Aquatic Resources Delineation Report

Bridge I-17-X

Prepared By:
Stanley Consultants, Inc.
8000 South Chester St, Ste 500
Centennial, Colorado 80112

Prepared For:
Colorado Department of Transportation, Region 2
5615 Wills Blvd.
Pueblo, Colorado 81008

FINAL

January 2021

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 concrete double-box culvert on U.S. Highway (US) 24 northwest of Manitou Springs, Colorado, known as the I-17-X 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 findings at the CDOT bridge I-17-X surveyed area (1.20 acres), where the OHWM for Fountain Creek (R4SBA: 0.04 acres and 120 linear ft) was delineated. Fountain Creek is a relatively narrow perennial stream with steep banks that is located in the median between the north- and south-bound lanes of US 24. 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.

Table of Contents

TABLES

APPENDICES

Appendix A – Aquatic Resources Delineation Maps

Appendix B – Supporting Maps and Documents

Appendix C – Photo Inventory

Appendix D – Signed Property Access Letter (not included; needs to be obtained prior to permitting efforts)

Acronyms and Abbreviations

BLM	Bureau of Land Management
CDOT	Colorado Department of Transportation
CO	Colorado State Highway
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 U.S. Highway (US) 24 north of Manitou Springs, Colorado, known as the I-17-X 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 29, 2020, by wetland biologists for Stanley Consultants, Inc.

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

Applicant
Jennifer Sparks
Region 2 Resident Engineer

Colorado Department of Transportation
5615 Wills Blvd.
Pueblo, CO 81008

Office: (719) 546-5753
Fax: (719) 546-5414
jennifer.sparks@state.co.us

Land Owner
Colorado Department of Transportation

Agent:
Amber Billings, ROW Supervisor
5615 Wills Blvd.
Pueblo, CO 81008

Office: (719) 546-5413
Fax: (719) 546-5414
amber.billings@state.co.us

2. Location and Project Description

2.1 Location

The surveyed Potential Impact Area (the PIA) is approximately 1.2 acres and is located along US 24 in the median between the north- and south-bound lanes (Appendix A, Figures 1 and 2). The culvert is approximately 2.25 miles northwest of Manitou Springs in El Paso County, Colorado (38.881797/-104.950173), in Section 36 of Township 13 South, Range 68 West (6^{th} Principal Base and Meridian). The PIA includes the CDOT right-of-way (ROW) and an existing culvert that currently allows traffic to cross Fountain Creek at a turn-around land on US 24. A map of the PIA is located in the Aquatic Resources Delineation Map in Appendix A.

2.2 Purpose and Need

The concrete double-box culvert at I-17-X was constructed in 1965 along US 24, a key corridor connecting residents and tourists from Colorado Springs and southern Colorado to the recreational activities in the Rocky Mountains. The structure is in poor condition, requiring frequent inspection and repair, including patching of concrete and replacement of wing walls.

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 (US 350, US 24, Colorado State Highway [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 I-17-X is an Additionally Requested Element (ARE) structure will be funded by the Colorado Bridge Enterprise (Project No. 23559).

Bridge I-17-X is located on US 24 near milepost 295.450, approximately 2.25 miles northwest of Manitou Springs, Colorado (Figure 1). The bridge is comprised of a concrete double-box culvert that has perennial flows from Fountain Creek cross through the structure. The Project will replace this bridge with a similarly sized culvert, concrete or steel bridge.

The bridge is located at a turn-around point on US 24. This turn-around will be closed to traffic for the duration of the Project. More information on traffic detour plans can be found in the Traffic Design Memorandum for this structure.

Once the bridge is complete and ready for use, any disturbed areas from bridge construction 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 Manitou Springs, Colorado. Approximately 2.25 miles after Manitou Springs, at milepost 295.450, turn left into the turn-around in the median between the north- and south-bound lanes. The Project culvert is located below the turn-around. Parking is available on the shoulder of the road on the south-bound side directly across from the Project bridge.

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 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.

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

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 – 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 – 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 steep mountain slopes, rocky hillsides, and the narrow Fountain Creek river terrace that runs between the north- and south-bound lanes of US 24. The elevation at the site is approximately 7,040 feet (ft) above mean sea level (AMSL).

Land use in the vicinity of the PIA predominantly consists of the US 24 transportation corridor, rural roads, and recreation activities. The PIA occurs entirely on privately-owned lands, although National Forest System (NFS) lands begin approximately 60 ft north of the PIA. No other structures or residences are located in the vicinity of the PIA.

4.2 Climate

The nearest weather station to the PIA, Colorado Springs, Colorado, has an average maximum temperature of 62°F and average minimum temperature of 36°F (U.S. Climate Data 2020). The average annual precipitation is 16.54 inches of rain and 39 inches of snowfall (U.S. Climate Data 2020). The monthly precipitation average for August is 3.34 inches; however, during this past August (when the field survey was conducted) the rainfall was measured at 2.54 inches (Weather Underground 2020), which is below normal.

4.3 NWI Mapping

The National Wetlands Inventory (NWI) has mapped the drainage crossing under the Project bridge as riverine (R5UBH). See Appendix B, Supporting Maps, NWI Mapping.

4.4 Plant Communities

The plant community in the drainage in the PIA consists entirely of riparian vegetation along the banks of Fountain Creek. The riparian corridor overstory is dominated by cottonwoods (*Populus angustifolia, P. deltoides*), as is the shrub layer (*P. angustifolia*). The understory is comprised of herbaceous vegetation dominated by smooth brome (*Bromus inermus*) (UPL), with minor components of Rocky Mountain goldenrod (*Solidago multiradiata*) (FACU), Canada thistle (*Cirsium arvense*) (FAC), and Baltic rush (*Juncus balticus*).

4.5 Hydrology

The dominant hydrological feature in the PIA is Fountain Creek, a perennial drainage that extends along US 24 within the PIA and is bordered on both sides by the north- and south-bound lanes. Flows from Fountain Creek travel southeast until the stream's confluence with 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 perennial flows from Fountain Creek, with other minor inputs comprised of sources such as groundwater and surface runoff from the adjacent hillsides and the highway.

No fens are located within the vicinity of the PIA (OTIS 2020).

4.6 Soils

One soil type was identified in the PIA (see Appendix B, Soil Resource Report): Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes. This soil complex is considered to be All of the soils are considered to be nonhydric (NRCS 2020). Soils observed in the test soils pits sampled during field survey were all nonhydric as well.

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 summarizes the results of the delineation, including a description of the delineated OHWM and justification for the boundaries. Feature details are summarized in Table 1 (Aquatic Resources within the PIA).

Table 1. Aquatic Resources within the PIA

Name	Cowardin Classification	Location (Lat/Long)	Size (ac)	Length (ft)
Non-wetland Waters				
Fountain Creek	R5UBH	38.881797/-104.950173	0.20	430
		Totals	**0.20**	**430**

All portions of the PIA were examined for their potential to support wetlands. The dominant vegetation observed within the tree and shrub stratums of the PIA were cottonwood species designated as FAC and FACW for the Western Mountains, Valleys, and Coast Region. However, although the plant composition passed the dominance test for hydrophytic vegetation due to the presence of the cottonwoods, the herbaceous layer was dominated (70 percent) by smooth brome, a species designated as an upland species. Additionally, the hydrology indictors were limited to secondary indicators (geomorphic position and the FAC-Neutral Test) and the soil test pits did not contain hydric soils. No wetlands were delineated within the PIA.

5.1 Fountain Creek

Fountain Creek is a perennial riverine system (430 linear ft, 0.20 acres) that flows through the PIA. The OHWM was determined to be approximately 1-2 above the Fountain Creek banks based on evidence of debris wracking and shelving.

Wetland vegetation and secondary indicators of hydrology were present within the PIA; however, test pits taken adjacent to the banks of Fountain Creek (approximately 3-4 ft above the banks and 1-3 ft above the OHWM) were found to contain nonhydric soils. Photographic documentation of Fountain Creek 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 Fountain Creek is in the middle of the highway median 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 with an OHWM (totaling 0.20 acres and 430 linear ft) 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 WOTUS 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 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. 2020. Climate Colorado Springs – Colorado. https://www.usclimate data.com/climate/colorado-springs/colorado/united-states/usco0078. Accessed December 16, 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. 2020. 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.

List of Preparers

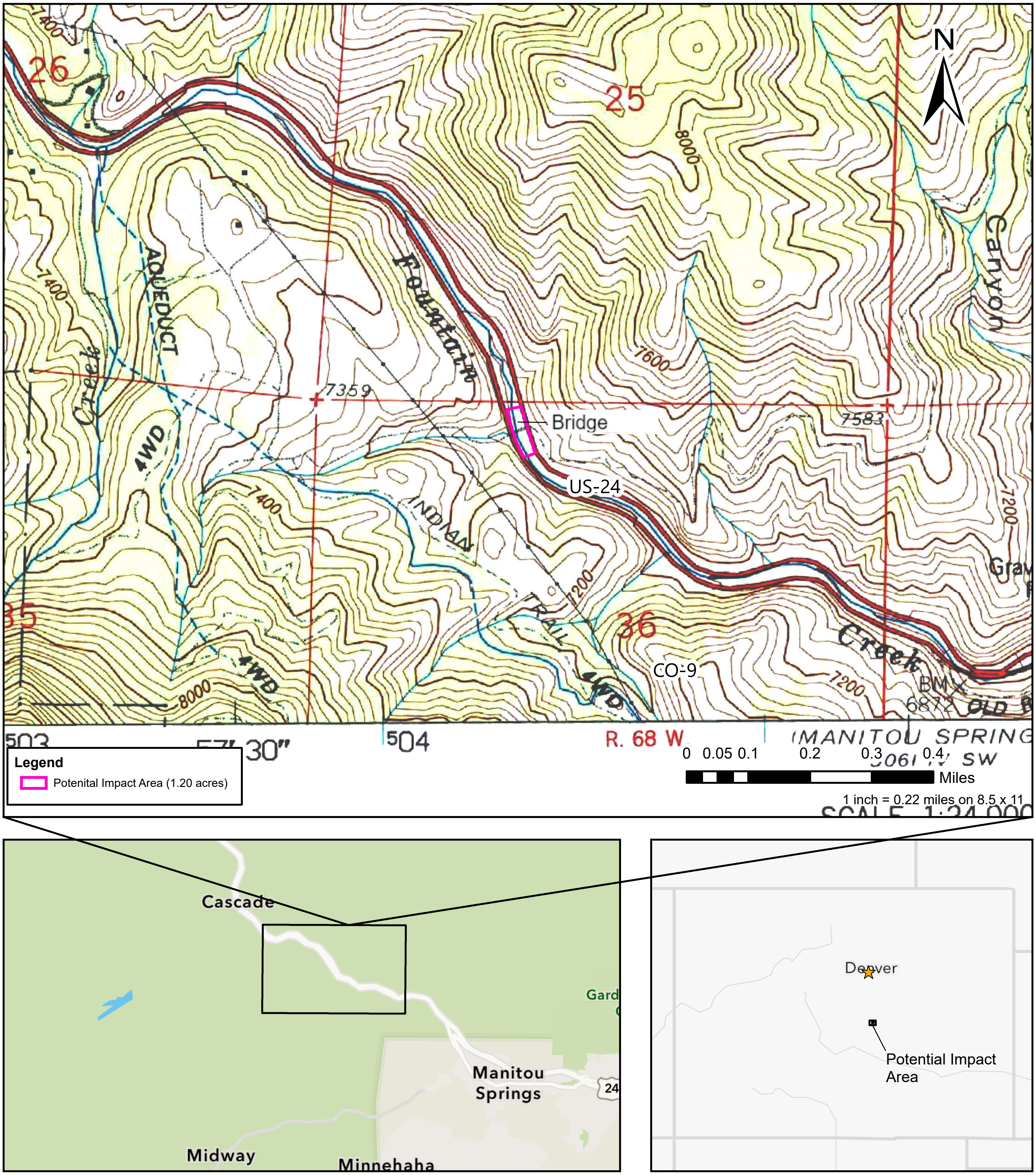
Claire Phillips, Environmental Scientist
Stanley Consultants, Inc.
8000 South Chester St., Ste. 500
Centennial, Colorado 80112
Main: (303) 799-5091
PhillipsClaire@stanleygroup.com

Trent Toler, Senior Scientist
Stanley Consultants, Inc.
6975 Union Park Ave., Ste 300
Cottonwood Heights, Utah 84047
Main: (801) 559-4612
TolerTrent@stanleygroup.com

Rick Black, Principal Ecologist
Stanley Consultants, Inc.
8000 South Chester St., Ste. 500
Centennial, Colorado 80112
Main: (303) 799-5091
Cell: (801) 559-4610
BlackRick@stanleygroup.com

Appendix A

Aquatic Resources Delineation Maps



COLORADO DEPARTMENT OF TRANSPORTATION
Region 2 Bridge Rebuild Project - Bridge I-17-X
Aquatic Resources Delineation Report

Figure 1
Vicinity Map

Data Source: Stanley Consultants, CDOT
Image Source: USGS, World Street Map, USA 7.5 min Topographic Map Cascade Quad 1986, World Topographic Map (no legends available)

Stanley Consultants INC.

Date Exported: 12/4/2020 1:19 PM

COLORADO DEPARTMENT OF TRANSPORTATION
Region 2 Bridge Rebuild Project - Bridge I-17-X
Aquatic Resources Delineation Report

Figure 2
Aquatic Resources Delineation

Stanley Consultants INC.

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

Spatial Reference:
Name: NAD 1983 2011 StatePlane
Colorado Central FIPS 0502 Ft US
Projection: Lambert Conformal Conic

Date Exported: 12/16/2020 3:21 PM

Appendix B

Supporting Maps and Documents

U.S. Fish and Wildlife Service

National Wetlands Inventory

I-17-X

December 16, 2020

Wetlands

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

United States Department of Agriculture

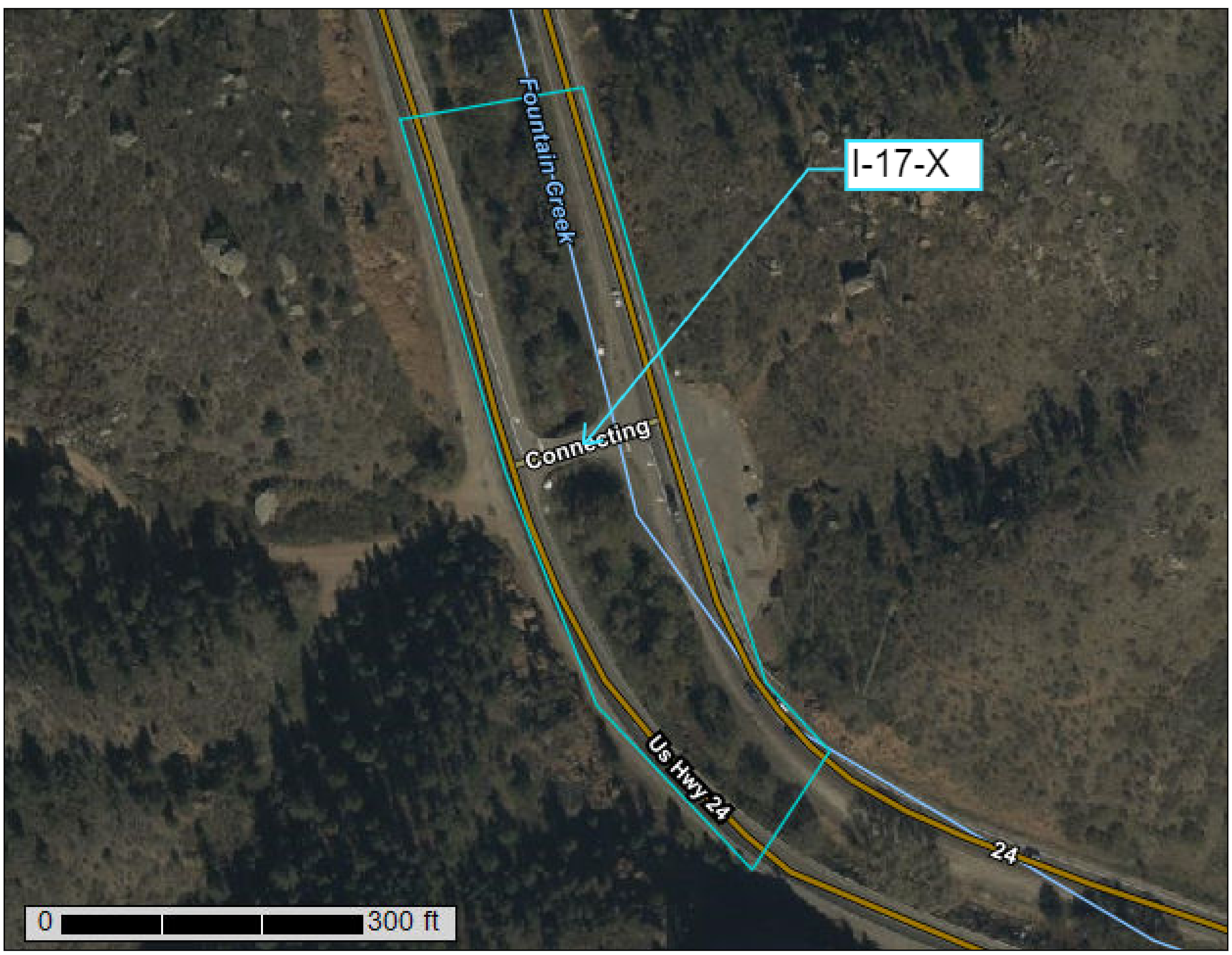
NRCS

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 Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties

I-17-X



December 16, 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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.

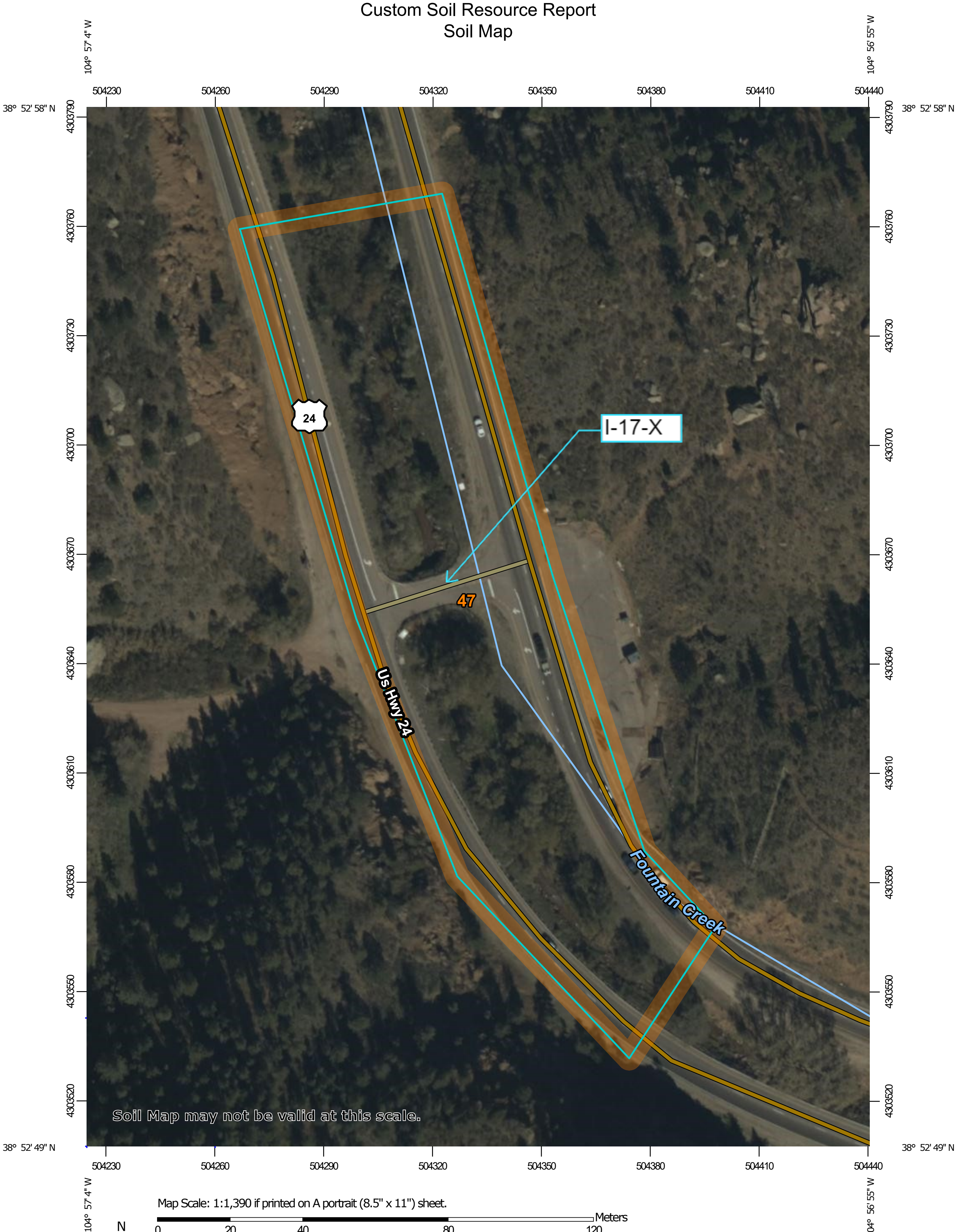
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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



Map Scale: 1:1,390 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 20, 40, 80, 120

Feet: 0, 50, 100, 200, 300

N

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: Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties
Survey Area Data: Version 7, 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: Sep 11, 2018—Oct 20, 2018

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
47	Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes	3.1	100.0%
Totals for Area of Interest		**3.1**	**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.

Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties

47—Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes

Map Unit Setting

National map unit symbol: jpjz
Elevation: 6,500 to 9,200 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Sphinx, warm, and similar soils: 60 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sphinx, Warm

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: gravelly coarse sandy loam
AC - 5 to 13 inches: very gravelly loamy coarse sand
Cr - 13 to 61 inches: weathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex

Typical profile

R - 0 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 80 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 0.06 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Sphinx, dark surface

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Garber

Percent of map unit: 5 percent
Landform: Drainageways, mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Linear, convex, concave
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

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: Fountain Creek
Date: 8/29/3030
Photo Location: Upstream (north) side of bridge, facing upstream (north)
Description: The OHWM boundary is approximately 1-2 above the Fountain Creek waterline visible in the photo. A soil point was taken next to the surveyor on the left side of the photo; no hydric soils were present at this point.

Photo 2
Feature: Fountain Creek
Date: 8/29/3030
Photo Location: Upstream (north) side of bridge, facing downstream (south)
Description: The Fountain Creek OHWM is close to the stream's banks due to the steep slopes on either side of the feature.

Photo 3
Feature: Fountain Creek
Date: 8/29/3030
Photo Location: Downstream (south) side of bridge, facing upstream (north)
Description: Although plant species within the sample points passed dominance test for hydrophytic vegetation, this is primarily due to the presence of cottonwoods (*Populus angustifolia, P. deltoides*) within the tree stratum, as the herbaceous stratum is dominated by smooth brome (*Bromus inermus*),an upland species for the Western Mountains, Valleys, and Coast Region.

Photo 4
Feature: Fountain Creek
Date: 8/29/3030
Photo Location: Downstream (south) side of bridge, facing downstream (south)
Description: The bank of Fountain Creek. A soils sample point was taken approximately 3-4 feet to the right of this photo (see Photo 5); no hydric soils were present at the site.

Photo 5
Feature: Fountain Creek
Date: 8/29/3030
Photo Location: Downstream (south) side of bridge, facing cross-gradient (east)
Description: This soil pit, located approximately 3-4 feet from the Fountain Creek bank, contained nonhydric soils with an herbaceous layer dominated by smooth brome.

Appendix D

Signed Property Access Letter

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