Aquatic Resources Delineation Report

Bridge P-19-G Minor

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

Executive Summary

Stanley Consultants, Inc. (Stanley) has prepared an aquatic resources delineation for the proposed replacement of a bridge structure on State Highway (SH) 239 about 2.5 miles northeast of Trinidad, Colorado, known as the P-19-G Minor Bridge Replacement Project (Project). The purpose of the delineation is to identify any potential wetlands and/or waters of the U.S. (WOTUS) 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) (U.S. Army Corps of Engineers [USACE] 2010).

This delineation reports on the finding at the CDOT bridge P-19-G Minor survey area (5.6 acres), where the OHWM for a constructed intermittent drainage (R4SB5Cx: 0.11 acres and 250 linear feet [ft]) was identified. The drainage is known as the Picketwire Ditch, an excavated irrigation ditch that is supplied with water from the Purgatoire River. No wetlands were identified in the survey area.

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 or, if impacts to surface waters are unavoidable, to understand the total anticipated impacts that would need to be approved or permitted by the USACE and/or CDOT. Depending on the level of impacts, the Project would likely require permitting under the Nationwide Permit (NWP) program or through an Individual Permit (IP). 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 IPs are required for projects with larger impacts and can involve a lengthy permitting process.

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Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
CO	Colorado State Highway
CWA	Clean Water Act
IP	Individual Permit
MP	Mile Post
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 Colorado Department of Transportation (CDOT), Stanley Consultants, Inc. (Stanley) has prepared an aquatic resources delineation for the proposed replacement of a bridge structure on State Highway (CO) 239 about 2.5 miles northeast of Trinidad, Colorado, known as the P-19-G Minor Bridge Replacement Project (the 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 26, 2020, by wetland biologists for Stanley Consultants, Inc.

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2. Location and Project Description

2.1 Location

The surveyed Potential Impact Area (PIA; based on the area of potential Project-related impacts, per communications with Project engineers) is approximately 5.6 acres. The PIA includes the CDOT right-of-way (ROW), along with an expanded limit of disturbance to account for a possible detour or other work. The existing steel beam bridge is located approximately 2.5 miles northeast of Trinidad (37.203386/-104.482354), in Section 5, Township 33S, Range 63W (6th Principal Base and Meridian). The map of the PIA is located in the Aquatic Resources Delineation Map in Appendix A.

2.2 Purpose and Need

The steel beam bridge (Structure P-19-G Minor) was built in 1932 on CO 239 which is a north-south corridor connecting residents and farmers from north-central Las Animas County, Colorado to Trinidad, Colorado and the Rocky Mountains. The structure is in poor condition and well past its replacement life. This bridge is also 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, including two (2) Additionally Requested Elements (AREs) 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, 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 P-19-G Minor is an Additionally Requested Element (ARE) that will be funded by the Colorado Bridge Enterprise (Project No. 23559).

Bridge P-19-G Minor is located on CO 239 at milepost 1.74, approximately 2.5 miles northeast of Trinidad, Colorado. The existing structure is a single span steel I beam girder bridge built in 1932 to span the Picketwire Ditch, a historic irrigation ditch. The existing bridge has a width of 20 feet [ft], a length 31 ft (from edge-to-edge of the deck), and a vertical clearance of approximately 5 ft. The Project will replace this bridge with a similarly sized concrete or steel bridge, or a concrete box culvert. Due to the historic designation of the irrigation ditch, the size of the new crossing will be coordinated with the State Historic Preservation Office and the Picketwire Ditch Company.

As stated by the CDOT grant application, the roadway shall not be closed for construction. Two other alternatives were investigated:

Alternative 1: Phasing the constructions to keep one lane open. To meet all typical CDOT roadway phased construction criteria, this alternative will require overbuilding the

proposed bridge on one side. The width of the proposed structure is contingent upon the girder type and width and will vary depending on the final bridge design selection.

Alternative 2: Building a two-lane shoofly on one side of the existing bridge with a temporary pipe placed under the shoofly for drainage. The existing right-of-way (ROW) provides enough clearance to construct a shoofly on either side of the bridge. However, due to the length of the existing bridge structure and consistently high existing vertical clearance under the bridge, this alternative is considered to be less cost effective than Alternative 1, phased construction.

Alternative 1 was identified as a preferred traffic alternative for this structure. 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, any disturbed areas will be restored to original contours and reseeded.

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 Pueblo, Colorado, by taking the I-25 S exit towards Trinidad. At Trinidad, take exit 15 for US 160 E (Goddard Ave.), and head east under I-25. Turn north onto Freedom Rd., and then in 0.3 miles veer right onto CO 239. Continue north on CO 239 for 1.3 miles to reach Structure P-19-G Minor. Parking is available on the side of the road immediately before the 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 WOTUS within the PIA therefore will be evaluated per the definition in 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 WOTUS 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.

3.2 Wetland Delineation

All wetland delineations were 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: Great Plains Region (Version 2.0)* (USACE 2010). Survey areas were assessed by the Project team to determine the presence or absence of wetland features. Locations that contained some potential as a wetland based on surface conditions such as the presence of dominant hydrophytic vegetation or surface hydrology were investigated more closely with a sampling point containing a soil pit, a delineation field form, and photo documentation.

Sources of information used in this Aquatic Resources investigation could 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)
- National Wetland Inventory (NWI) Map – see Appendix B, NWI Mapping

3.3 Non-Wetland Waters Delineation

Delineations of non-wetland waters were conducted using the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). The project specific 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.

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

4. Existing Conditions

4.1 Topography

The PIA is located in the eastern plains of Colorado including the Purgatoire River Valley and the distant Arkansas River Valley to the north. To the west are the foothills of the Front Range of the Rocky Mountains, and to the south and east is the Purgatoire River Valley of which this site is located within. The elevation at the site is approximately 5,970±5 ft above sea level. Land use in the area is agricultural and rural residential, with the high density commercial and residential area of Trinidad, Colorado starting approximately 1 mile to the southwest. The highway and bridge structure were constructed in 1932, with the bridge being constructed across the ditch.

4.2 Climate

The PIA (as measured from Trinidad, Colorado) has an average maximum temperature of 67.5° F and average minimum temperature of 37.7° F. The average annual precipitation is 14.8 inches, with an average snowfall of 43.2 inches (CCC 2020a). Normal monthly precipitation average for August is 2.7 inches but during this past August (when field investigations were conducted) the rainfall was measured at 1.2 inches, which is below normal (CCC 2020b).

4.3 NWI Mapping

National Wetlands Inventory (NWI) data indicated that no wetlands exist within the PIA, only one water classified as riverine (see Appendix B, Supporting Maps, NWI Mapping).

4.4 Plant Communities

The plant communities in the PIA consisted of irrigation ditch edges and disturbed roadway edges. The irrigation ditch edges include a mix of upland and riparian bank species such as wild ryes (*Elymus* spp.), prickly Russian thistle (*Salsola tragus*, FACU), field bindweed (*Convovulus arvensis*, UPL), sunflower (*Helianthus annuus*, FACU), great ragweed (*Ambrosia trifida*, FAC), yellow rabbitbrush (*Chrysothamnus viscidiflorus*, UPL), and a few eastern cottonwood (*Populus deltoides*, FAC) along parts of the banks. Roadways were not extensively sampled but contained some of the same upland grass and forb species found in the sample areas, along with other species likely seeded by CDOT or blown in from other upland areas.

4.5 Hydrology

The dominant hydrological feature at this site is the Picketwire Ditch, but very little surface and sub-surface drainage flows into the ditch as it is lined with debris castings excavated from the ditch. The ditch itself flows from the southeast to the northwest through the PIA, but it originates at a control structure on the Purgatoire River just north of downtown Trinidad, Colorado, which is approximately 2.5 miles (direct) from Bridge P-19-G Minor.

The ditch appears to continue northwards via a serpentine path until its end by a farm field approximately 4.5 miles west-northwest of Hoehne, Colorado. The ditch has no apparent outlet to any other receiving water.

In the PIA, surface flows were present in the ditch at the time of investigation. As with most agricultural ditches and canals, flows mostly occur during the agricultural growing season, but local knowledge also reported some flows periodically during the winter for livestock use.

4.6 Soils

Two soils were identified in the PIA (see Appendix B, Custom Soil Resource Report), Wapiti clay loam, 0-3% slopes, and Wiley-Kandrix complex, 1-6% slopes, cool, and neither are considered hydric (NRCS 2020). As no wetland conditions were observed, no soil pits were investigated.

5. Aquatic Resource Results

The OHWM data forms reflect the conditions as observed at the time of investigation and can be found in Appendix C. Associated photos of the sample points can be found in Appendix D. No soil sample points were taken though an OHWM profile was conducted (See Appendix C). The following subsections summarize the results of the delineation including a description of any waters delineated, justification for the boundaries, classification of the waters. Feature details are summarized in Table 1 (Aquatic Resources within the PIA).

Table 1. Aquatic Resources within the PIA

Aquatic Resource Name	Aquatic Resources Classification		Area (ac)	Length (ft)
	Cowardin	Location (Lat/Long)		
Non-Wetland Waters				
Picketwire Ditch	R4SB5Cx	37.203464/-104.482502	0.11	250
		Totals	**0.11**	**250**

5.1 Picketwire Ditch

The Picketwire Ditch is an intermittent constructed drainage (0.11 acres and 250 linear ft) flowing through the PIA from the southeast to northwest. As the Picketwire Ditch is a feature constructed in uplands used for agricultural irrigation (managed by the Picketwire Ditch Company), it has very little watershed. The water to supply the ditch is from the Purgatoire River, with its diversion located just north of downtown Trinidad, Colorado. After crossing under the P-19-G Minor bridge, the ditch continues north until its end in a farm field approximately 4.5 miles (direct) west-northwest of Hoehne, Colorado, and 6.35 miles north of the P-19-G Minor bridge.

The Picketwire Ditch does not appear to have any receiving water, and therefore does not connect back into any navigable water. However, without a detailed investigation on the

property where the ditch appears to end, it cannot be absolutely determined that some of the excess ditch flow could continue north and into a tributary of the Chicosa Arroyo, approximately 0.5 miles to the north of the ditch's apparent end. The Chicosa Arroyo does drain into the Purgatoire River, which is connected to the Arkansas River. The Arkansas River flows east and then southeast into the Mississippi River, which flows south to the Gulf of Mexico.

The portion of the ditch's channel that extends through the PIA is generally 20 ft wide with steep channel banks. Over years of regular ditch maintenance, excavated spoils have been placed above the banks, forming a berm on either side of the ditch. The height of the berm transitions from moderately steep on the south side of the bridge to extremely steep on the north side of the bridge.

Vegetation density varies along the channel, with sparse patches along the top of excavation spoils bank and denser patches along the edge of the OHWM (see Appendix D: Photopages). Most of the vegetation species are either upland or non-wetland riparian, with a few wetland species at or just below the OHWM (see above in Section 4.4 Plant Communities) where the regular irrigation flows allow those species to persist. No vegetation appeared to exist within the active channel, as either the flows prevent establishment of vegetation, or the regular maintenance keeps the channel mostly clear of vegetation.

The OWHM was observed as a fully developed bed and bank with scour, water stained leaves, and mud cracks (Appendix D: Photo Inventory). As the channel is maintained by the Picketwire Ditch Company, it is a fairly consistent width through the PIA, though there is minor widening around the bridge abutments, especially on the downstream side of the structure (Appendix A, Figure 2). The channel was flowing at the time of investigation, so characteristics of the channel bottom were not available for observation.

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)).

This irrigation ditch feature, the Picketwire Ditch, is believed to support instate commerce, as it distributes irrigation water to agricultural and/or ranching entities. 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 feature to support any future interstate commerce.

7. Summary

One constructed intermittent drainage, the Picketwire Ditch (0.11 acres and 250 linear ft), was identified and delineated 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 may 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). An Individual Permit (IP) would be required for a project 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 the USACE.

- 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 from stormwater run-off, pollutants, etc., due to construction activities.

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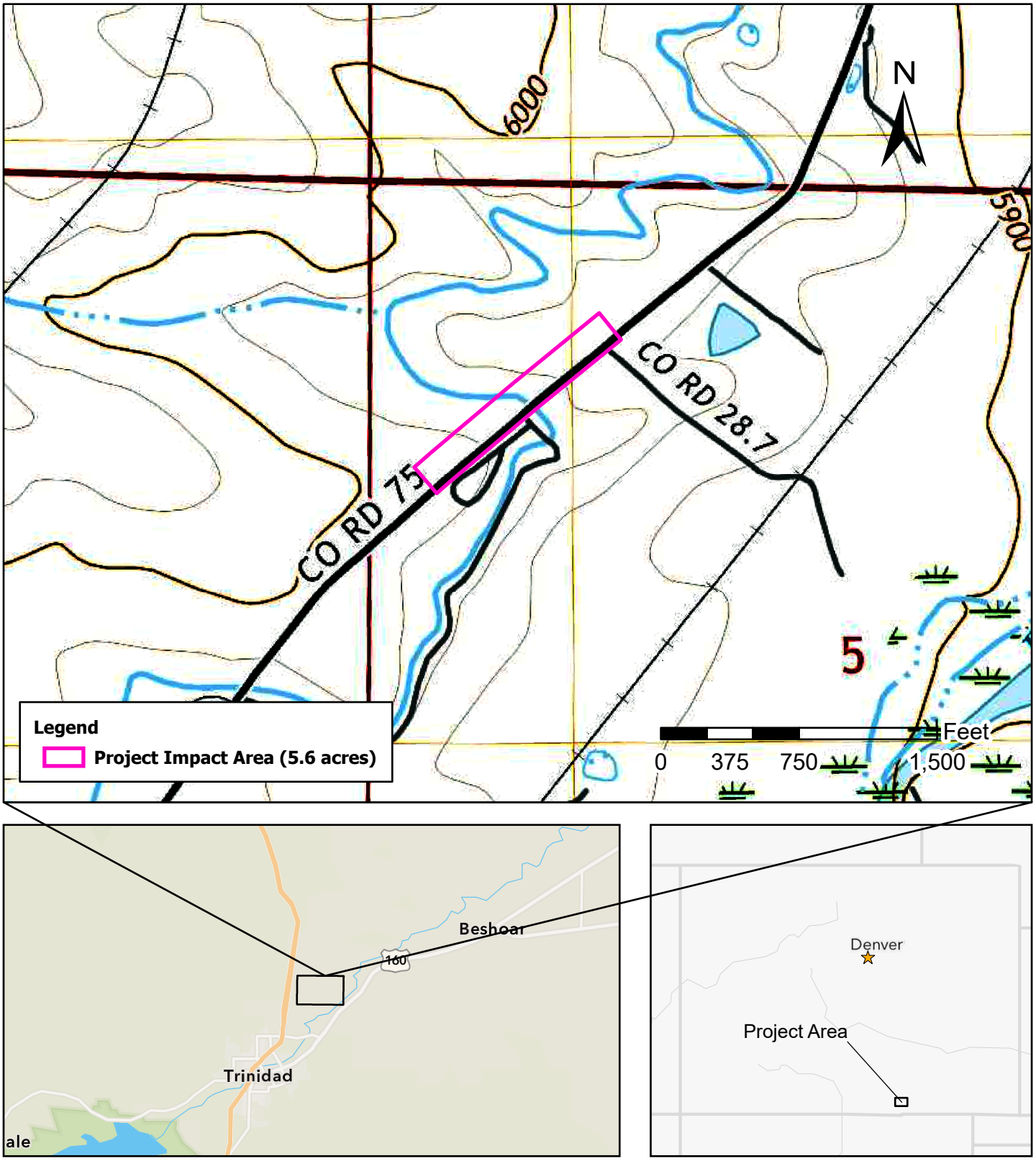
Appendix A

Aquatic Resources Delineation Maps



Colorado Department of Transportation
R2 Bridges Project - P-19-G Minor

Figure 1
Vicinity Map

Image Source: ArcGIS Online, World Street Map, USGS TopoView
USGS Topo: Trinidad East, CO
S5, T33S, R63W
Bridge Lat/Long: 37.203386/-104.482354

Stanley Consultants INC.

Date Exported: 11/19/2020 9:11 AM

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Colorado Department of Transportation
R2 Bridges Project - P-19-G Minor

Figure 2: Aquatic Delineation Map

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

Coordinate System: NAD 1983
State Plane CO Central FIPS 0502 (US Feet)
Projection: State Plane
Datum: North American 1983
Created: November 28, 2020

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Appendix B

Supporting Maps and Documents

U.S. Fish and Wildlife Service

National Wetlands Inventory

CDOT R2 Bridges - P-19-G

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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

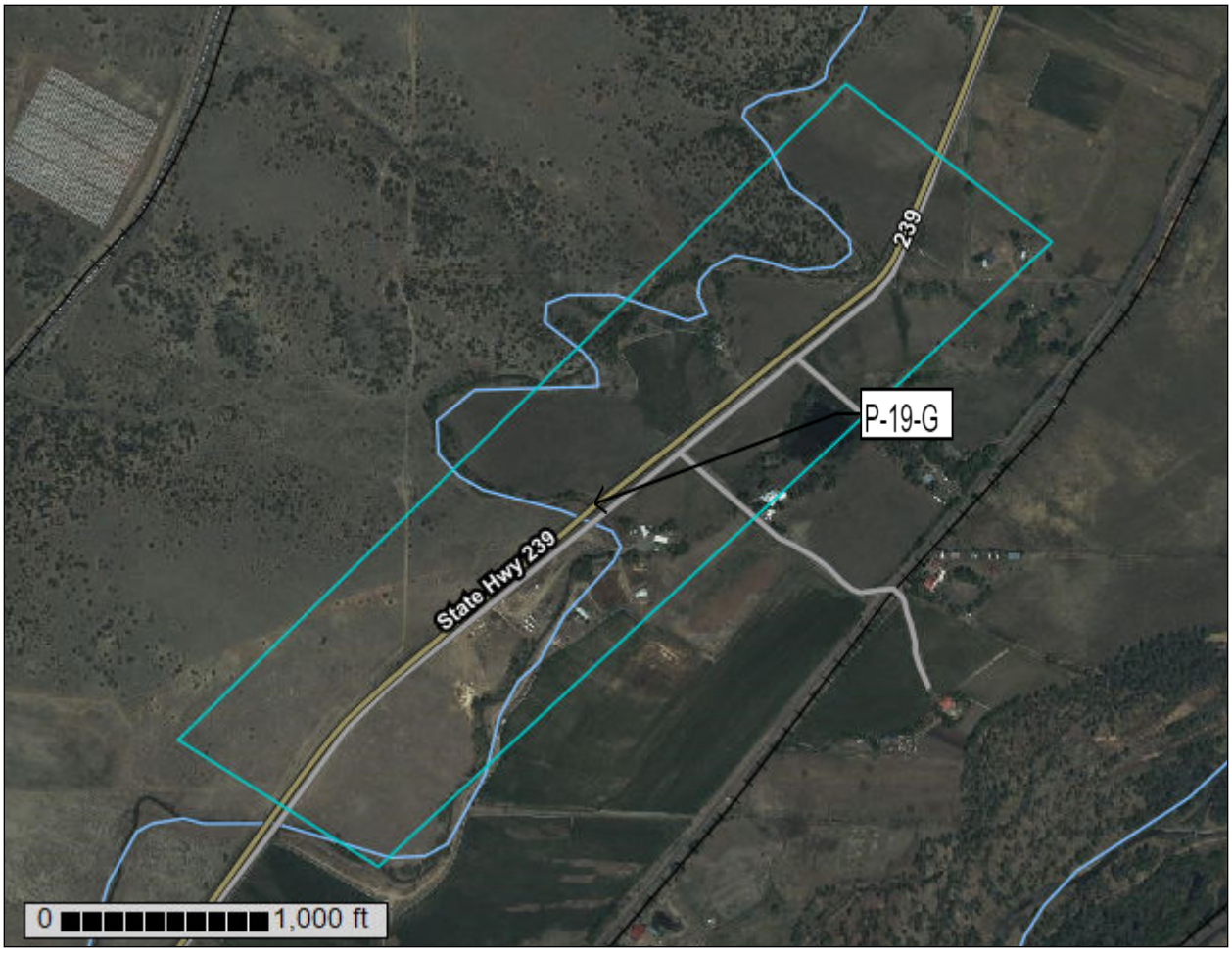
NRCS

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

CDOT R2B2 P-19-G Minor



November 28, 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.

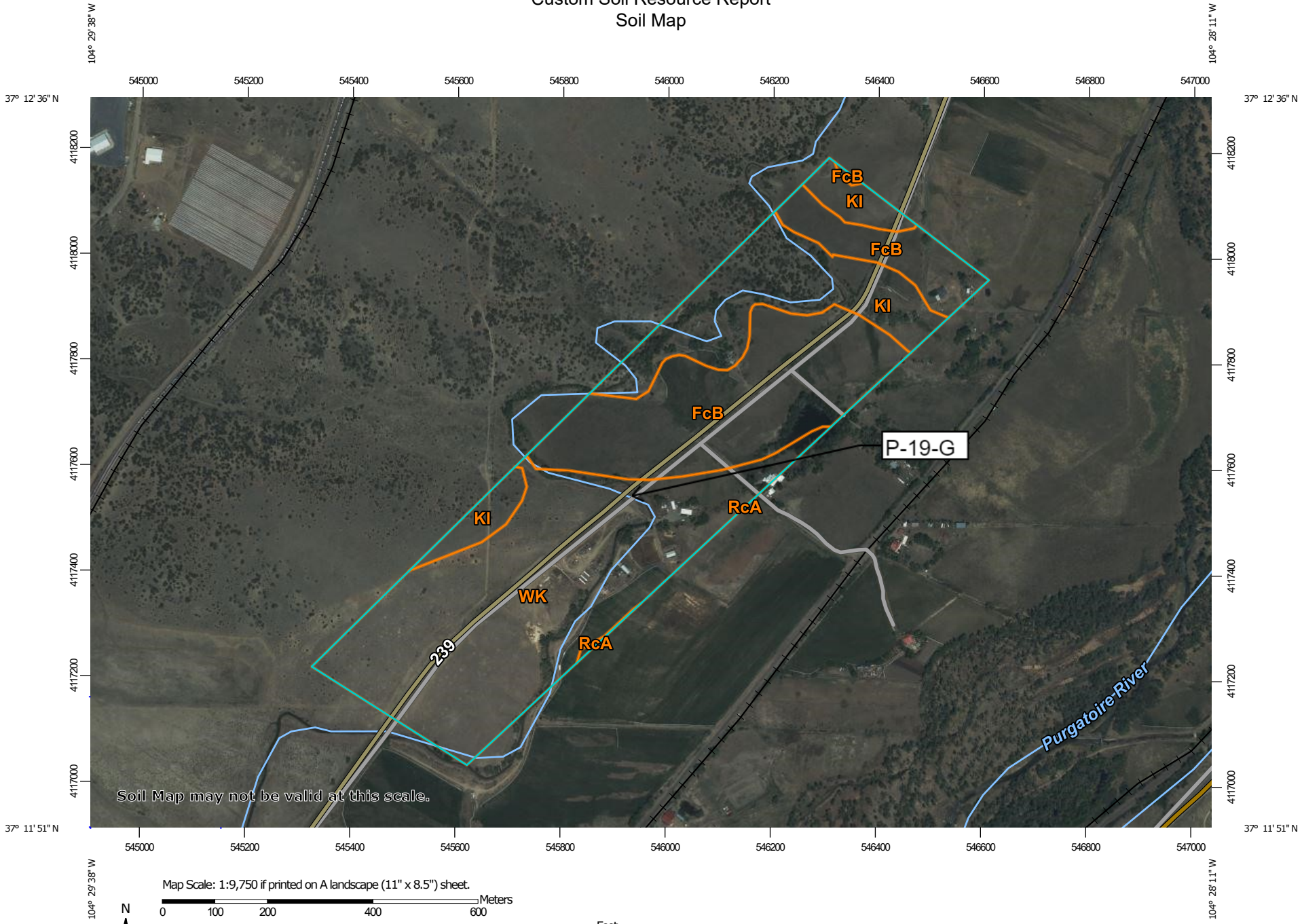
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Las Animas County Area, Colorado, Parts of Huerfano and Las Animas Counties
Survey Area Data: Version 23, 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: Mar 31, 2020—May 18, 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
FcB	Wapiti clay loam, 0 to 3 percent slopes	39.4	32.5%
KI	Kandrix-Chicosa complex, 3 to 9 percent slopes	26.0	21.5%
RcA	Raku silt clay loam, 0 to 1 percent slopes	0.2	0.1%
WK	Wiley-Kandrix complex, 1 to 6 percent slopes, cool	55.6	45.9%
Totals for Area of Interest		**121.2**	**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.

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

FcB—Wapiti clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3jq6
Elevation: 5,500 to 6,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Wapiti

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium from irrigation over eolian deposits

Typical profile

Ap - 0 to 6 inches: clay loam
Bt1 - 6 to 14 inches: clay loam
Bt2 - 14 to 26 inches: clay loam
Btk - 26 to 34 inches: clay loam
Bk1 - 34 to 43 inches: loam
Bk2 - 43 to 67 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water capacity: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C

Ecological site: R069XY006CO - Loamy Plains, LRU's A & B 10-14 Inches, P.Z.
Forage suitability group: Loamy (G069XW017CO)
Other vegetative classification: Loamy (G069XW017CO), Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

Minor Components

Bacid
Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY042CO - Clayey Plains LRU's A & B
Other vegetative classification: Clayey (G069XW001CO), CLAYEY PLAINS (069AY042CO)
Hydric soil rating: No

Chicosa
Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY064CO - Gravel Breaks LRU's A & B
Other vegetative classification: Loamy, Dry (G069XW019CO), Gravel Breaks #64 (069XY064CO_2)
Hydric soil rating: No

Aquic haplustalfs
Percent of map unit: 5 percent
Landform: Fans, terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY042CO - Clayey Plains LRU's A & B
Other vegetative classification: Clayey (G069XW001CO), Clayey Plains #42 (067XY042CO_2)
Hydric soil rating: No

KI—Kandrix-Chicosa complex, 3 to 9 percent slopes

Map Unit Setting
National map unit symbol: 3jmp
Elevation: 4,800 to 6,000 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 53 degrees F

Frost-free period: 125 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Kandrix

Setting

Landform: Fans, fan remnants
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 6 inches: loam
Bw - 6 to 15 inches: loam
Bk1 - 15 to 33 inches: loam
Bk2 - 33 to 60 inches: loam

Properties and qualities

Slope: 3 to 9 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: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R067BY002CO - Loamy Plains
Forage suitability group: Loamy (G070XW017CO)
Other vegetative classification: Loamy (G070XW017CO), Loamy Plains #2 (067XY002CO_2)
Hydric soil rating: No

Description of Chicosa

Setting

Landform: Fans, fan remnants
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser, rise
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Sandy and gravelly alluvium

Typical profile

A - 0 to 6 inches: gravelly loam
Bw - 6 to 14 inches: very gravelly loam
2Bk1 - 14 to 19 inches: extremely gravelly sandy loam
2Bk2 - 19 to 29 inches: extremely gravelly sandy loam
2C - 29 to 70 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: 14 to 30 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R067BY063CO - Gravel Breaks
Hydric soil rating: No

Minor Components

Capulin

Percent of map unit: 5 percent
Landform: Fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Other vegetative classification: Loamy (G070XW017CO), Loamy Plains #2 (067XY002CO_2)
Hydric soil rating: No

Wiley

Percent of map unit: 5 percent
Landform: Plains, ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, base slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Other vegetative classification: Loamy (G070XW017CO), loamy plains #2 (49XY004CO_1)
Hydric soil rating: No

RcA—Raku silt clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1nxtz
Elevation: 5,700 to 6,000 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 50 to 53 degrees F
Frost-free period: 125 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Raku and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raku

Setting

Landform: Terraces, drainageways
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium from irrigation water over clayey alluvium derived from sedimentary rock

Typical profile

Ap - 0 to 3 inches: silty clay loam
Bt1 - 3 to 11 inches: clay
Bt2 - 11 to 18 inches: clay
Bt3 - 18 to 34 inches: clay
Btk - 34 to 41 inches: clay
BCk - 41 to 48 inches: clay loam
Bk - 48 to 66 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R067BY042CO - Clayey Plains
Forage suitability group: Clayey (G067BW001CO)
Other vegetative classification: Clayey (G067BW001CO), CLAYEY PLAINS (067XY042CO_1)
Hydric soil rating: No

Minor Components

Calemore

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY042CO - Clayey Plains
Other vegetative classification: Loamy (G067BW017CO), Loamy Plains #2 (067XY002CO_2)
Hydric soil rating: No

Baca

Percent of map unit: 5 percent
Landform: Fans, terraces
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Other vegetative classification: Clayey (G067BW001CO), Loamy Plains #2 (067XY002CO_2)
Hydric soil rating: No

WK—Wiley-Kandrix complex, 1 to 6 percent slopes, cool

Map Unit Setting

National map unit symbol: 2t50r
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 120 to 145 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Wiley, cool, and similar soils: 50 percent
Kandrix, cool, and similar soils: 45 percent
Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wiley, Cool

Setting

Landform: Interfluves, fans
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and/or alluvium derived from sedimentary rock

Typical profile

A - 0 to 6 inches: silt loam
Bt - 6 to 11 inches: silty clay loam
Btk - 11 to 29 inches: silty clay loam
Bk1 - 29 to 43 inches: silt loam
Bk2 - 43 to 79 inches: silt loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Gypsum, maximum content: 3 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R069XY006CO - Loamy Plains, LRU's A & B 10-14 Inches, P.Z.
Forage suitability group: Loamy (G069XW017CO)
Other vegetative classification: Loamy Plains #6 (069XY006CO_2), Loamy (G069XW017CO)
Hydric soil rating: No

Description of Kandrix, Cool

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or alluvium derived from sedimentary rock

Typical profile

A - 0 to 6 inches: loam
Bw - 6 to 19 inches: loam

Bk1 - 19 to 24 inches: clay loam
Bk2 - 24 to 50 inches: loam
Bk3 - 50 to 79 inches: loam

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
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
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.1 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R069XY006CO - Loamy Plains, LRU's A & B 10-14 Inches, P.Z.
Forage suitability group: Loamy (G069XW017CO)
Other vegetative classification: Loamy Plains #6 (069XY006CO_2), Loamy (G069XW017CO)
Hydric soil rating: No

Minor Components

Travessilla

Percent of map unit: 3 percent
Landform: Scarps
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R069XY053CO - Sandstone Breaks LRU's A & B
Other vegetative classification: Sandstone Breaks #53 (069XY053CO_2), Needs Field Review (G069XW050CO)
Hydric soil rating: No

Chicosa

Percent of map unit: 2 percent
Landform: Fan remnants
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R069XY064CO - Gravel Breaks LRU's A & B
Other vegetative classification: Loamy, Dry (G069XW019CO)
Hydric soil rating: No

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Appendix C

OHWM Data Sheet

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: CDOT R2 Bridges - P-19-G Minor
Project Number: 29715.02.00
Stream: Picketwire Ditch
Investigator(s):

Date: 8-26-2020 **Time:**
Town: Trinidad **State:** CO
Photo begin file#: **Photo end file#:**
See Appendix D: Photo Inventory

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: MP 1.74 SH 239, 2.5 mi NE of Trinidad, CO

Projection: Lat/Long **Datum:** WGS84
Coordinates: 37.203386/-104.482354

Potential anthropogenic influences on the channel system:
Bridge and associated roadway (SH 239), regular channel maintenance (excavation of sediment and vegetation), by irrigation company, and control of flow and use by irrigation company and their users.

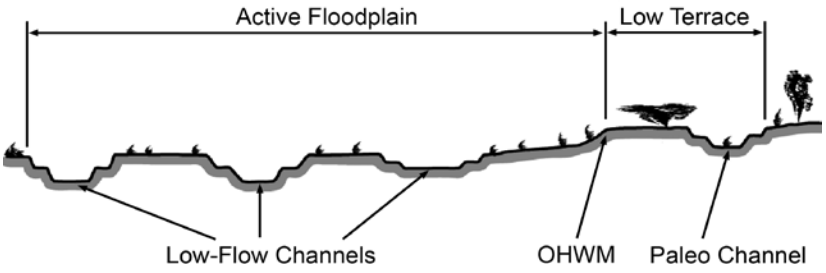
Brief site description:
Excavated irrigation ditch with intermittent (seasonal) flows based on irrigation needs. Ditch flows from southeast to the northwest and ends 4.5 miles north in farm field. Mostly herbaceous vegetation along banks but with some cottonwood trees in places. Muddy/silty and sandy channel bottom and banks.

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [X] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
- [ ] History of recent effective discharges
- [ ] Results of flood frequency analysis
- [ ] Most recent shift-adjusted rating
- [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [X] GPS
   - [ ] Digitized on computer
   - [ ] Other:

Project ID: 29715.02 **Cross section ID:** A **Date:** 8-26-2020 **Time:**

Cross section drawing:

See attached drawing

OHWM

GPS point: 37.203491/-104.482478

Indicators:

- [ ] Change in average sediment texture
- [ ] Change in vegetation species
- [X] Change in vegetation cover
- [X] Break in bank slope
- [X] Other: Scour
- [ ] Other: _____

Comments:

Very steep bank, with moderately steeply sloping top of banks from ditch maintenance. Some scour and defined break in bank slope at OHWM. Some vegetation along banks, but also bare in places due to maintenance.

Floodplain unit:

- [X] Low-Flow Channel
- [X] Active Floodplain
- [X] Low Terrace

GPS point: 37.203491/-104.482478

Characteristics of the floodplain unit:

Average sediment texture: sand and silt

Total veg cover: 50 % Tree: _____% Shrub: 20 % Herb: 30 %

Community successional stage:

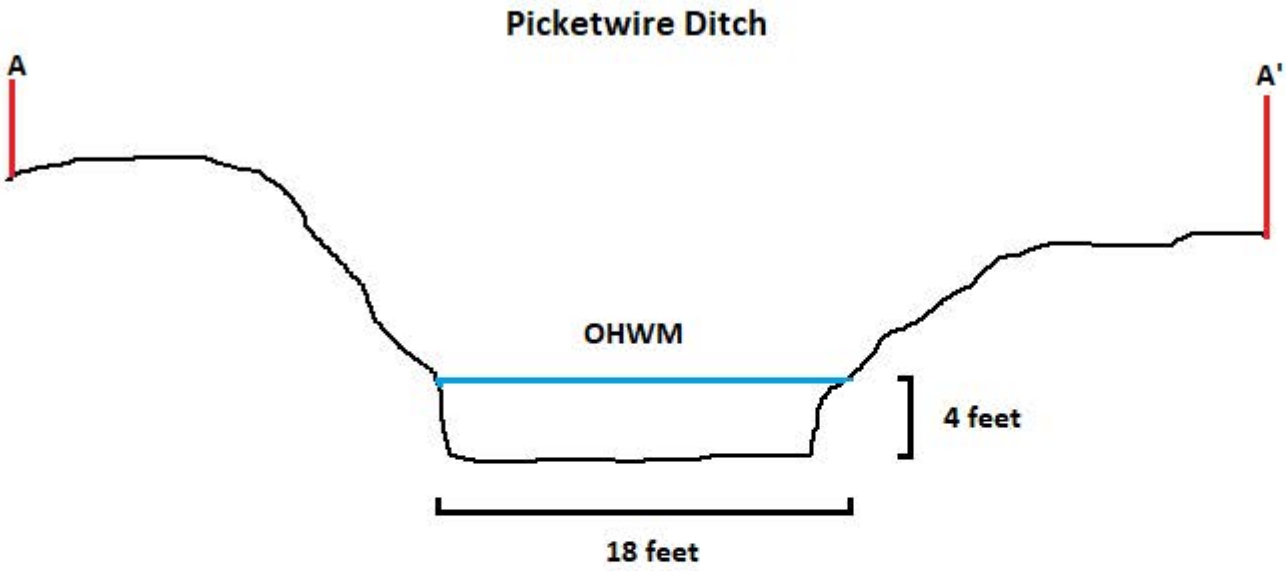
- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [X] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [X] Presence of bed and bank
- [X] Benches
- [ ] Soil development
- [ ] Surface relief
- [X] Other: scour
- [ ] Other: _____
- [ ] Other: _____

Comments:

Entire channel and floodplain with constructed channel area, with steep banks and moderately steep to top of banks. Vegetation in clumps along banks, mostly herbaceous with some areas of shrubs.


Picketwire Ditch
A
A'
OHWM
4 feet
18 feet

Appendix D

Photo Inventory

Photo 1.
Picketwire Ditch, looking northwest and downstream away from the bridge, just upstream of cross section A (Appendix C). OHWM can be seen on the right bank (above the wetted area), and starting within the overgrown bankside vegetation on the left.

Photo 2.
Picketwire Ditch, looking east and upstream towards the bridge, from cross section A. OHWM can be seen starting above the wetted and eroded area on the bank. Debris and trash can also be seen along the upper banks, likely from regular ditch maintenance.

Photo 3.
Picketwire Ditch, looking southeast away from the bridge on the upstream side of the bridge. The PIA (and also CDOT ROW) boundary at the fence line can be seen. Vegetation is denser along this part of the ditch.

Photo 4.
Picketwire Ditch, looking north at the upstream side of the bridge. Note that the channel is a few feet narrower here and its normal operating water level is very close to the existing bridge beams and decking.

Appendix E

Signed Property Access Letter

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