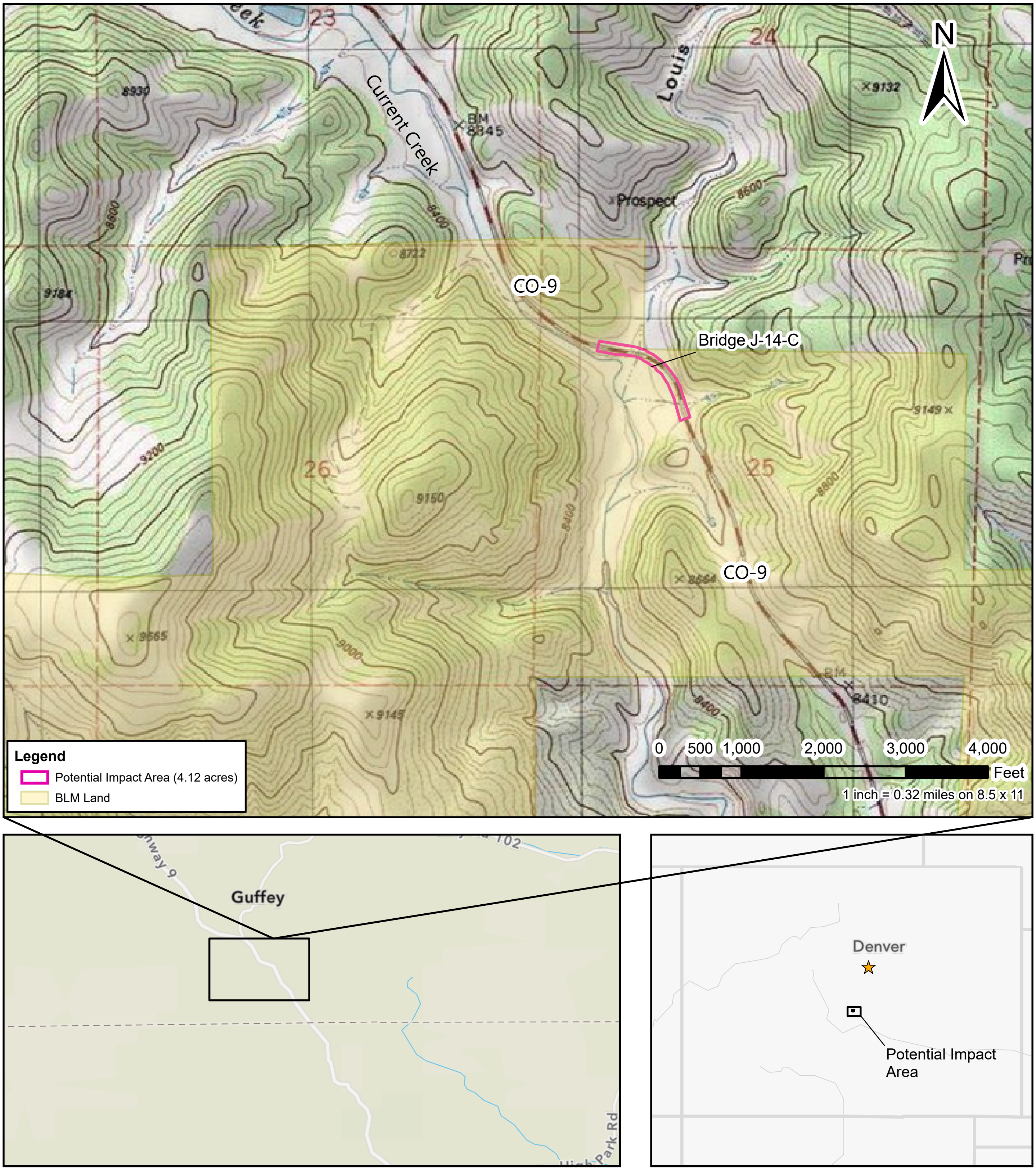
Appendix A

Aquatic Resources Delineation Maps



COLORADO DEPARTMENT OF TRANSPORTATION
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Figure 1
Vicinity Map

Data Source: Stanley Consultants, CDOT
Image Source: USGS, World Street Map, USA 7.5 min Topographic Map Thirty-one Mile Mountain Quad 1983, World Topographic Map (no legends available)

Stanley Consultants INC.

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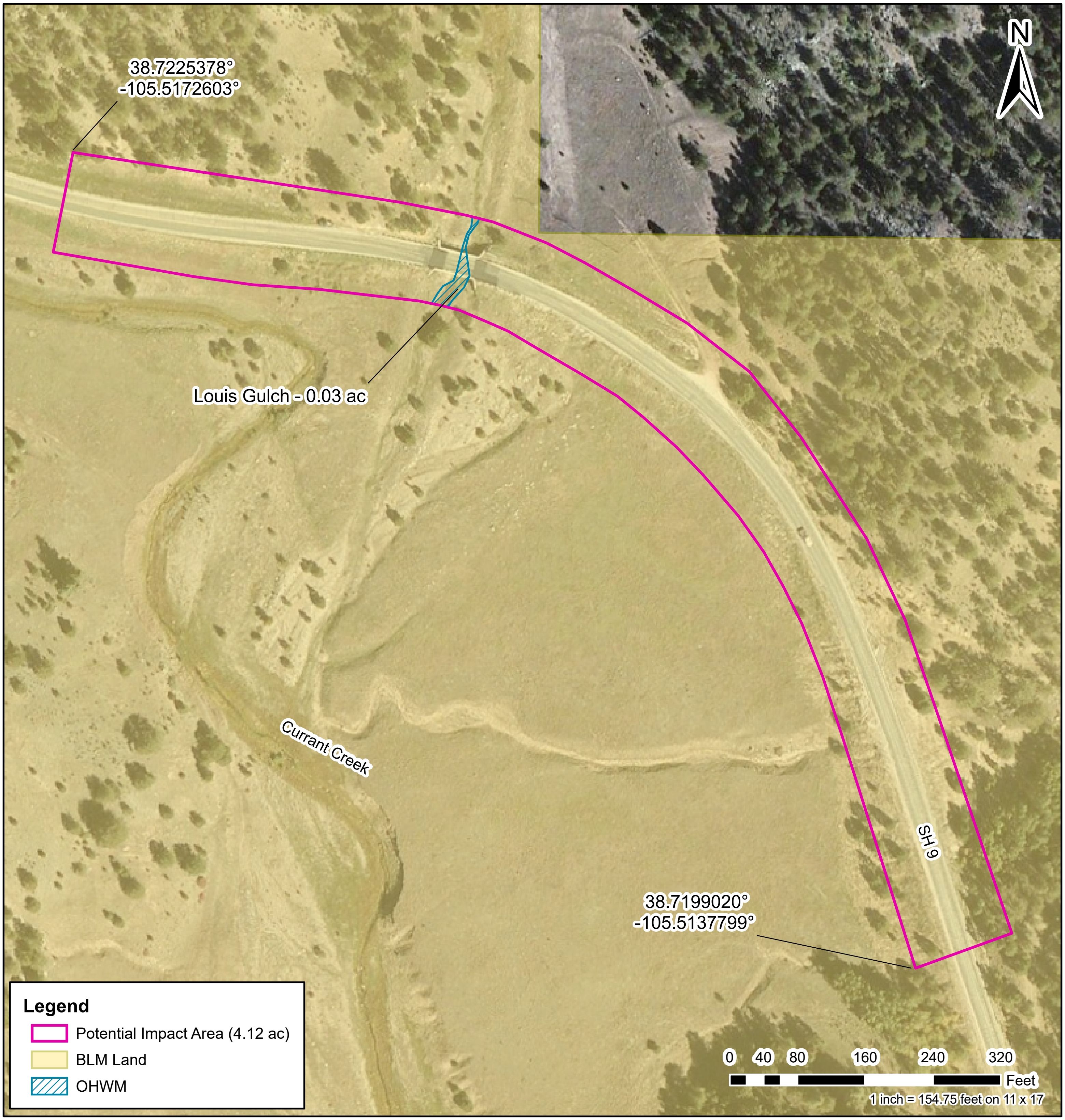

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Figure 2
Aquatic Resources Delineation

Stanley Consultants INC.

Data Source: Stanley Consultants, Inc., CDOT
Image Source: ArcGIS Online, World Imagery

Coordinate System: NAD 1983 StatePlane Colorado Central FIPS 0502 Feet
Datum: North American 1983

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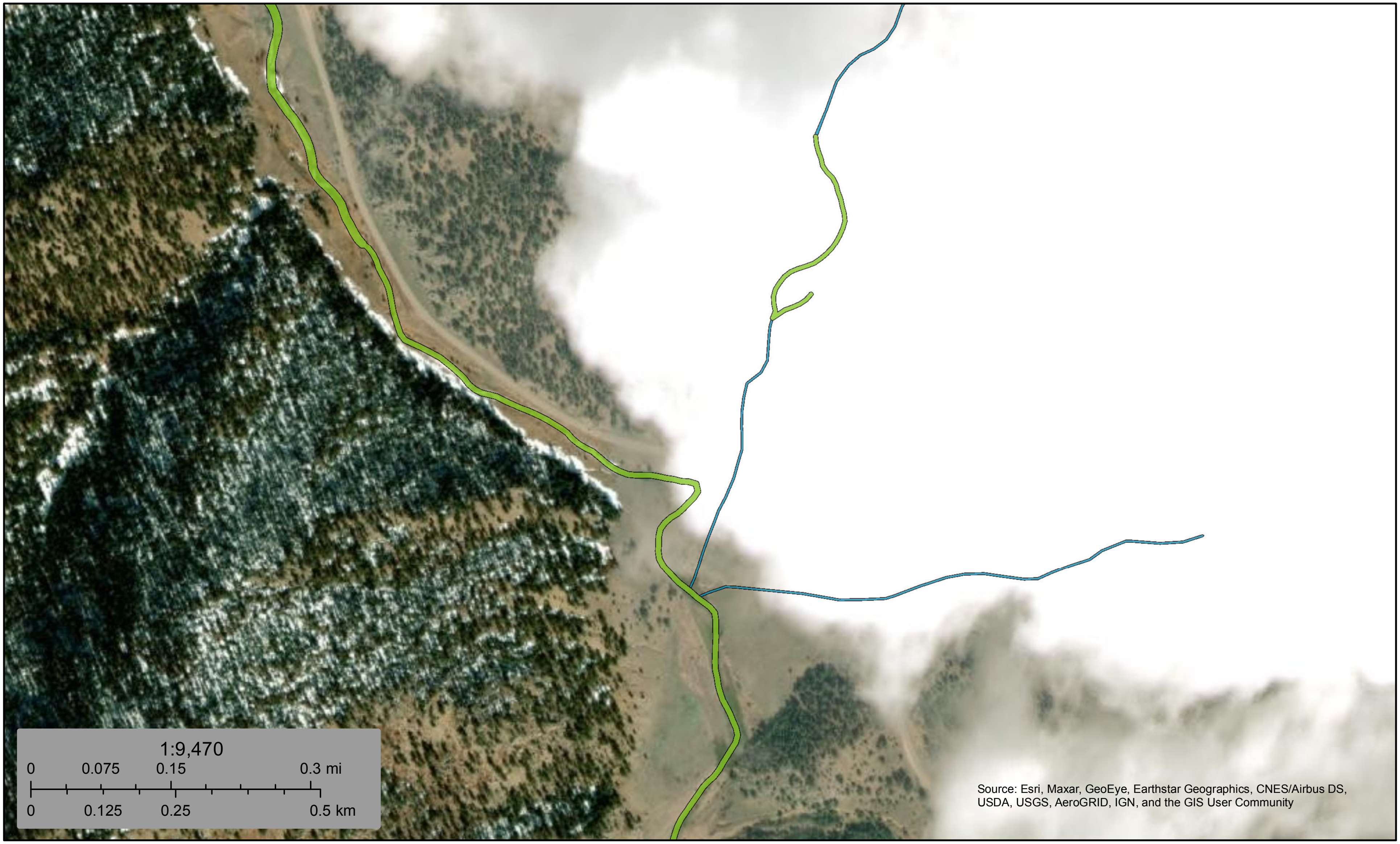
Appendix B

Supporting Maps and Documents

U.S. Fish and Wildlife Service
National Wetlands Inventory

J-14-C



December 8, 2020

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

United States Department of Agriculture

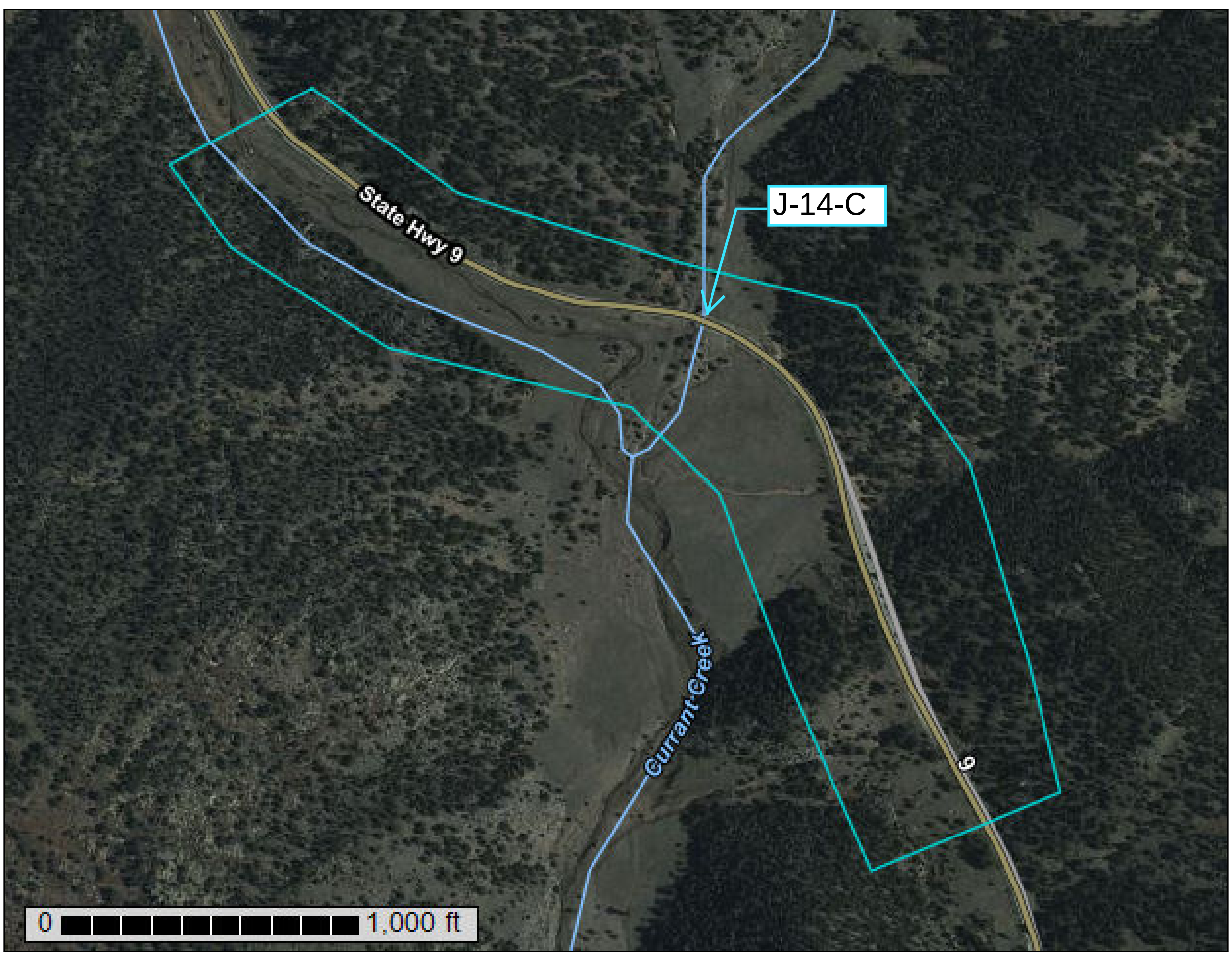
NRCS

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 Teller-Park Area, Colorado, Parts of Park and Teller Counties

J-14-C



December 8, 2020

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 (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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.

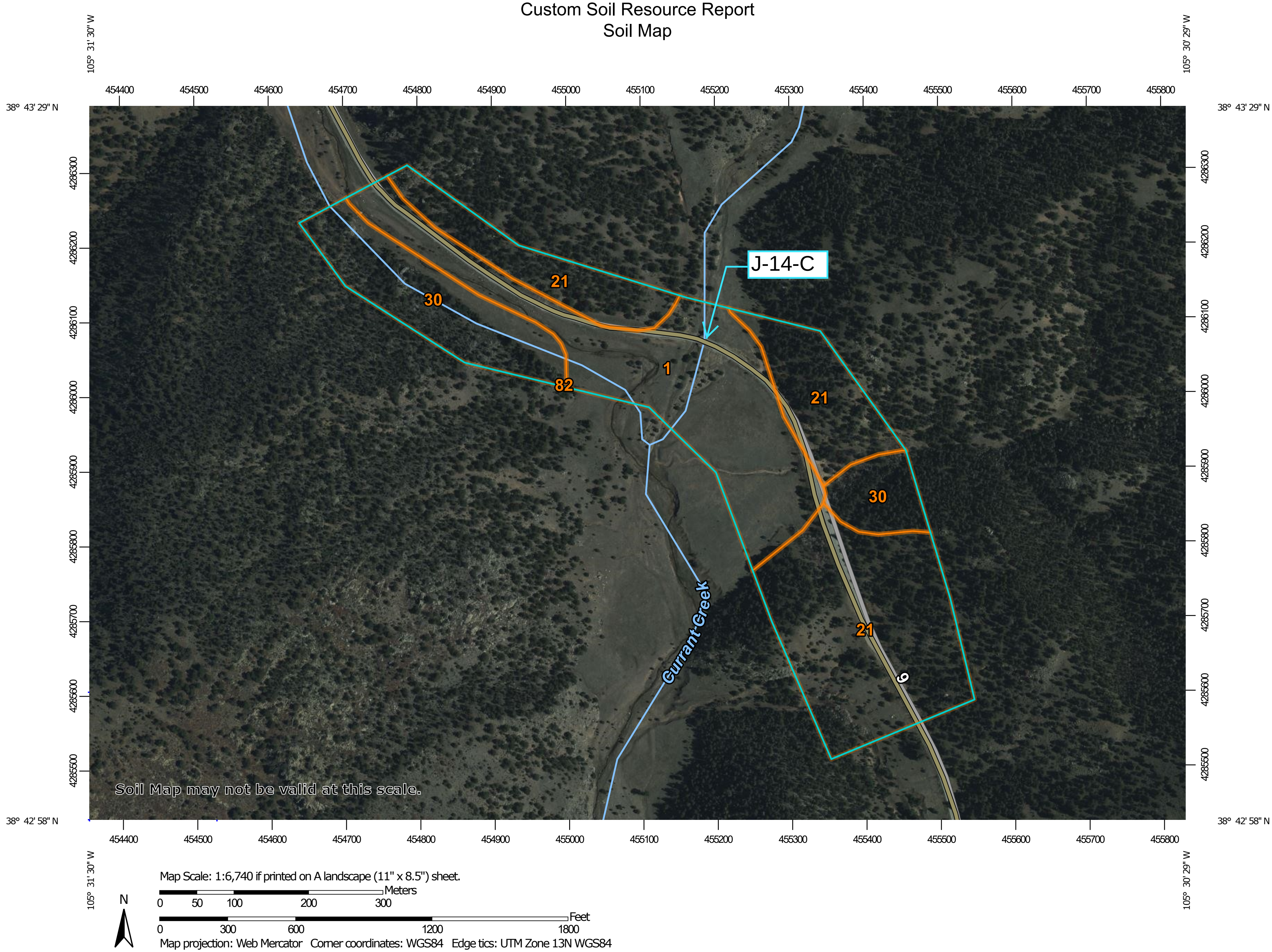
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map


105° 31' 30" W
105° 30' 29" W
38° 43' 29" N
38° 42' 58" N
454400
454500
454600
454700
454800
454900
455000
455100
455200
455300
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4286300
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4286100
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4285900
4285800
4285700
4285600
4285500
J-14-C
21
30
1
82
21
30
21
9
Currant Creek
Soil Map may not be valid at this scale.
N
Map Scale: 1:6,740 if printed on A landscape (11" x 8.5") sheet.
Meters
0 50 100 200 300
Feet
0 300 600 1200 1800
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

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 1:24,000.

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:
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: Teller-Park Area, Colorado, Parts of Park and Teller Counties
Survey Area Data: Version 12, Jun 5, 2020

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

Date(s) aerial images were photographed: May 18, 2020—May 21, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Adderton loam, 2 to 6 percent slopes	17.7	32.2%
21	Cathedral-Rock outcrop complex, 20 to 60 percent slopes	26.6	48.4%
30	Edloe very gravelly sandy loam, 20 to 55 percent slopes	10.7	19.4%
82	Quander-Bushpark very gravelly loams, 5 to 40 percent slopes complex	0.0	0.0%
Totals for Area of Interest		**55.0**	**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.

Teller-Park Area, Colorado, Parts of Park and Teller Counties

1—Adderton loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: k0xn
Elevation: 8,000 to 10,200 feet
Mean annual precipitation: 14 to 23 inches
Mean annual air temperature: 37 to 40 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Adderton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adderton

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A1 - 0 to 10 inches: loam
A2 - 10 to 30 inches: loam
A3 - 30 to 42 inches: loam
C1 - 42 to 50 inches: sandy loam
2C2 - 50 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Platdon, frequently flooded

Percent of map unit: 10 percent
Landform: Flood plains

Ecological site: R048AY241CO
Hydric soil rating: Yes

Rofork

Percent of map unit: 3 percent
Landform: Mountains
Ecological site: R048AY240CO
Hydric soil rating: No

Bushpark

Percent of map unit: 2 percent
Landform: Mountains
Ecological site: R048AY230CO
Hydric soil rating: No

21—Cathedral-Rock outcrop complex, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2n842
Elevation: 8,450 to 9,850 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 38 to 42 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Cathedral and similar soils: 60 percent
Rock outcrop: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cathedral

Setting

Landform: Mountains
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from gneiss and/or granite and/or sandstone

Typical profile

A1 - 0 to 4 inches: very gravelly sandy loam
A2 - 4 to 9 inches: very gravelly sandy loam
Bw - 9 to 12 inches: very gravelly sandy loam
R - 12 to 22 inches: bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO
Other vegetative classification: Ponderosa pine/Arizona fescue (PIPO/FEAR2) (C1109), Mountain muhly - Arizona fescue (MUMO-FEAR2) (G2602)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountains
Landform position (three-dimensional): Free face
Parent material: Gneiss and/or granite and/or sandstone

Typical profile

- 0 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 60 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 to moderately low (0.00 to 0.14 in/hr)

Minor Components

Typic haplustolls

Percent of map unit: 5 percent
Landform: Mountains
Ecological site: R048AY222CO
Hydric soil rating: No

Adderton

Percent of map unit: 5 percent
Landform: Flood plains
Ecological site: R048AY222CO
Hydric soil rating: No

30—Edloe very gravelly sandy loam, 20 to 55 percent slopes

Map Unit Setting

National map unit symbol: k0yd
Elevation: 8,000 to 10,000 feet
Mean annual precipitation: 14 to 17 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Edloe and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edloe

Setting

Landform: Mountains
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from gneiss and/or sandstone and/or monzonite and/or granite

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: very gravelly sandy loam
E1 - 4 to 10 inches: very gravelly sandy loam
E2 - 10 to 20 inches: very gravelly sandy loam
Bt - 20 to 32 inches: extremely gravelly sandy clay loam
R - 32 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 55 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Other vegetative classification: Douglas-fir/common juniper (PSME/JUCO6) (C1210), Douglas-fir/kinnikinnick-common juniper (PSME/ARUV-JUCO6) (C1219)
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Landform: Hills, knobs
Landform position (three-dimensional): Crest, nose slope
Hydric soil rating: No

Catamount

Percent of map unit: 5 percent
Landform: Mountains
Hydric soil rating: No

Ivywild

Percent of map unit: 5 percent
Landform: Mountains
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

82—Quander-Bushpark very gravelly loams, 5 to 40 percent slopes complex

Map Unit Setting

National map unit symbol: k0xv
Elevation: 8,500 to 10,900 feet
Mean annual precipitation: 14 to 23 inches
Mean annual air temperature: 37 to 40 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Quander and similar soils: 60 percent
Bushpark and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quander

Setting

Landform: Mountains
Landform position (three-dimensional): Mountainflank, mountainbase
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium and/or slope alluvium derived from trachyte

Typical profile

A - 0 to 7 inches: very gravelly loam
AB - 7 to 12 inches: extremely gravelly loam
Bt1 - 12 to 20 inches: extremely cobbly clay loam
Bt2 - 20 to 26 inches: extremely cobbly clay loam
Bt3 - 26 to 43 inches: extremely cobbly clay loam
BC - 43 to 60 inches: extremely cobbly loam

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R048AY377CO - Skeletal Loam
Hydric soil rating: No

Description of Bushpark

Setting

Landform: Mountains
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from trachyte and/or volcanic breccia

Typical profile

A - 0 to 3 inches: very gravelly loam
Bt1 - 3 to 8 inches: very gravelly clay loam
Bt2 - 8 to 16 inches: extremely gravelly clay loam
R - 16 to 60 inches: bedrock

Properties and qualities

Slope: 10 to 40 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D
Ecological site: R048AY230CO
Hydric soil rating: No

Minor Components

Adderton

Percent of map unit: 5 percent
Landform: Drainageways
Ecological site: R048AY222CO
Hydric soil rating: No

Tellura

Percent of map unit: 3 percent
Landform: Mountains
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R048AY377CO - Skeletal Loam
Hydric soil rating: No

Platdon, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Ecological site: R048AY241CO
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C

Photo Inventory

Photo 1
Feature: Louis Gulch
Date: 8/30/2020
Photo Location: Upstream (north) side of bridge, facing upstream (north)
Description: This photo is taken at the upstream extent of the channel's OHWM. The drainage is a swale with no visible OHWM upstream of the PIA, although a more distinct OHWM may be present further upstream from the surveyed area, as is suggested by the band of Baltic rush (*Juncus balticus*) rush visible at the top of the drainage in this photo.

Photo 2
Feature: Louis Gulch
Date: 8/30/2020
Photo Location: Upstream (north) side of bridge, facing downstream (south)
Description: The Louis Gulch OHWM within the PIA is primarily characterized by a change in plant community and changes in the character of the soil. A dominant species within the OHWM is Baltic rush, a FACW species within the Western Mountains, Valleys, and Coast Region where the PIA is located.

Photo 3
Feature: Louis Gulch
Date: 8/30/2020
Photo Location: Downstream (south) side of bridge, facing upstream (north)
Description: Baltic rush becomes denser and more concentrated downstream of the bridge. Large cobble deposits were observed within the OHWM throughout the PIA.

Photo 4
Feature: Louis Gulch
Date: 8/30/2020
Photo Location: Downstream (south) side of bridge, facing downstream (south)
Description: Downstream of the CDOT right-of-way the edges of the channel become less distinct and more swale-like, although the Baltic rush is still visible within the bottom of the drainage.

Photo 5
Feature: Louis Gulch
Date: 8/30/2020
Photo Location: Downstream (south) side of bridge, facing downstream (south)
Description: This soil pit, located at a low point with the most moisture and highest concentration of Baltic rush, contained dry, sandy soil that, while dark, did not contain redox features that would qualify the soil as hydric.

Appendix D

Signed Property Access Letter

(not included; needs to be obtained prior to permitting efforts)