Aquatic Resources Delineation Report

Bridge I-13-H

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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 U.S. Highway (US) 24 about 10 miles southwest of Hartsel, Colorado, known as the I-13-H Bridge Replacement Project (Project). The purpose of the delineation is to identify any potential waters of the U.S. (WOTUS) and 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) (U.S. Army Corps of Engineers [USACE] 2010).

This delineation reports on the finding at the CDOT bridge I-13-H survey area (12.2 acres), where one wetland (PEM: 0.73 acres within survey area) was recorded. The wetland is in an ephemeral swale feature that does not regularly flow but does collect water to support wetlands upstream of the bridge. This swale is heavily grazed by livestock and only supports close-cropped alkaline wetland grasses and a seepweed. Water collects under the bridge and appears to restrict flows immediately downstream of the bridge enough to not support wetland conditions.

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

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Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
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
PSS	palustrine scrub-shrub
ROW	right-of-way
SH	State Highway
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WOTUS	Waters 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 U.S. Highway (US) 24 about 10 miles southwest of Hartsel, Colorado, known as the I-13-H 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 27 and 28, 2020, by wetland biologists for Stanley Consultants, Inc.

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2. Location and Project Description

2.1 Location

The surveyed 12.2-acre Potential Impact Area (PIA) is based on the area of potential Project-related impacts per communications with Project engineers. 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 treated timber bridge is located approximately 3 miles west of Antero Junction and 9.75 miles southwest of Hartsel (38.937463/-105.919104), in Section 8, Township 13S, Range 76W (6th Principal Base and Meridian). A map of the PIA is located in the Aquatic Resources Delineation Map in Appendix A.

2.2 Purpose and Need

The bridge (Structure I-13-H) was built in 1937 on US 24 which is a key corridor connecting residents and tourists from Colorado Springs and southern Colorado to the recreational activities in the Rocky Mountains. The age and condition of Bridge I-13-G requires frequent inspection and repair. Rot, mold, water staining, checks, and deterioration are present throughout numerous primary structure components. Repairs to wood girders are present and inspections have found broken/split timber posts and heavy erosion of the banks. The bridge is load restricted, limiting routes through major sections of the US corridor. 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-13-H will be solely funded by the Colorado Bridge Enterprise (Project No. 23559).

Bridge I-13-H is located on US 24 at milepost 229.47, approximately 9.75 miles southwest of Hartsel, Colorado. This structure is a treated timber 3-span stringer bridge (22.5 feet [ft] wide, 69 ft long) structure that crosses over an ephemeral swale. The Project will replace this bridge with a similarly sized concrete or steel bridge or a concrete box culvert. This crossing currently allows for cattle to pass under the bridge. The new structure will provide a similar opening with a minimum of 7 ft of clearance to allow for cattle underpass.

Prior to construction of the new structure, a detour will likely be constructed to accommodate traffic while allowing bridge replacement activities to proceed. A temporary two-lane shoofly will be constructed on the north or south side of the existing bridge with

a temporary drainage pipe. The area of disturbance will be restricted to the limits of the ROW and a temporary detour disturbance area. Once the bridge is complete and ready for use, any disturbed areas will be restored to original contours and reseeded.

2.4 Directions to the Site

The PIA is accessible from Denver, Colorado, by taking CO-470 to the US 285 S exit towards Fairplay. At Fairplay, continue south of US 285 for another 20 miles, then turn left at the intersection with US 24 E towards Hartsel. Travel on US 24 for approximately 2.8 miles until Structure I-13-H. Pull off onto the vegetated shoulder just past the bridge to access the Project.

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 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 survey area was assessed by the Project team to determine the presence or absence of wetland features. Any location that contained some potential as a wetland based on the National Wetland Inventory mapping (Appendix B) or observed surface conditions, such as the presence of dominant hydrophytic vegetation (Appendix C) or surface hydrology, was investigated more closely with a sampling point containing a soil pit that was recorded in a delineation field form (Appendix D) with photo documentation (Appendix E).

Additionally, a Functional Assessment of Colorado Wetlands (FACWet) was conducted for the site using the CDOT wetland functional assessment method (Version 3, 2013). Information on site characteristics was collected during the field survey, and additional information was gathered from multiple online databases. The results of the site assessment and desktop analysis are presented in a FACWet form (Appendix F).

At the request of CDOT, a preliminary Wetland Findings Report has been prepared using the CDOT Programmatic template (Appendix G). Please note that the Wetland Findings Report will need impact information to be complete. All impact analysis will not be completed at this time.

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)
- National Wetland Inventory (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 also were surveyed using the same sub-meter GPS unit.

4. Existing Conditions

4.1 Topography

The PIA is located on a slope south of a high elevation basin (about 8,950 ft) containing the Antero Reservoir. To the west is the central ridgeline of the Rocky Mountains with many 12,000-13,000+-ft peaks. The edge of this drainage basin includes a few hills to the south and some foothills to the taller peaks to the immediate west. The area drains to the south and into either an evaporative basin or into the reservoir itself. The elevation at the site is approximately 8,990±5 ft above sea level. Land use in the area is agricultural (grazing only), open space, and sparse ranch residential to the south. The highway and bridge structure were constructed in approximately 1937, with fill being built up for the roadway with a gap where the ephemeral swale occurs, and the bridge was constructed across the swale.

4.2 Climate

The PIA has an average maximum temperature of 53.3° F and average minimum temperature of 18.7° F. The average annual precipitation is 10.9 inches, with an average snowfall of 47.1 inches (CCC 2020a). Normal monthly precipitation average for August is 2.42 inches but during this past August (when the field survey was conducted) the rainfall was measured at 0.56 inches, which is below normal (CCC 2020b).

4.3 NWI Mapping

National Wetlands Inventory (NWI) data suggested that wetlands could exist within the PIA, classified as freshwater emergent wetland (See Appendix B, Supporting Maps and Documents, NWI Mapping).

4.4 Plant Communities

The plant communities in the PIA consisted of alkaline wet meadow and disturbed roadway edges (See Appendix C for the full plant list of species recorded). The alkaline wet meadow included few plants as the area was heavily grazed and appeared alkaline, with the primary dominants were coastal salt grass (*Distichlis spicata*, FACW) and shrubby seepweed (*Suaeda nigra*, OBL). Salt grass continued in the adjacent upland edges but also with more red-woolly plantain (*Plantago eriopoda*, FACW). Non-wetland areas in the swale contained some salt grass but also bluebunch fescue (*Festuca idahoensis*, FACU) and some blue wild rye (*Elymus glaucus*, FACU). Roadways were not extensively sampled but contained some of the same upland grass 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 ephemeral swale, where all surface and sub-surface drainage flows into. Along this swale showed no indicators of frequent

surface flows, at least short-term sheet flow during storm events along with seasonal subsurface flows likely happen and move northwards toward a large evaporative basin area. This evaporative basin just south of the Antero Reservoir appears to not be directly connected to the reservoir, but some man-made overflow connection could exist. The basin is surrounded by slopes higher than the reservoir, so it does not appear to directly connect, nor would it then have a potential connection to other waters including receiving interstate waters and eventually the ocean.

In the PIA, groundwater and saturation levels were not observed in any soil pits, which is not necessarily surprising given the dry season that the sampling was conducted. However, the hydrology supporting this system is also likely only seasonal, when snow melt and/or spring precipitation supplies enough water into the system to support wetland conditions. Seasonal groundwater movement into this area is also a possibly hydrological supply.

4.6 Soils

Three soils were identified in the PIA (See Appendix B, Custom Soil Resource Report; also see Table 1), and none are considered hydric (NRCS 2020). Soils observed in the soil pits were generally dark gray to dark grayish brown with loams in the wetland area, but in the upland areas, sandy loams, sandy clay loams, and silty loams. All soil pits appear to be within the mapped soil, Lanswick loam.

Table 1. NRCS Soils listed for PIA

Soil Map Unit Name	Potentially Hydric?
Gebson sandy loams, 2 to 10% slopes	No
Gebson-Glentivar complex, 3 to 15% slopes	No
Lanswick loam, 1 to 5% slopes	No

5. Aquatic Resource Results

Field data forms reflect the conditions as observed at the time of investigation and can be found in Appendix D. Associated photos of the sample points can be found in Appendix E. Sample points were chosen to best represent the features observed and are listed in Table 2 (Sample Point Summary Data). The following subsections summarize the results of the delineation including a description of any wetlands delineated, justification for the boundaries, classification of the wetlands, functionality of the wetlands, and any waters identified. Feature details are summarized in Table 3 (Aquatic Resources within PIA).

Table 2. Sample Point Summary Data

Sample Point ID	Hydrophytic Vegetation?	Hydric Soils?	Wetland Hydrology?	Sampled Area within a Wetland?
SP1	Y	Y	Y	**Y**
SP2	Y	N	N	N
SP3	N	N	N	N

Table 3. Aquatic Resources within PIA

Aquatic Resource Name	Aquatic Resources Classification		Area (ac)	Length (ft)
	Cowardin	Location (Lat/Long)		
Wetlands				
Wetland 1	PEM1C	38.934482/-105.919022	0.73	NA
		Total	**0.73**	

5.1 Wetland 1

Wetland 1 is a palustrine emergent marsh wetland (0.73 ac) located on the southeastern side of the I-13-H bridge. This wetland is an alkaline wet meadow that is located within the lower part of a wide swale feature that extends under the bridge. The wetland's southern (upstream) extent is outside of the PIA, and the wetland extends from the southern boundary of the PIA, narrowing until it reaches the northeastern side of the bridge where it appears to end by a small scour pool under the bridge at the base of the abutment (See Wetland 1, Appendix E: Photo Inventory). The shading of the bridge prevents vegetation from growing in this small part of the wetland.

The vegetation community is mapped as a palustrine emergent marsh, but field observations characterized the vegetation as representative of an alkaline wet meadow, as the vegetation is dominated by coastal salt grass (FACW) and shrubby seepweed (OBL). The soils observed in the soil pit (SP1) consisted of dark gray and dark grayish-brown loamy soils with redox concentrations in the matrix starting just below the surface and continuing to 8 inches. This soil profile satisfied both hydric indicators of Depleted Matrix (F3) and Redox Depressions (F8). Wetland hydrology was present at this dry time of the year primarily as surface soil cracking, but also secondary indicators of drainage patterns, geomorphic position, and the FAC-Neutral test.

This wetland is located within a swale feature that did not display any OHWM features to indicate a potential WOTUS. This wetland likely receives hydrology input from seasonal and storm precipitation and sheet flow run-off, but such movements have not produced any scouring channel with a bed and bank. These low flows also appear to slow and often fully infiltrate before or at the bridge, as the area immediately downstream of the bridge (within the PIA) did not indicate wetland conditions (see SP3). It is likely some water periodically moves downstream but does not remain long enough to develop wetland conditions. There also does not appear to be any connection to other downstream WOTUS as this swale appears to end in an evaporative basin about 1 mile to the north with no apparent outlet.

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 ephemeral swale feature and its associated wetland does not appear to support interstate commerce. However, the area including this feature is used for livestock grazing and it is unknown if any cattle grazing in this area are shipped out of state for sale. 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 palustrine emergent marsh wetland (0.73 acres total within the PIA) was identified and delineated within the PIA.

7.1 Anticipated Impacts

In the event that the selected Project design will impact the wetlands 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 (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. Permitting impacts to wetlands could potentially require the submittal of a pre-construction notification to the Corps if the permanent impacts exceed the no-notification thresholds dictated by the NWP program.

CDOT assesses projects for wetland impacts and compensates for losses regardless of the Clean Water Act jurisdiction. CDOT requires the submittal of a Wetland Findings Report. Once Project impacts have been determined, the Contractor will be required to 1) determine whether the impacts meet the CDOT Programmatic or Non-Programmatic report template requirement criteria, 2) complete the existing Wetland Findings Report; and 3) submit the Wetland Findings Report to CDOT for approval. At the request of CDOT, a preliminary Programmatic Wetland Findings Report has been started with the available information and is provided in Appendix F.

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.

8. References

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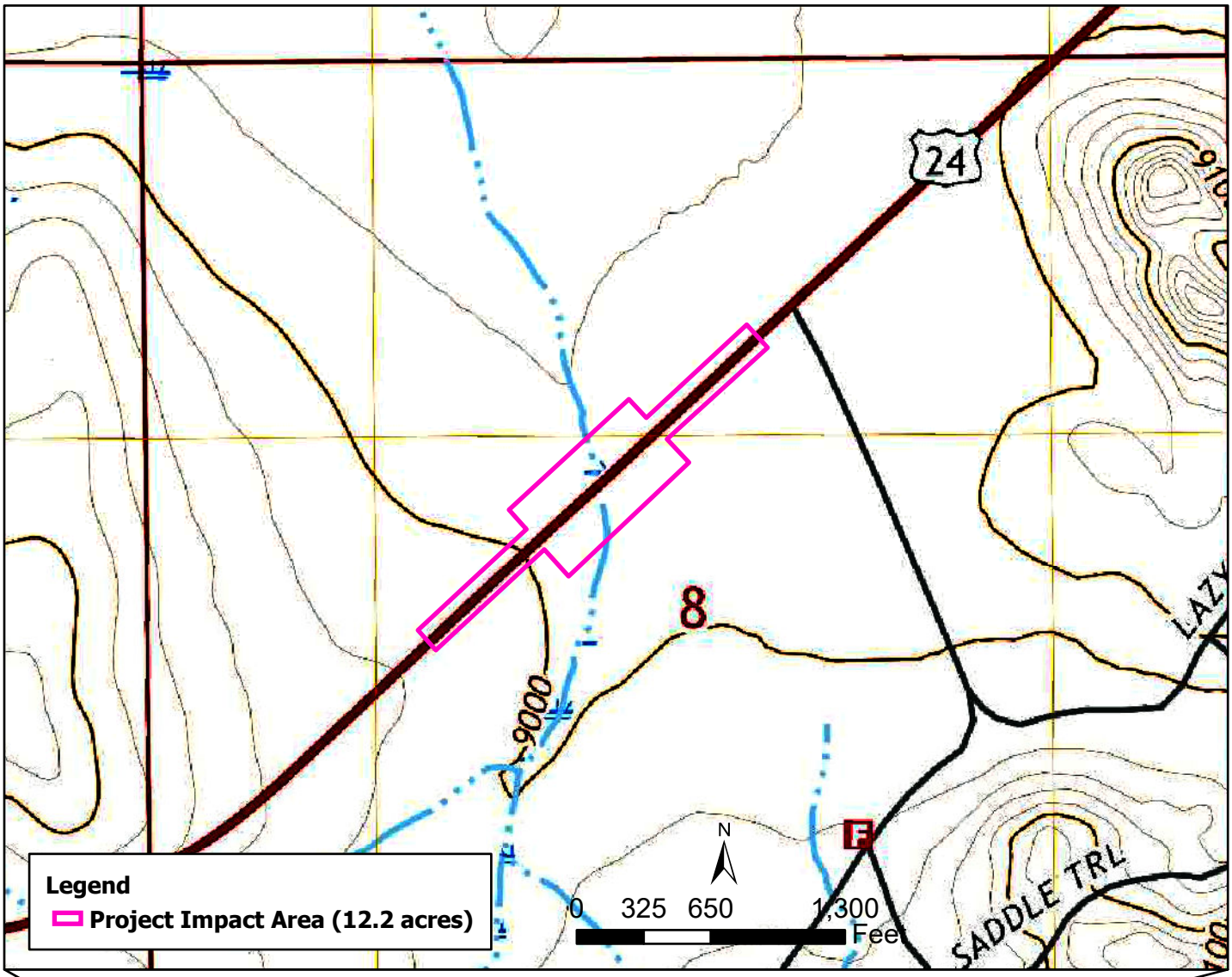
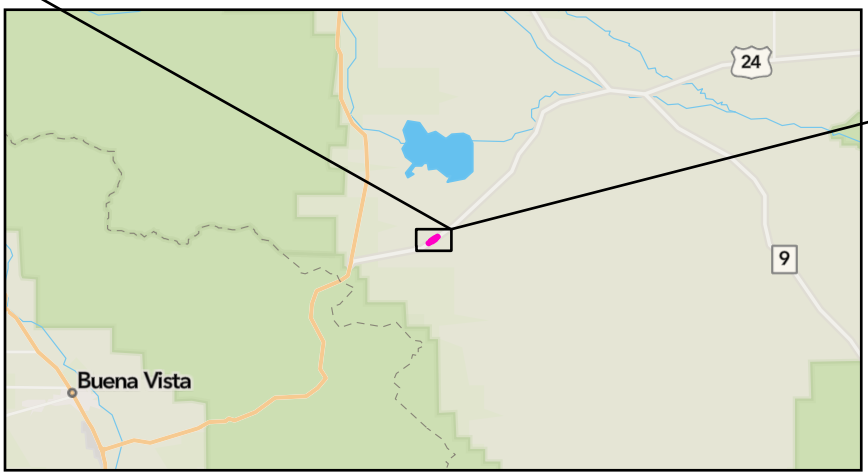
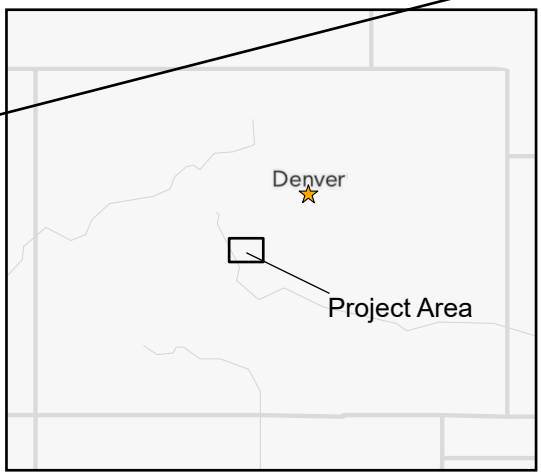
Appendix A

Aquatic Resources Delineation Maps







Colorado Department of Transportation
R2 Bridges Project - I-13-H

Figure 1
Vicinity Map

Image Source: ArcGIS Online, World Street Map, USGS TopoView
USGS Topo: Antero Reservoir, CO
S8, T13S, R76W
Bridge Lat/Long: 38.937463/-105.919104

Stanley Consultants INC.

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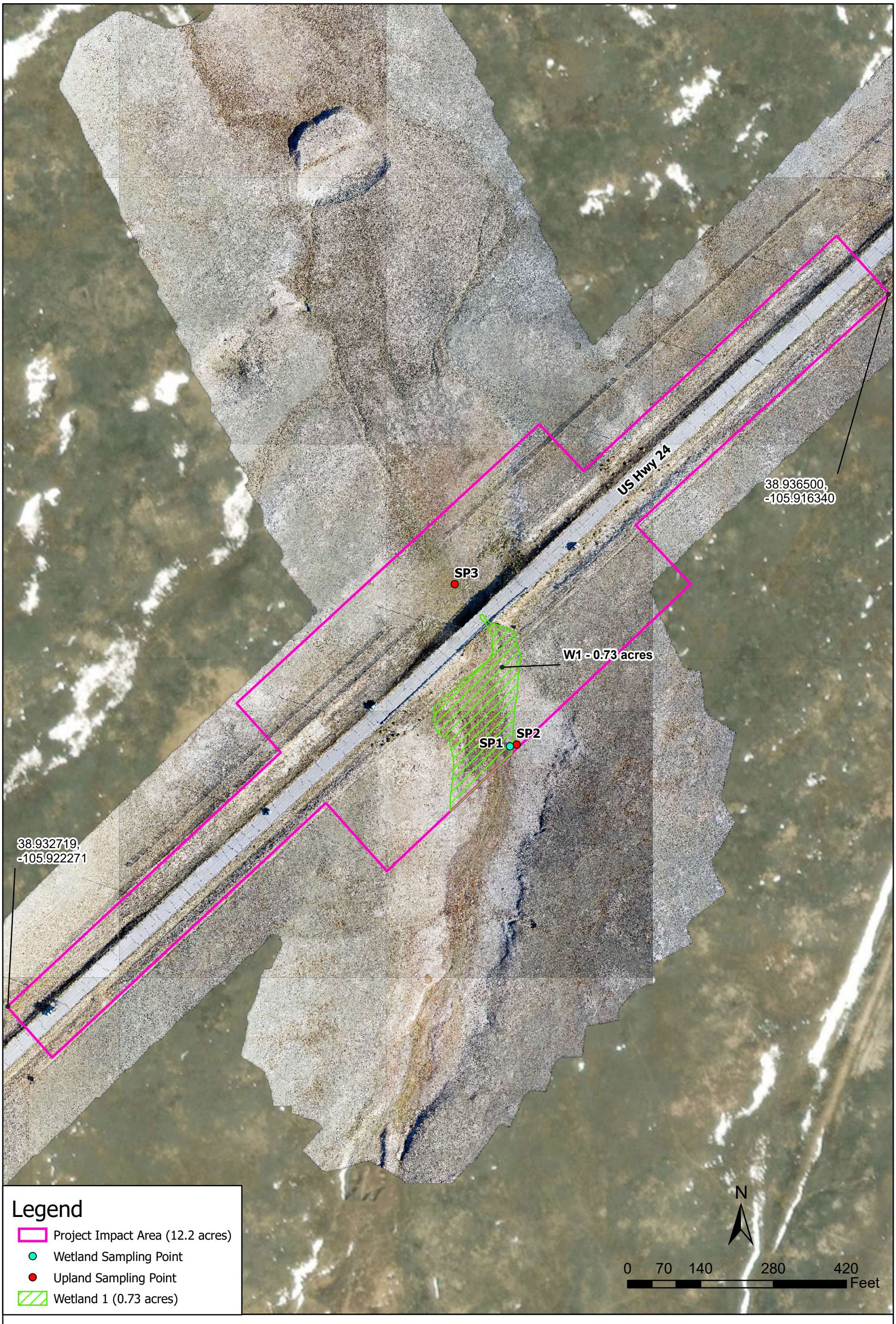

Colorado Department of Transportation
R2 Bridges Project - I-13-H

Figure 2: Aquatic Delineation Map

Data Source: Stanley Consultants, Inc.
Image Source: Drone Aerials-Stanley Consultants, and ArcGIS Online, World Imagery (Clarity)

Coordinate System: NAD 1983
State Plane CO Central FIPS 0502 (US Feet)
Projection: State Plane
Datum: North American 1983
Created: October 21, 2020

Stanley Consultants INC.

Date Exported: 10/23/2020 11:13 AM

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Appendix B

Supporting Maps

U.S. Fish and Wildlife Service

National Wetlands Inventory

CDOT R2B2 I-13-H

October 13, 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

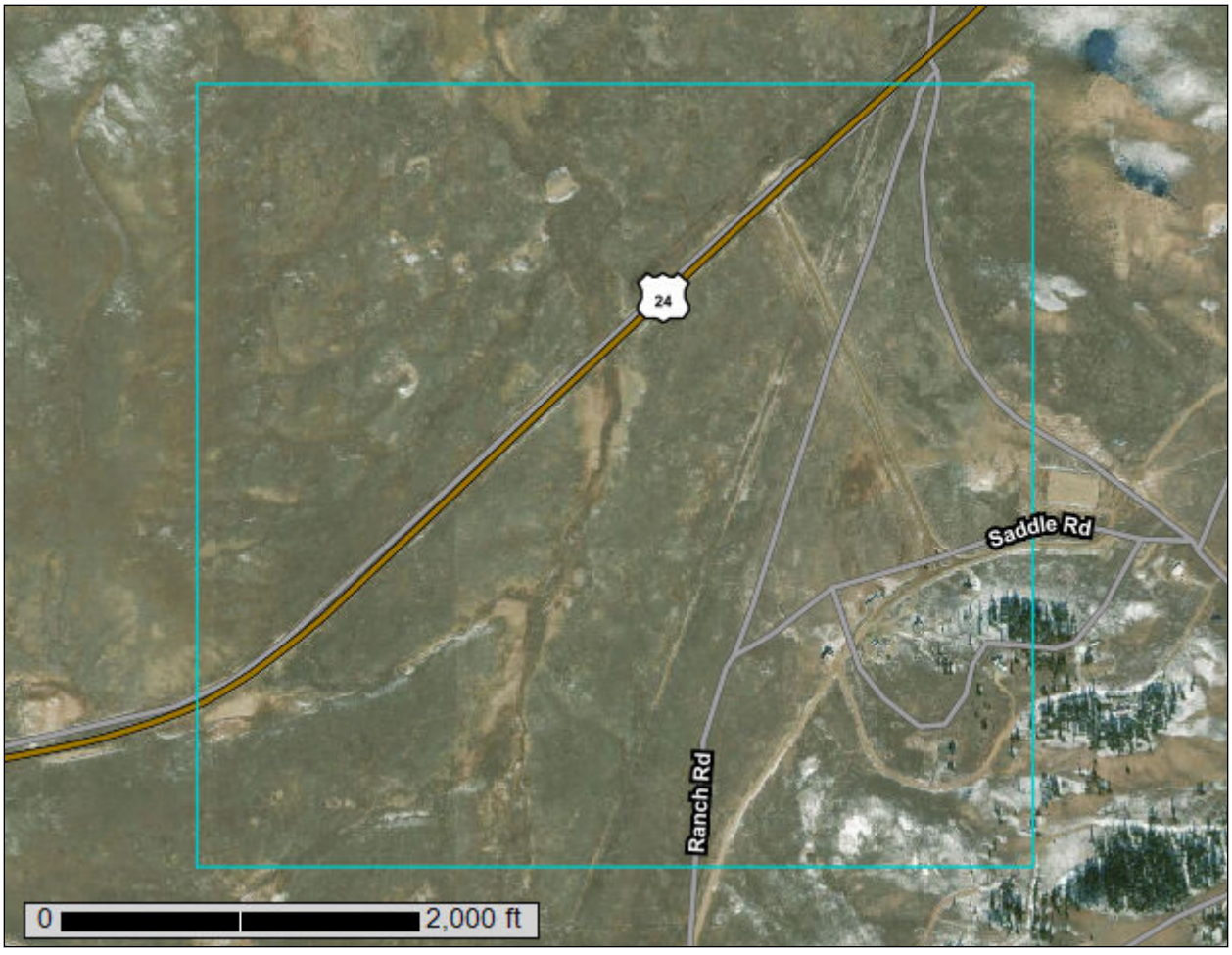
NRCS

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

CDOT R2B2 I-13-H



October 13, 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.

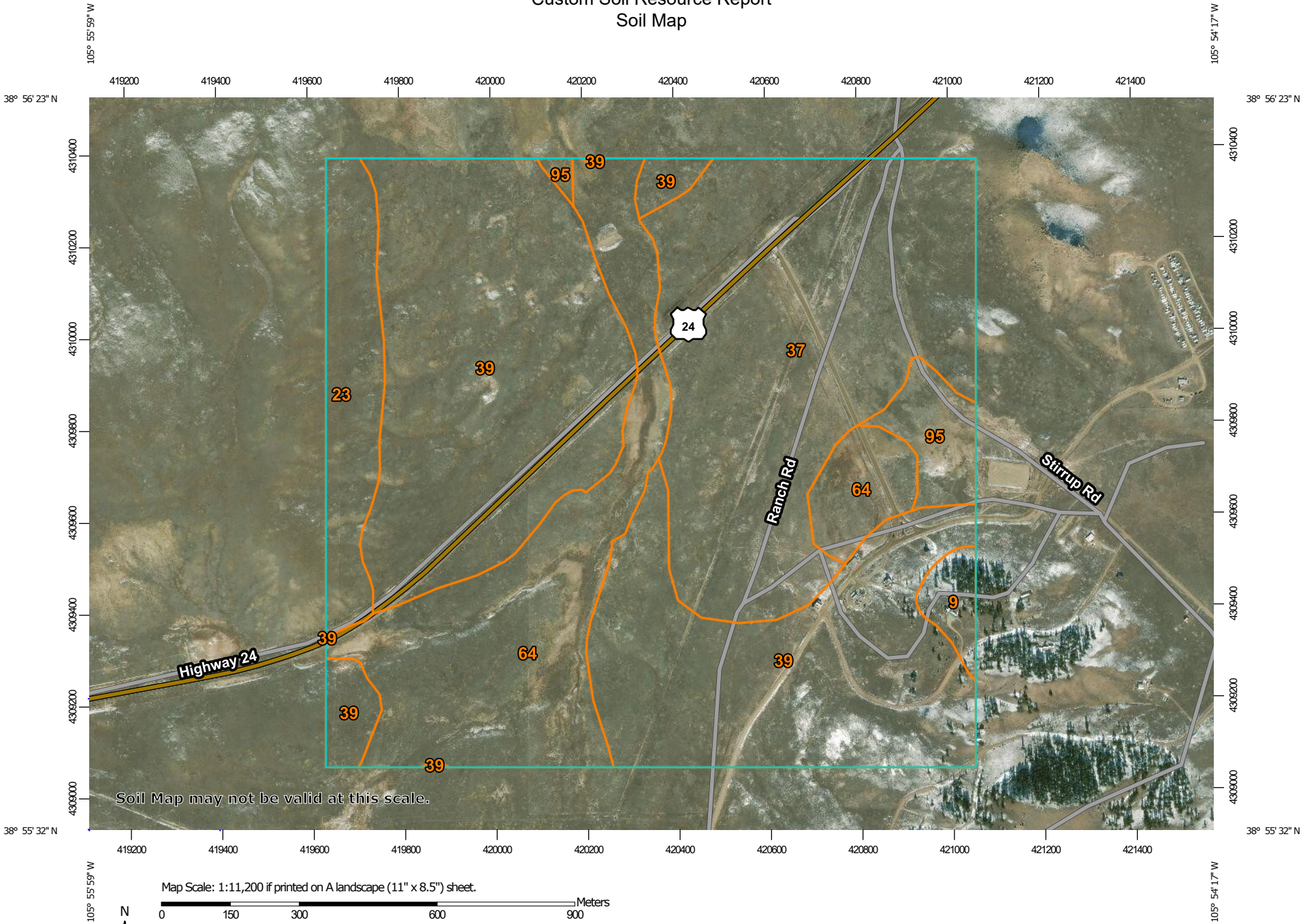
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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 Scale: 1:11,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

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

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

Date(s) aerial images were photographed: Jul 4, 2010—Nov 8, 2017

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
9	Betemer very gravelly loam, 3 to 40 percent slopes	5.6	1.2%
23	Chubbs-Glentivar sandy loams, 5 to 20 percent slopes	27.7	5.9%
37	Gebson sandy loam, 2 to 10 percent slopes	127.8	27.3%
39	Gebson-Glentivar complex, 3 to 15 percent slopes	204.3	43.7%
64	Lanswick loam, 1 to 5 percent slopes	90.1	19.3%
95	Saltworks-Water-Hartsel complex, 0 to 3 percent slopes	12.2	2.6%
Totals for Area of Interest		**467.7**	**100.0%**

Map Unit Descriptions

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

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

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

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

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

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

9—Betemer very gravelly loam, 3 to 40 percent slopes

Map Unit Setting

National map unit symbol: k0zf
Elevation: 8,900 to 9,200 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Betemer

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from volcanic breccia

Typical profile

A - 0 to 5 inches: very gravelly loam
Bw - 5 to 11 inches: very gravelly loam
R - 11 to 60 inches: bedrock

Properties and qualities

Slope: 3 to 40 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048BY232CO
Hydric soil rating: No

Minor Components

Lanswick

Percent of map unit: 5 percent
Landform: Hills, drainageways
Landform position (three-dimensional): Base slope

Ecological site: R048BY280CO
Hydric soil rating: No

Gebson

Percent of map unit: 5 percent
Landform: Pediments
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Landform: Knobs, hills
Landform position (three-dimensional): Crest, nose slope
Hydric soil rating: No

Glentivar

Percent of map unit: 2 percent
Landform: Ridges
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

23—Chubbs-Glentivar sandy loams, 5 to 20 percent slopes

Map Unit Setting

National map unit symbol: k0xt
Elevation: 8,600 to 9,600 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Chubbs and similar soils: 50 percent
Glentivar and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chubbs

Setting

Landform: Hills
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from limestone, sandstone, and shale

Typical profile

A - 0 to 4 inches: sandy loam
Bt - 4 to 12 inches: gravelly sandy clay loam
R - 12 to 22 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R048BY232CO
Hydric soil rating: No

Description of Glentivar

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from limestone, sandstone, and shale

Typical profile

A - 0 to 6 inches: sandy loam
Bt - 6 to 12 inches: clay loam
Bk1 - 12 to 21 inches: gravelly loam
Bk2 - 21 to 24 inches: sandy loam
Bk3 - 24 to 36 inches: sandy loam
Bk4 - 36 to 40 inches: sandy loam
Cr - 40 to 50 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 40 to 50 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park

Hydric soil rating: No

Minor Components

Rock outcrop

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

Gebson

Percent of map unit: 5 percent
Landform: Swales, hills
Landform position (three-dimensional): Base slope
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

37—Gebson sandy loam, 2 to 10 percent slopes

Map Unit Setting

National map unit symbol: k103
Elevation: 8,900 to 9,600 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Gebson

Setting

Landform: Fan remnants, pediments
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or slope alluvium

Typical profile

A - 0 to 2 inches: sandy loam
Bt1 - 2 to 12 inches: sandy clay loam
Bt2 - 12 to 18 inches: gravelly sandy clay loam
Bk1 - 18 to 32 inches: gravelly sandy clay loam
Bk2 - 32 to 60 inches: gravelly sandy clay loam

Properties and qualities

Slope: 2 to 10 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 (0.60 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: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Minor Components

Hodden

Percent of map unit: 6 percent
Landform: Breaks
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Glentivar

Percent of map unit: 6 percent
Landform: Ridges
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Lanswick

Percent of map unit: 3 percent
Landform: Drainageways
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

39—Gebson-Glentivar complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: k10g
Elevation: 9,000 to 9,300 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Gebson and similar soils: 50 percent
Glentivar and similar soils: 40 percent

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

Description of Gebson

Setting

Landform: Pediments
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or slope alluvium

Typical profile

A - 0 to 6 inches: loam
Bt - 6 to 11 inches: clay loam
Bk1 - 11 to 19 inches: loam
Bk2 - 19 to 29 inches: loam
Bk3 - 29 to 60 inches: loam

Properties and qualities

Slope: 3 to 15 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 (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: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Description of Glentivar

Setting

Landform: Pediments
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from limestone, sandstone, and shale

Typical profile

A - 0 to 6 inches: sandy loam
Bt - 6 to 12 inches: clay loam
Bk1 - 12 to 21 inches: gravelly loam
Bk2 - 21 to 24 inches: sandy loam
Bk3 - 24 to 36 inches: sandy loam
Bk4 - 36 to 40 inches: sandy loam
Cr - 40 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent

Depth to restrictive feature: 40 to 50 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Minor Components

Hodden

Percent of map unit: 5 percent
Landform: Hills
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Lanswick

Percent of map unit: 3 percent
Landform: Drainageways
Ecological site: R048BY280CO
Hydric soil rating: No

Newett

Percent of map unit: 2 percent
Landform: Ridges, knobs
Ecological site: R048BY232CO
Hydric soil rating: No

64—Lanswick loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: k115
Elevation: 8,900 to 9,200 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Lanswick

Setting

Landform: Flood-plain steps, drainageways, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A1 - 0 to 5 inches: loam
A2 - 5 to 13 inches: loam
A3 - 13 to 23 inches: sandy loam
Bw - 23 to 33 inches: sandy loam
Bk1 - 33 to 43 inches: loam
Bk2 - 43 to 60 inches: stratified loamy coarse sand to loam

Properties and qualities

Slope: 1 to 5 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 to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: R048BY280CO
Hydric soil rating: No

Minor Components

Hodden

Percent of map unit: 2 percent
Landform: Breaks
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Gebson

Percent of map unit: 2 percent
Landform: Fan remnants
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Glentivar

Percent of map unit: 2 percent
Landform: Ridges
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Platdon, frequently flooded

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

Temdille

Percent of map unit: 2 percent
Landform: Bajadas
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

95—Saltworks-Water-Hartsel complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: k101
Elevation: 8,900 to 9,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 35 to 39 degrees F
Frost-free period: 50 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Saltworks and similar soils: 35 percent
Water: 25 percent
Hartsel and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saltworks

Setting

Landform: Drainageways, playas on basin floors, alluvial flats
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Alluvium

Typical profile

Az - 0 to 6 inches: coarse sandy loam
Bknz - 6 to 22 inches: clay loam
Bknzg - 22 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
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: About 0 to 8 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Strongly saline (16.0 to 40.0 mmhos/cm)
Sodium adsorption ratio, maximum: 35.0
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: R048BY224CO
Hydric soil rating: Yes

Description of Water

Setting

Landform: Playa lakes on basin floors

Description of Hartsel

Setting

Landform: Rises on basin floors
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

A - 0 to 3 inches: fine sandy loam
Bknyz1 - 3 to 13 inches: clay loam
Bknyz2 - 13 to 21 inches: clay loam
Bknyz3 - 21 to 30 inches: clay loam
Bknz - 30 to 60 inches: sandy clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
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: About 20 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Gypsum, maximum content: 25 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 20.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Very low (about 0.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D
Ecological site: R048BY221CO
Hydric soil rating: No

Minor Components

Fine, gypsic, frigid aeric halaquepts
Percent of map unit: 10 percent
Landform: Basin floors
Ecological site: R048BY224CO
Hydric soil rating: Yes

Gebson
Percent of map unit: 5 percent
Landform: Rises
Ecological site: R048BY225CO - Mountain Loam 10-16" South Park
Hydric soil rating: No

Platdon, frequently flooded
Percent of map unit: 3 percent
Landform: Flood plains
Ecological site: R048AY241CO
Hydric soil rating: Yes

Spinney
Percent of map unit: 2 percent
Landform: Drainageways, stream terraces
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R048AY241CO
Hydric soil rating: Yes

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Appendix C

Plant List

Common Name	Scientific Name	Wetland Indicator Status*
Bluebunch fescue	*Festuca idahoensis*	FACU
Blue wild rye	*Elymus glaucus*	FACU
Coastal salt grass	*Distichlis spicata*	FACW
Red-woolly plantain	*Plantago eriopoda*	FACW
Shrubby seepweed	*Suaeda nigra*	OBL

Appendix D

Wetland Delineation Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: R2 Bridges/I-13-H City/County: Park Co Sampling Date: 8/27/2020

Applicant/Owner: CDOT State: CO Sampling Point: SP1

Investigator(s): R. Black and C. Phillips Section, Township, Range: S8, T13S, R76W

Landform (hillslope, terrace, etc.): swale/depression Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): E Lat: 38.934110 Long: -105.918895 Datum: WGS84

Soil Map Unit Name: Lanswick loam, 1-5% slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Wet meadow wetland wide drainage swale, likely seasonal, heavily grazed by livestock in places.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 2m)			
1. Distichlis spicata	25	Y	FACW
2. Suaeda nigra	25	Y	OBL
3. Plantago eriopoda	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 45

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Wetland area heavily grazed and in the dry season, other species may be present but not apparent due to condition.

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	90	5YR 5/6	10	C	M	Loam	
2-8	7.5YR 4/1	70	5YR 3/4	30	C	M	Loam	
8-18	10YR 4/2	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Redox concentrations starting very close to the surface and extending to 8 inches deep.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry season (August), likely a early seasonal wetland, so no saturation or other water present. Surface soil cracks along with 3 secondary indicators.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: R2 Bridges/I-13-H City/County: Park Co Sampling Date: 8/27/2020

Applicant/Owner: CDOT State: CO Sampling Point: SP2

Investigator(s): R. Black and C. Phillips Section, Township, Range: S8, T13S, R76W

Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): none Slope (%): 2

Subregion (LRR): E Lat: 38.934120 Long: -105.93850 Datum: WGS84

Soil Map Unit Name: Lanswick loam, 1-5% slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Upland slope, close to wetland edge, heavily grazed by cattle. Plant community still hydrophytic but soils and hydrology fail to indicate a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 2m)			
1. Distichlis spicata	40	Y	FACW
2. Plantago eriopoda	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Slope area heavily grazed and in the dry season, other species may be present but not apparent due to condition.

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/2	100	5YR 4/6	0*	C	M	Loamy sand	redox <1, only a hint
4-10	7.5YR 4/1	100					Sandy loam	
10-18	10YR 4/2	100					SaClLo	gravel layer at 10"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

*Redox concentrations in the upper 4 inches were only a hint, less than 1%. Soils likely close to the wetland boundary.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry season (August), but no other indicators other than 1 secondary.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: R2 Bridges/I-13-H City/County: Park Co Sampling Date: 8/28/2020

Applicant/Owner: CDOT State: CO Sampling Point: SP3

Investigator(s): R. Black and C. Phillips Section, Township, Range: S8, T13S, R76W

Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): none Slope (%): 1

Subregion (LRR): E Lat: 38.934964 Long: -105.919273 Datum: WGS84

Soil Map Unit Name: Lanswick loam, 1-5% slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

Upland slope/swale down slope of wetland area after bridge, fails to indicate wetland conditions.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 2m)			
1. Distichlis spicata	30	Y	FACW
2. Festuca idahoensis	30	Y	FACU
3. Elymus glaucus	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species 30	x 2 = 60
FAC species ____	x 3 = ____
FACU species 40	x 4 = 160
UPL species ____	x 5 = ____
Column Totals: 70 (A)	220 (B)

Prevalence Index = B/A = 3.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

Area heavily grazed and in the dry season, other species may be present but not apparent due to condition. Appeared to be a mix of salt grass and upland grasses.

SOIL

Sampling Point: SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	98+	7.5YR 4/3	>2	C	PL	Loam	faint redox, only a hint
6-11	10YR 3/2	100					Loam	
11-18	10YR 4/2	100					Silty loam	gravel layer at 10"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

*Redox concentrations in the upper 6 inches were only a hint, less than 2% and faint; must be 2% or greater and be distinct to be hydric. Soils likely receive some periods of brief saturation but not sufficient in the growing season to fully develop hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry season (August), but no other indicators other than 1 secondary.

Appendix E

Photo Inventory

Photo 1.
Wetland 1, looking northwest at SP1 (wetland point) towards US 24. Wet alkaline meadow, heavily grazed, dry at the time of investigation as the wetland is likely seasonal.

Photo 2.
Wetland 1, looking northwest at SP2 (upland point) towards US 24. Upland area close to wetland boundary (photo left), soils and hydrology failed but vegetation was still considered hydrophytic. Site heavily grazed and disturbed by livestock.

Photo 3.
Wetland 1, looking southwest towards I-13-H and US 24 at part of Wetland 1 as it narrows under the bridge. Foreground is in the wetland, but area by other side of bridge failed to display wetland conditions.

Photo 4.
Wetland 1, looking northwest under Bridge I-13-H where Wetland 1 narrows and stops under bridge and become a small scour pool in front of the abutment.

Photo 5.
SP3, looking southeast from SP3 (upland point) on other side of I-13-H from Wetland 1. Area failed to indicate wetland conditions.

Appendix F

FACWet Functional Assessment Forms

ADMINISTRATIVE CHARACTERIZATION

General Information		Date of Evaluation:	
Site Name or ID:		Project Name:	
404 or Other Permit Application #:		Applicant Name:	
Evaluator Name(s):		Evaluator's professional position and organization:	

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):		Geographic Datum Used (NAD 83):	
		Elevation	
Location Information:			
Associated stream/water body name:		Stream Order:	
USGS Quadrangle Map:		Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):		Wetland Ownership:	

Project Information:

This evaluation is being performed at: *(Check applicable box)*
- ☐ *Project Wetland*
- ☐ *Mitigation Site*

Purpose of Evaluation (check all applicable):
- ☐ *Potentially Impacted Wetlands*
- ☐ *Mitigation; Pre-construction*
- ☐ *Mitigation; Post-construction*
- ☐ *Monitoring*
- ☐ *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	ac.	☐ Measured ☐ Estimated					
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	ac.	☐ Measured	ac.	ac.	ac.	ac.	
		☐ Estimated	ac.	ac.	ac.	ac.	
Characteristics or Method used for AA boundary determination:							
Notes:							

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- ☐ Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- ☐ Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- ☐ Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- ☐ The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- ☐ Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.

  _____

  _____
- ☐ Federally threatened or endangered species are **SUSPECTED** to occur in the AA?

  _____

  _____

  _____

  _____
- ☐ Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- ☐ The site is located within a potential conservation area or element occurrence buffer area as determined by CNHP?
- ☐ Other special concerns (please describe

  _____

HYDROGEOMORPHIC SETTING

- ☐ AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- ☐ AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- ☐ AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting	**Water source**	Surface flow	Groundwater	Precipitation	Unknown	
	Hydrodynamics	Unidirectional	Vertical	Bi-directional		
	Wetland Gradient	0 - 2%	2-4%	4-10%	>10%	
	# Surface Inlets	Over-bank	0	1	2	3	>3
	# Surface Outlets		0	1	2	3	>3
	Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)					
	HGM class	Riverine	Slope	Depressional	Lacustrine	

Historical Conditions

Previous wetland typology	**Water source**	Surface flow	Groundwater	Precipitation	Unknown
	Hydrodynamics	Unidirectional	Vertical		
	Geomorphic Setting (Narrative Description)				
	Previous HGM Class	Riverine	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass):

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	*A Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	*B Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	*C Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	*D Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	*F Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes:

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.
2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.
3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
		Major Highway	
		Secondary Highway	
		Tertiary Roadway	
		Railroad	
		Bike Path	
		Urban Development	
		Agricultural Development	
		Artificial Water Body	
		Fence	
		Ditch or Aqueduct	
		Aquatic Organism Barriers	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	*A* *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	*B* *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	*C* *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	*D* *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	*F* *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	
SV 1.2 Score	

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the average of the two sub-variable scores

SV 2.1 - Buffer Condition

SV 2.1 - Buffer Condition Score

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resourc extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

Precent of AA with Buffer

SV 2.2 - Buffer Extent

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)									
Line #	1	2	3	4	5	6	7	8	Avg. Buffer Width (m)

	Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
SV 2.3 - Average Buffer Width Score	1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
	<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
	<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
	<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
	<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

SV 2.4 - Surrounding Land Use Score

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
	Industrial/commercial	
	Urban	
	Residential	
	Rural	
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
	Transportation Corridor	
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

Buffer Score (Lowest score) **Surrounding Land Use**

(☐ + ☐) ÷ 2 = **Variable 2 Score** ☐

Variable 3: Water Source

This variable is concerned with ***up-gradient*** *hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
	Culverts or Constrictions	
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score ☐

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
	Culverts	
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score _____

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.
2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
	Road Grades	
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score _____

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.
2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
		Fill, including dikes, road grades, etc.	
		Grading	
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score _____

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			
	Nearby Industrial Sites			
	Road Drainage/Runoff			
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff			
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			
	Lack of Shading			
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
	+		+		+		+		=	

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score ☐

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.
2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.
3. Estimate and record the current coverage of each vegetation layer at the top of the table.
4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weighting factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.
5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cove of Layer". Note, percentages will often sum to more than 100% (1.0).
6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.
7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.
8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*
9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer			50		
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Noxious Weeds					
Exotic/Invasive spp.					
Tree Harvest					
Brush Cutting/Shrub Removal					
Livestock Grazing			X		heavy grazing
Excessive Herbivory			X		vegetation grazed down very low
Mowing/Haying					
Herbicide					
Loss of Zonation/Homogenization					
Dewatering					
Over Saturation					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED			30		should be better coverage

Reference/Expected % Cover of Layer		+		+	0.8	+	= 0.8
	X		X		X		X
Veg. Layer Sub-variable Score					0.7		÷
	=		=		=		=
Weighted Sub-variable Score		+		+	0.56	+	= 0.56

See sub-variable scoring guidelines on following page

Variable 8 Score 0.7

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	*A Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	*B Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	*C Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	*D Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	*F Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	Variable 1:	Habitat Connectivity (Connect)	
	Variable 2:	Contributing Area (CA)	
Hydrology	Variable 3:	Water Source (Source)	
	Variable 4:	Water Distribution (Dist)	
	Variable 5:	Water Outflow (Outflow)	
Abiotic and Biotic Habitat	Variable 6:	Geomorphology (Geom)	
	Variable 7:	Chemical Environment (Chem)	
	Variable 8:	Vegetation Structure and Complexity (Veg)	

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$					=	Total Functional Points	÷ 4	=	FCI
	+		+		+		+		=		÷ 4	=	

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$							
	+		+		+		+		+		=		÷ 9	=	

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$					
	+		+		+		+		+		=		÷ 9	=	

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$									
	+		+		+		+		+		=		÷ 6	=	

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$									
	+		+		+		+		+		=		÷ 6	=	

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$											
	+		+		+		+		+		=		÷ 5	=	

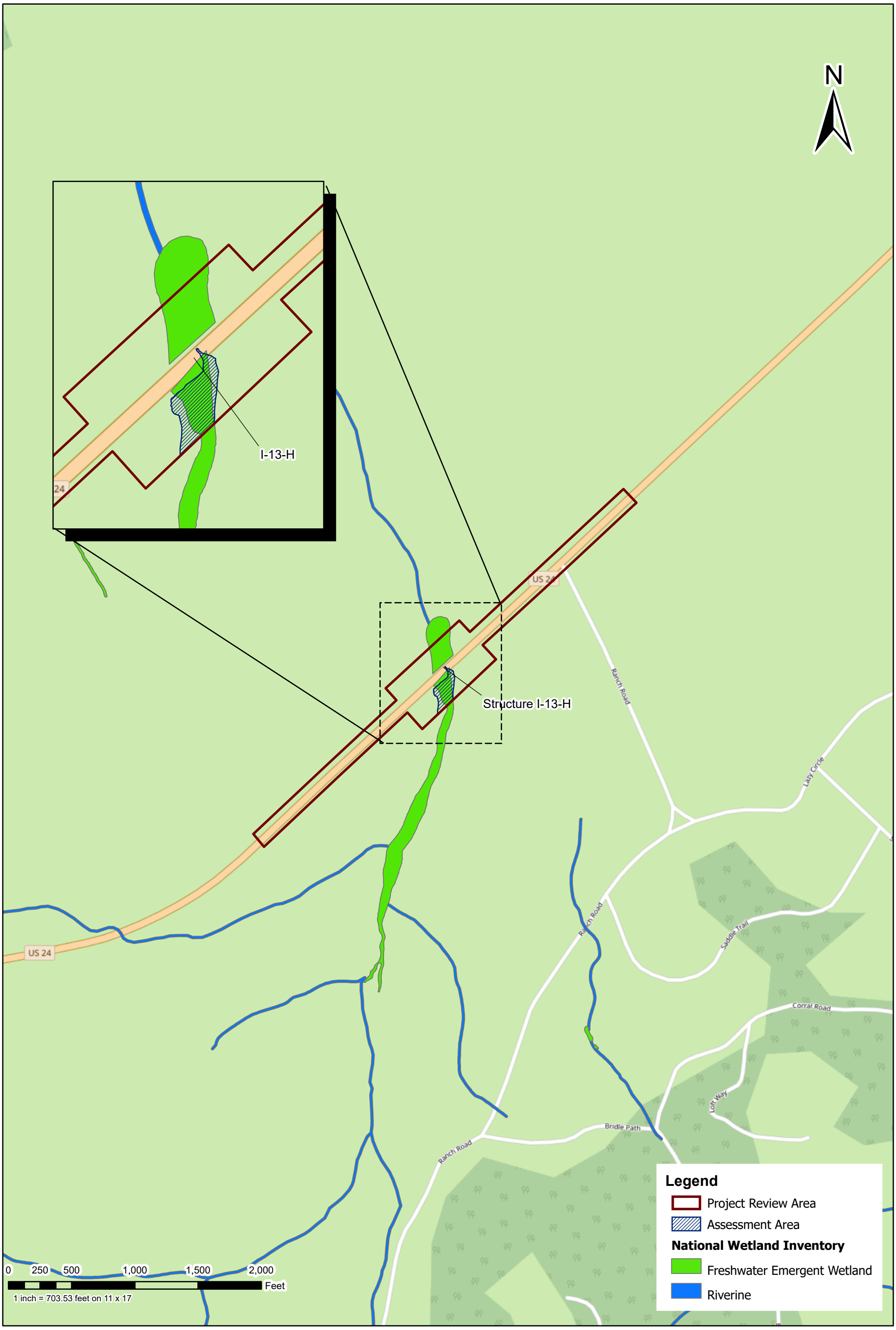
Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$							
	+		+		+		+		+		=		÷ 7	=	

Sum of Individual FCI Scores

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score



Data Source: Stanley Consultants, Inc., CDOT
Image Source: ArcGIS Online, OpenStreetMap, USFWS NWI State Data

COLORADO DEPARTMENT OF TRANSPORTATION
Region 2 Bridge Rebuild Project - Bridge I-13-H
Functional Assessment of Colorado Wetlands

Figure 1
Site Map

Stanley Consultants INC.

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Appendix G

CDOT Programmatic Wetland Findings Report

DRAFT Wetland Findings Report: Region 2 Bridge Rebuild Project

Bridge I-13-H

This wetland finding has been written in accordance with Executive Order 11990, "Protection of Wetlands" and in accordance with 23 CFR 771, 23 CFR 777, and Technical Advisory T6640.8A.

Project Description and Location

The objective of the CDOT Region 2 Bridge Bundle Design Build project is to replace rural structures spread across highway corridors in southern and western Colorado. This structure, I-13-H, is located on US 24 southwest of Hartsel, Colorado. This design build project is funded by the USDOT FHWA Competitive Highway Bridge Program grant (5 structures, Project No. 23559.

Bridge I-13-H is located on US 24 at Mile Post (MP) 229.47, approximately 9.75 miles southwest of Hartsel, Colorado (38.937463/-105.919104) in Section 8, Township 13S, Range 76W (6th Principal Base and Meridian; Figure 1). The bridge is a treated timber stringer bridge (3 spans x 22.5 feet, 69-foot long) structure that crosses over an unnamed ephemeral swale. The Project will replace this bridge with a similarly sized concrete or steel bridge or a concrete box culvert. This crossing currently allows for cattle to pass under the bridge. Prior to construction of the new structure, a detour will likely be constructed to accommodate traffic while allowing bridge replacement activities to proceed. A temporary two-lane shoofly will be constructed on the north or south side of the existing bridge with a temporary drainage pipe. The area of disturbance will be restricted to the limits of the ROW and a temporary detour disturbance area. Once the bridge is complete and ready for use, any disturbed areas will be restored to original contours and reseeded.

The treated timber stringer bridge at I-13-H southwest of Hartsel, Colorado was built in 1937 on US 24, which is a key corridor connecting residents and tourists from Colorado Springs and southern Colorado to the recreational activities in the Rocky Mountains. The structure is dilapidated and in poor condition, requires frequent inspection and repair for issues such as the piles splitting (requiring banding). This bridge is well past its replacement life and is not up to current construction and safety standards and must be replaced to prevent potential failure.

Wetland Summary

This delineation reports on the finding at the CDOT bridge I-13-H survey area (12.2 acres), where one emergent wetland (PEM: 0.73 acres; Figure 2) was recorded. The wetland is contained within the ephemeral swale and is dominated by seepweed and grasses. The ephemeral swale apparently does not support regular flows as no OHWM indicators were present.

The Functional Assessment of Colorado Wetlands (FACWet) determined this wetland had a score of 0.67.

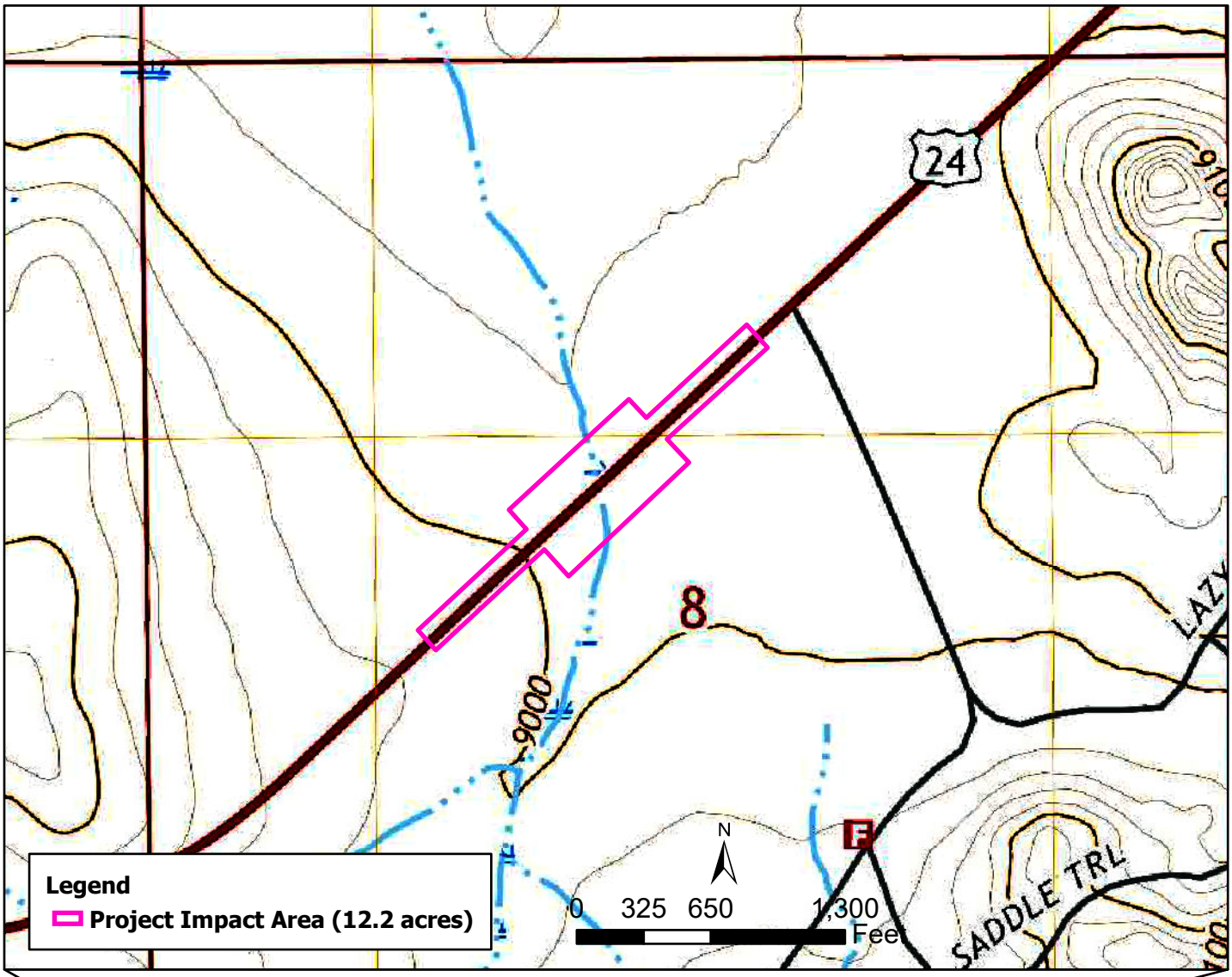
Wetland Impacts

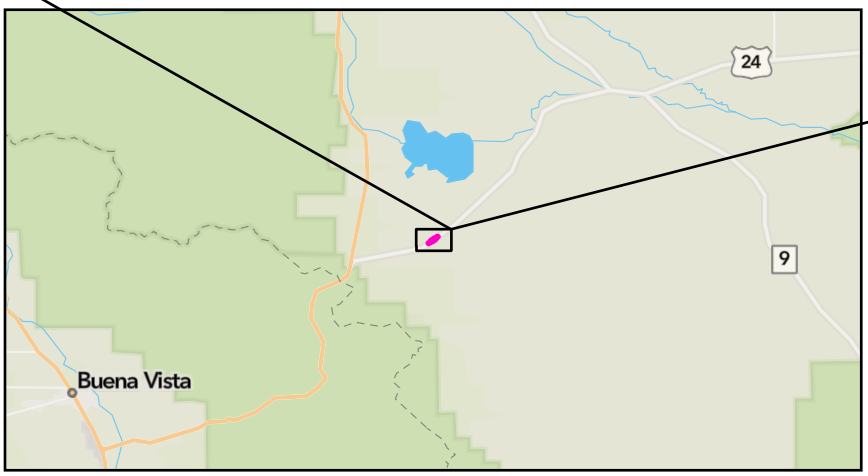
- Permanent and temporary impact summary, size, and cause
- Section 404 permitting assumptions

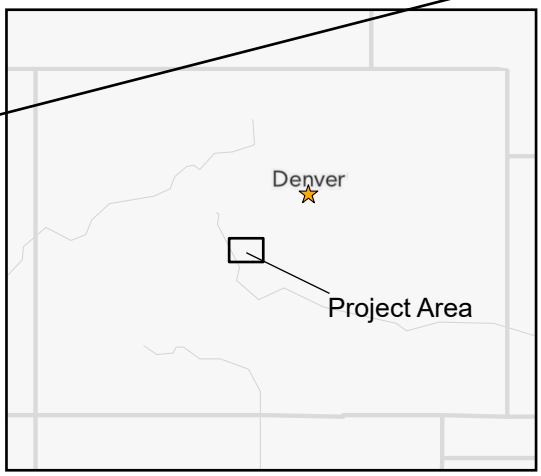
Wetland Mitigation

- Brief summary of specific measures to avoid and minimize wetland impacts
- Compensatory mitigation decision and justification

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands. The proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.







Colorado Department of Transportation
R2 Bridges Project - I-13-H

Figure 1
Vicinity Map

Image Source: ArcGIS Online, World Street Map, USGS TopoView
USGS Topo: Antero Reservoir, CO
S8, T13S, R76W
Bridge Lat/Long: 38.937463/-105.919104

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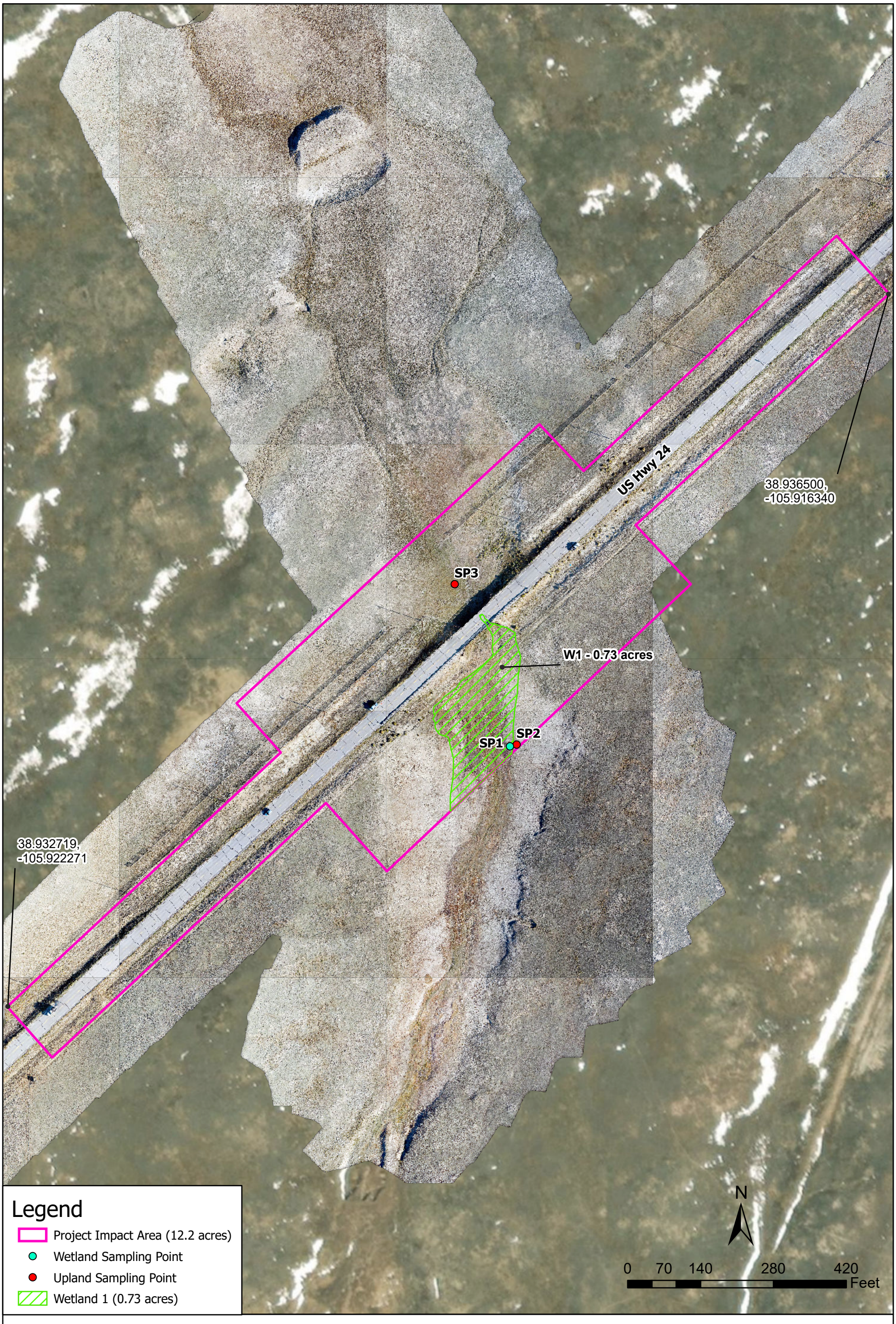

Colorado Department of Transportation
R2 Bridges Project - I-13-H

Figure 2: Aquatic Delineation Map

Data Source: Stanley Consultants, Inc.
Image Source: Drone Aerials-Stanley Consultants, and ArcGIS Online, World Imagery (Clarity)

Coordinate System: NAD 1983
State Plane CO Central FIPS 0502 (US Feet)
Projection: State Plane
Datum: North American 1983
Created: October 21, 2020

Stanley Consultants INC.

Date Exported: 10/23/2020 11:13 AM

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Appendix H

Signed Property Access Letter

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