Appendix 6
Wetland Delineation

ASPEN/PITKIN COUNTY AIRPORT
IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT

Wetland Delineation Report

Aspen/Pitkin County Airport-ASE Terminal Development EA

Aspen, Colorado

November 27, 2015

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Aspen/Pitkin County Airport-ASE Terminal Development EA
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1.0 INTRODUCTION

Bio-Environs was contracted to perform a jurisdictional determination and delineation of the boundaries of "waters of the United States," including wetlands, that occur within the approximately 385 acre Aspen/Pitkin County Airport-ASE Terminal Development EA Project Area. The study area is located here:

Aspen/Pitkin County Airport
Section 34 T9S, R85W, 6th P.M.
39˚ 13' 27.0" N, 106˚ 52' 5.0" W NAD 83
Aspen County, Colorado
Elev. 7730'
(Figures 1 and 2)

The project area (Figure 2) is established in association with Phase 2 of an Environmental Assessment that is being conducted in relation to development of additional Terminal Facilities and runway expansion. The delineation was completed for planning purposes and potential wetland permitting associated with development of the Terminal Facilities in the northwest potion of the project area, expansion of runway area as well as a reconfiguration of the bike path that runs along the western project area boundary.

This 2015 study identifies 3.0 acres of regulated wetlands associated with Owl Creek, approximately 1890 Linear Feet (LF) of "waters of the US" that are part of the Owl Creek wetlands that are to the west of the airport Area of Operations (AOA), 470 LF of drainage features (D-1 and D-2) that are tributaries to Owl Creek as well as 1670 LF of Owl Creek within the current Airport Area of Operations (AOA) perimeter. Two irrigation ditches are also located with the project area, and while they contain water that flows to Owl Creek, they are used for irrigation and have control features on them. They were originally developed in upland areas.

The project area also includes approximately 1.3 acres of wetlands that were created for mitigation associated with a previous airport runway expansion in the southern portion of the project area (Figure 3). Owl Creek enters the project area in the northwest portion of the project area and supports the identified wetland area. Owl creek exits the project area at the northeast corner of the project area to flow northeast into the Roaring Fork River, which flows into the Colorado River in Glenwood Springs, CO and is considered a "waters of the US." All of the wetlands that are identified in this report exhibit a surface connection to the Roaring Fork River.

This report identifies the jurisdictional status of the project area based on Bio-Environs professional understanding and interpretation of the *Corps of Engineers Wetland Delineation Manual (1987), Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), 2010*;

the *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States (2008);* and Corps of Engineers guidance documents and regulations. Jurisdictional determinations for other "waters of the United States" were made based on definitions and guidance found in 33 CFR 328.3, Corps Regulatory Guidance Letters, and the wetland delineation manual. The Corps of Engineers administers Section 404 of the Clean Water Act which regulates the discharge of fill or dredged material into all "waters of the United States," and is the regulatory authority that must make the final determination as to the jurisdictional status of the project area.

2.0 REGULATORY DEFINITIONS

2.1 Waters of the United States

"Waters of the United States" are within the jurisdiction of the Corps of Engineers under the Clean Water Act. "Waters of the United States" is a broad term which includes waters that are used or could be used for interstate commerce. This includes wetlands, ponds, lakes, territorial seas, rivers, tributary streams including any definable intermittent waterways, and some ditches below the "Ordinary High Water Mark (OHWM)." Also included are manmade waterbodies such as quarries and ponds which are no longer actively being mined or constructed. Wetlands, mudflats, vegetated shallows, riffle and pool complexes, coral reefs, sanctuaries, and refuges are all considered special aquatic sites which involve more rigorous regulatory permitting requirements. A specific, detailed definition of "waters of the United States" can be found in the Federal Register (33 CFR 328.3).

2.2 Wetlands

Wetlands are a category of "waters of the United States" for which a specific identification methodology has been developed. As described in detail in the *Corps of Engineers Wetland Delineation Manual (1987)* and its supplements, wetland boundaries are delineated using three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology.

2.2.0 Other Waters of US

Detection of "other waters of US' was based on *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States (2008)*. "Other waters" for this study include rivers, streams, arroyos, drainages or other features that convey water and may support and active floodplain. The OHWM is used to identify the lateral limits of non-wetland waters under Section 404 of the Clean Water Act (33 USC 1344). Federal jurisdiction over "other waters of the US" extends to the ordinary high water mark (OHWM) as defined in 33 CFR Part 328.3.

In the arid west, clear natural scour lines impressed on the bank, recent erosion, destruction of native terrestrial vegetation, and the presence of litter and debris are the most commonly used physical features to indicated the OHWM (US Army Corps of Engineers, South Pacific Division, 2001). Lichvar and Wakeley (2004) continue to refine OHWM indicators and delineation methods, and have developed lists of

geomorphic and vegetative indicators. These have been used to aid in defining the OHWM within the project area.

2.2.1 Wetland Vegetation

In the course of developing the wetland determination methodology the Corps, in cooperation with the U.S. Fish and Wildlife Service, Environmental Protection Agency, and the Soil Conservation Service, compiled a comprehensive list of wetland vegetation. The indicator status of plant species is expressed in terms of the estimated probabilities of that species occurring in wetland conditions within a given region. The indicator categories as defined by the Corps are:

> Obligate Wetland (OBL) occur almost always (estimated probability >99%) under natural conditions in wetlands.
>
> Facultative Wetland (FACW) usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
>
> Facultative (FAC) equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
>
> Facultative Upland (FACU) usually occur in non-wetlands, but occasionally found in wetlands (estimated probability 1%-33%).
>
> Obligate Upland (UPL) occur almost always (estimated probability >99%) in uplands.

The percentage of the dominant wetland species in each of the vegetation strata in the sample area determines the hydrophytic, or wetland status of the plant community. Soil type and hydroperiod are two factors important in controlling species composition.

2.2.2 Hydric Soils

The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service, 1994). Nearly all hydric soils exhibit characteristic morphologies that result from repeated periods of saturation or inundation for more than a few days. Saturation or inundation, when combined with microbial activity in the soil, causes the depletion of oxygen. This anaerobiosis promotes certain biogeochemical processes, such as the accumulation of organic matter and the reduction, translocation, or accumulation of iron and other reducible elements. These processes result in distinctive characteristics that persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils in the field (USDA Natural Resources Conservation Service, 2006). The indicators that we use are a subset of the NTCHS *Field Indicators of Hydric soils in the United States, Version 7.0 (2010)* that are commonly found in the Western Mountains. Indicators are presented in three groups. Indicators for “All Soils” include eight indicators of hydric soil regardless of soil texture.

There are five indicators for “Sandy Soils” for use in soil layers with a texture of loamy fine sand or coarser. There are six indicators for “Loamy and Clayey Soils” in the Western Mountains region for use in soil layers with a loamy very fine sand or finer texture.

In this report, soil colors are described using the Munsell notation system. This method of describing soil color consists of separate notations for hue, value, and chroma, which are combined in that order to form the color designation. The *hue* notation of a color indicates its relation to red, yellow, green, blue, and purple; the *value* notation indicates its lightness; and the *chroma* notation indicates its strength or departure from a neutral of the same lightness.

The symbol for *hue* consists of a number from 1 to 10, followed by the letter abbreviation of the color. Within each letter range, the hue becomes more yellow and less red as the numbers increase. The notation for *value* consists of numbers from 0 for absolute black, to 10 for absolute white. The notation for *chroma* consists of numbers beginning with /0 for neutral grays and increasing at equal intervals. Soil color, texture and depth provide the basis for assigning a hydric soil indicator.

2.2.3 Wetland Hydrology

Wetland hydrology is defined as the presence of water for a significant period of time at or near the surface (within the root zone) during the growing season. Wetland hydrology is present only seasonally in many cases, and is often inferred by indirect evidence. Hydrology is controlled by such factors as seasonal and long-term rainfall patterns, local geology and topography, soil type, local water table conditions, and drainage. Wetland hydrology indicators for the Western Mountain Region include primary and secondary indicators grouped as: A) Observation of Surface Water or Saturated Soils B) Evidence of Recent Inundation C) Evidence of Current or Recent Soil Saturation and D) Evidence of Other Site Conditions or Data. One primary indicator or two or more secondary indicators are required to establish a positive indication of hydrology.

2.2.4 Wetland Definition Summary

In general, an area must meet all three criteria to be classified as a wetland. In certain problem areas such as seasonal wetlands which are not wet at all times, or in recently disturbed (atypical) situations, an area may be considered a wetland if only two criteria are met. In special situations, an area which meets the wetland definition may not be within the Corps of Engineers jurisdiction due to a specific regulatory exemption.

3.0 BACKGROUND INFORMATION

3.1 Existing Maps

Several sources of information were consulted to identify potential wetlands and wetland soil units on the site. These include the U.S. Fish and Wildlife Service's *National Wetland Inventory* (NWI) and the Natural Resources Conservation Service's (NRCS) *Soil Survey* for this county. These maps identify *potential* wetlands and wetland soil units on the site. The NWI maps were prepared from high altitude

photography and in most cases were not field checked. Because of this, wetlands are sometimes erroneously identified, missed, or misidentified. Additionally, the criteria used in identifying these wetlands were different from those currently used by the Corps of Engineers. The county soil maps, on the other hand, were developed from actual field investigations. However, they address only one of the three required wetland criteria and may reflect historical conditions rather than current site conditions. The resolution of the soil maps limits their accuracy as well. The mapping units are often generalized based on topography, and many mapping units contain inclusions of other soil types for up to 15% of the area of the unit.

3.2 National Wetland Inventory Map

The *National Wetland Inventory* (NWI) map of the area (Figure 5a, 5b) identifies three wetland types within the project area boundaries. The Owl Creek drainage within the project area is perennial and is identified as a riverine system (R3UBH) that includes forested/shrub wetlands (PSSC) associated with the drainage. The southern portion of the project area includes a small section of emergent wetlands (PEMC), which are associated with the created wetlands

3.3 Soil Survey

According to the NRCS Web Soil Survey (Figures 6a, 6b), there are fifteen separate Soils types identified within the project area. The predominant soils associated with the Owl Creek drainage within the study area are the Anvik-Skylick-Sligting association (11), the Jodero loam (68) and the Kobar silty clay loam (70). These soil types are not identified as hydric by the NRCS. The Kilgore silt loam located in the far southern end of the study area is identified as hydric.

3.4 FEMA Mapping

FEMA Mapping does indicate that the Owl Creek drainage is within the 100-yr floodplain (Figure 7). No other areas within the project area are within identified floodplain zones

4.0 SITE INVESTIGATION AND DESCRIPTION

4.1 Investigation Methodology

The delineation of wetlands and other “waters of the United States” on the site was based on the methodology described in the *Corps of Engineers Wetland Delineation Manual* (Technical Report Y-87-1) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), 2010* and the *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States (2008)* as required by current Corps of Engineers policy.

Prior to the field work, the background information was reviewed to establish the probability and approximate location of wetlands on the site. Next a general reconnaissance of the project area was made to determine site conditions. The site was walked and accessed by boat with the specific intent of determining wetland boundaries. Data stations were established at locations within and near the wetland

areas to document soil characteristics, evidence of hydrology, and dominant vegetation. Note that no attempt was made to examine a full soil profile to confirm any soil series designations. However, soils were examined to a depth of 12 inches where rock prevented further investigation or to 16 inches assess soil characteristics and site hydrology. Complete descriptions of typical soil series can be found in the soil survey for East, Hinsdale and Saguache counties, though the survey does not cover this area.

4.1.1 Site Photographs

Photographs of the site are located in Appendix A. These photographs are the visual documentation of site conditions at the time of inspection. The photographs are intended to provide representative visual samples of any wetlands or other special features found on the site inspected.

4.1.2 Delineation Data Forms

Where stations represent a wetland boundary point they are presented as paired data sheets, documenting the upland and wetland sides of the wetland boundary. The data forms used in the jurisdictional delineation process are located in Appendix B. These forms are the written documentation of how representative sample stations meet or do not meet each of the wetland criteria. Other points were also inspected during the delineation process but were not specifically recorded on data sheets.

4.1.3 GPS Survey of Wetland Boundary

The data points and boundaries of wetlands and “waters of the U.S.” were surveyed using a Trimble Geo XT-Explorer GPS unit.

4.2 General Site Conditions

The project area is comprised generally of developed areas that are associated with the Aspen/Pitkin County Airport facilities. The western edge of the northern portion of the project area includes a small area of agricultural lands and relatively undeveloped land that is situated in the Owl Creek drainage. Owl Creek is identified as perennial and enters the project area along the western boundary and traverses the project area to exit at the northeast corner of the area. The drainage is relatively undeveloped as it extends east from the western boundary and supports relatively natural forested and scrub-shrub wetlands up to the airport runway perimeter boundary. After entering the airport Area of Operations (AOA), the Owl Creek drainage has been denuded of taller vegetation and is piped underneath the existing runway. The northeast corner of the project area includes the extension of Owl Creek after the piped section underneath the runway. This reach of Owl Creek supports a well-drained riparian area along its banks and does not include regulated wetlands. The trees within the riparian area have been heavily trimmed to meet the requirements of the AOA.

The Roaring Fork Basin experienced below average snow pack through the 2014-2015 winter. However, in May 2015, the Aspen area received over 2 inches of rain with comparative amounts of snow at higher elevations. Flows in the Roaring Fork River this year have generally been above the median flow based on a 51-year record from the

USGS and are near the 75th percentile of flows recorded during that same 51-year period.

4.3 Results

Results are presented for the project area in Figure 4.

Wetland A (3.0 acre) is a forested/shrub-scrub riparian wetland that is associated with Owl Creek drainage within the project area. The upper reaches of the drainage within the project area are situated in relatively natural mountain terrain (Photographs 1 2 and 3). As the drainage extends to the east towards the airport AOA, it becomes confined within relatively level agricultural fields which demark the wetland boundary and supports wetlands as well as dense riparian areas along its banks (Photographs 4 and 5). As the drainage nears the AOA, it narrows and becomes channelized (Photograph 6) just before entering a culvert at the airport perimeter boundary (Photograph 7).

Sample point A-4 wetland

This sample point is located within the riparian area along Owl Creek in the western portion of the project area (Figure 4). The dominant vegetation in the riparian wetland is comprised of narrowleaf cotton wood (*Populus angustifolia,* FAC), gray willow (*Salix bebbiana,* FACW) and twinberry honeysuckle (*Lonicera involucrata*, FAC) with an understory that includes a dominance of beaked sedge (*Carex utriculata,* OBL), fowl mannagrass (*Glyceria striata*, OBL) and field horsetail (*Equisetum arvense*, FAC). The wetland supports a silty clay loam with some gravels from 0 to 6 inches with a color of 10 YR2/1 and cobble with similar color from 6 to 12 inches. No redoximorphic features are present in the soil test pit sample. Wetland hydrology was present on the day of investigation with saturation present at the ground surface. All three wetland criteria are met at this site (see data form A-4 wet in Appendix B).

Sample point A-2 upland

The adjacent upland to Wetland A at this location is an upland meadow that is elevated to the west of the wetland (Photograph 3). Vegetation in the meadow is dominated by smooth brome (*Bromopsis inermis*, FACU) and orchard grass (*Dactylis glomerata*, FACU). Soils in the upland are a loam showing a color of 10YR2/2 with no concentrations from 0 to 12 inches. A lack of wetland hydrology, hydric soils and a dominance of wetland vegetation distinguishes the uplands from the wetland area (see data form A-4 up in Appendix B).

Waters of the U.S

Owl Creek (3560 LF)

The entire study area includes a total of approximately 3560 LF of “waters of the U.S.” associated with the Owl Creek drainage to the west of the AOA (Figure 2). Of this total, approximately 1890 LF is associated with the Owl Creek wetlands that are identified in this report (Photograph 8). The channel associated with this reach of Owl Creek is approximately 20 feet wide and 0.05 feet deep with multiple channels in some locations

with a flow of 2 inches on the day of investigation. 1670 LF of stream is identified within the AOA as a channelized feature that is conveyed underground from the west side of the runway (Photograph 9) to the east via a piped section under the runway (Photograph 10). The reach that exists on the west side of the runway is largely denuded of vegetation and does not support wetlands along its banks excepting some small portions of fringe wetlands in lower areas. After exiting the underground section of pipe, Owl Creek appears to have been channelized as it extends to the northeast and the project boundary (Photograph 11). This reach of channel supports a dense, well-trimmed narrowleaf cottonwood dominated riparian areas (Photograph 12) but does not include hydric soils or saturated soils. As such, the channel does not support wetland criteria in the eastern portion of the project area.

Drainage Features D-1 and D-2

In addition to the main Owl Creek drainage, there are two small drainage features that enter Owl Creek in the western portion of the project area (Figure 2). D-1 (420 LF) is a small 3 foot wide by 1 foot deep tributary to Owl Creek that enters the channel near Sample Pt. A-4 wetland (Photograph 13). Although the drainage feature was dry on the day of investigation; it includes bed, bank and OHWM and drains surface waters from the foothills located to the south of the drainage into Owl Creek and is identified as regulated in this report.

D-2 (50 LF) is associated with drainage and spring discharge that enters Owl Creek near Data Point A-13. The feature appears to have been developed for the old vacant homestead located just south and includes an excavated area that creates a small area of open water (60 SF) before flowing into Owl Creek (Photograph 14). The area is included within the wetland boundary and supports wetland criteria

Table 1

Wetland Area "Waters of U.S."	Wetland Type	Acres/Linear feet
Wetland A	Forested/shrub, seasonally flooded palustrine.	3.0 acre
Owl Creek	Upper perennial, unconsolidated bottom, permanently/temporarily flooded, riverine.	3560 LF
D-1	Upper perennial, unconsolidated bottom, seasonally flooded, riverine	420 LF
D-2	Upper perennial, unconsolidated bottom, permanently/temporarily flooded, palustrine.	50 LF
Total		3.0 acre wetland 4030 LF "waters of the U.S."

5.0 JURISDICTIONAL ANALYSIS

5.1 Corps of Engineers

The Corps of Engineers has authority over the discharge of fill or dredged material into "waters of the United States." This includes authority over any filling, mechanical land clearing, or construction activities that occur within the boundaries of any "water of the United States". A permit must be obtained from the Corps of Engineers before any of these activities occur. Permits can be divided into three general categories: the Regional General Permit for Colorado, Nationwide Permits, and Individual Permits.

Nationwide Permits have been developed for projects which meet specific criteria and are deemed to have minimal impact on the aquatic environment.

Individual Permits are required for projects that do not fall into one of the specific Nationwide Permits or the Regional General Permit or that are deemed to have significant environmental impacts. These permits are much more difficult to obtain and receive a much higher level of regulatory agency and public scrutiny and may require several months to more than a year for processing.

On June 19, 2006, the U.S. Supreme Court issued decisions in regards to John A. Rapanos v. United States (No. 04-1034) and June Carabell v. United States (04-1384), et al. The plurality decision created two 'tests' for determining CWA jurisdiction: the permanent flow of water test (set out by Justice Scalia) and the "significant nexus" test (set out by Justice Kennedy). On June 5, 2007 the Corps and EPA issued joint guidance on how to interpret and apply the Court's ruling. According to this guidance, the Corps will assert jurisdiction over traditionally navigable waters, adjacent wetlands, and non-navigable tributaries of traditionally navigable waters that have "relatively permanent" flow, and wetlands that border these waters, so long as such waters are not separated by roads, berms, and similar barriers. In addition, the Corps will use a case-by-case "significant nexus" analysis to determine whether waters and their adjacent wetlands are jurisdictional. A "significant nexus" can be found where waters, including adjacent wetlands, alter the physical, biological, or chemical integrity of the traditionally navigable water based on consideration of several factors.

In May 2015, a Clean Water Act rule was issued that clarifies the extent of jurisdiction that the Corps of Engineers and the EPA exert over headwaters. The rule states that headwaters that demonstrate a bed, bank, ordinary high water mark and flow downstream will be regulated. Those that do not demonstrate the above will be evaluated for adjacency. Wetlands adjacent to jurisdictional waters within a minimum of 100 feet and within the 100-year floodplain to a maximum of 1,500 feet of the ordinary high water mark will be regulated. Regulatory jurisdiction is also afforded to waters with a significant nexus within the 100-year floodplain of traditional navigable waters, interstate waters, or the territorial seas, as well as waters with a significant nexus within 4,000 feet of jurisdictional waters.

The study area was reviewed per the Rapanos decision, as well as the recent Clean Water Act Rule instituted on August 28, 2015, though not in effect in Colorado due to an injunction regarding its legality.

6.0 SUMMARY AND CONCLUSIONS

On September 9, 2015 Bio-Environs inspected the Aspen/Pitkin County Airport-Terminal Development EA Project Area. One wetland area totaling 3.0 acres along with 3560 linear feet of perennial stream channel and 470 linear feet of a drainage features are identified within the study area. In our opinion, the wetlands are likely jurisdictional under both the Rapanos decision and the recent Clean Water rule as they are adjacent to or connect via surface hydrology to the Roaring Fork River, which is a regulated "waters of the US". The Army Corps of Engineers makes the final determination regarding the jurisdictional status of wetlands identified within the Project Area.

FIGURES

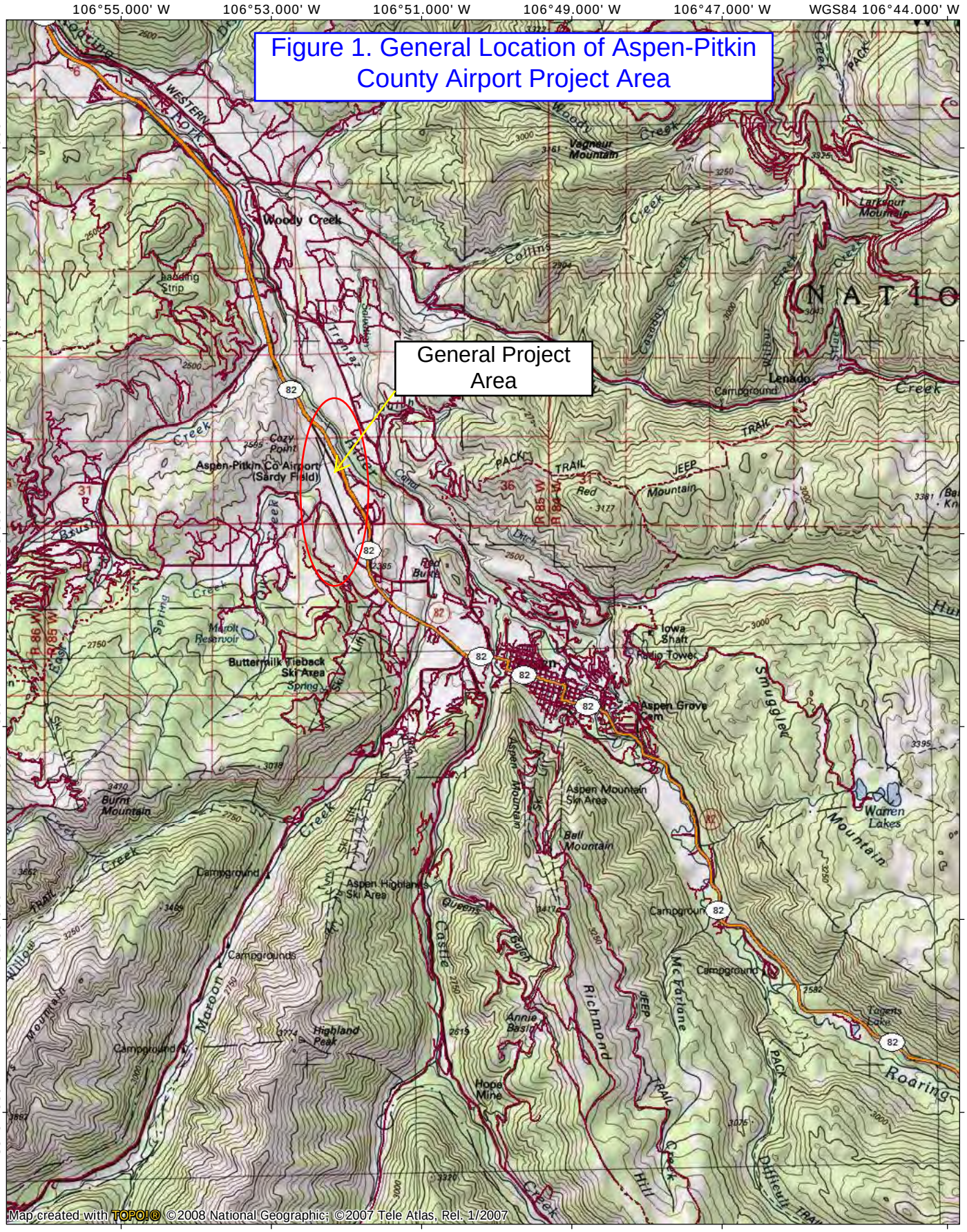


Figure 1. General Location of Aspen-Pitkin County Airport Project Area
General Project Area
106°55.000' W
106°53.000' W
106°51.000' W
106°49.000' W
106°47.000' W
WGS84 106°44.000' W
39°17.000' N
39°15.000' N
39°13.000' N
39°11.000' N
39°09.000' N
39°07.000' N
Woody Creek
Aspen-Pitkin Co Airport (Sardy Field)
Lenado
Campground
Buttermilk Tieback Ski Area
Aspen Mountain Ski Area
Aspen Highlands Ski Area
Campgrounds
Iowa Shaft
Aspen Grove
Warren Lakes
Tagents Lake
Hope Mine
Annie Basin
Highland Peak
Burnt Mountain
Bell Mountain
Red Mountain
Vagneur Mountain
Larkspur Mountain
Map created with TOPO!® ©2008 National Geographic; ©2007 Tele Atlas, Rel. 1/2007
NATIONAL GEOGRAPHIC
0.0 0.5 1.0 1.5 2.0 2.5 3.0 miles
0 1 2 3 4 5 km
TN MN
9°
11/13/15

Figure 2. Aspen/Pitkin County Airport-ASE Terminal Development EA Project Area Boundaries

Figure 3. Aspen/Pitkin County Airport-ASE Phase 2 Wetland Delineation Overview

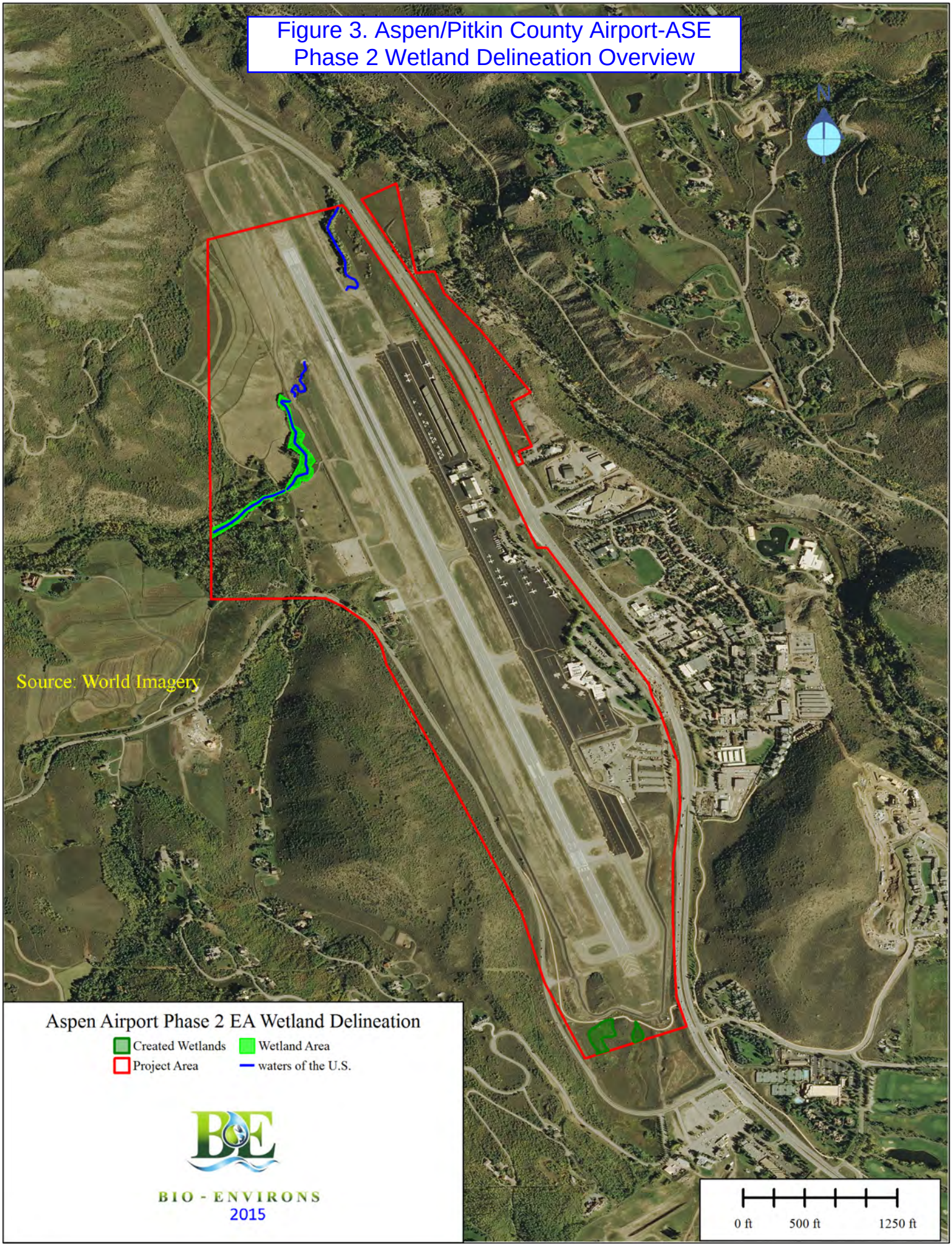


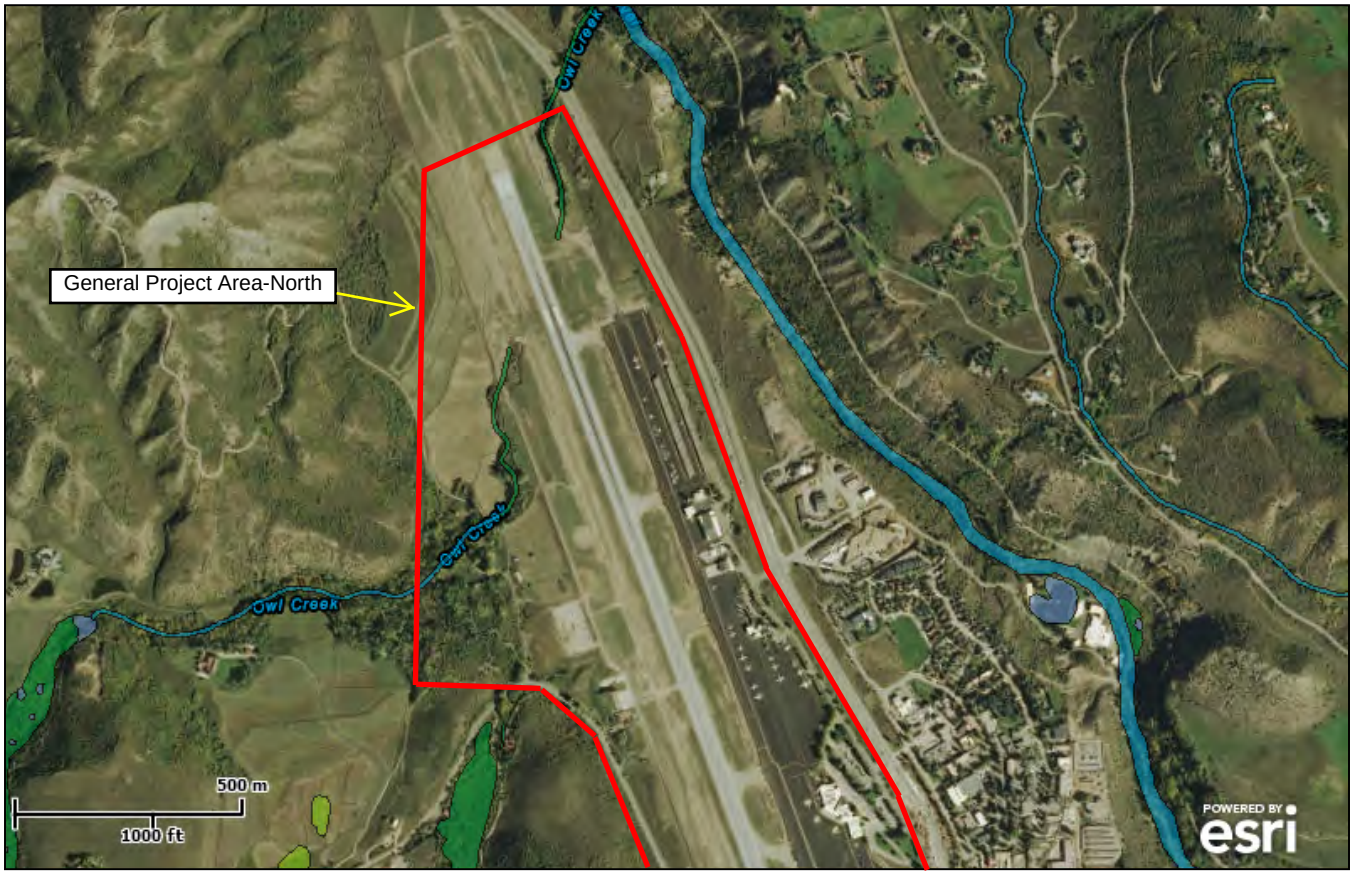
Figure. 4. Aspen/Pitkin County Airport-ASE Phase 2 Wetland Delineation- Owl Creek Detail

Figure 5a. NWI Map-Northern Project Area

U.S. Fish and Wildlife Service

National Wetlands Inventory

Sep 4, 2015



Wetlands

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

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

User Remarks:

Figure 5b. NWI Map- Southern Project Area

U.S. Fish and Wildlife Service

National Wetlands Inventory

Sep 4, 2015

Wetlands

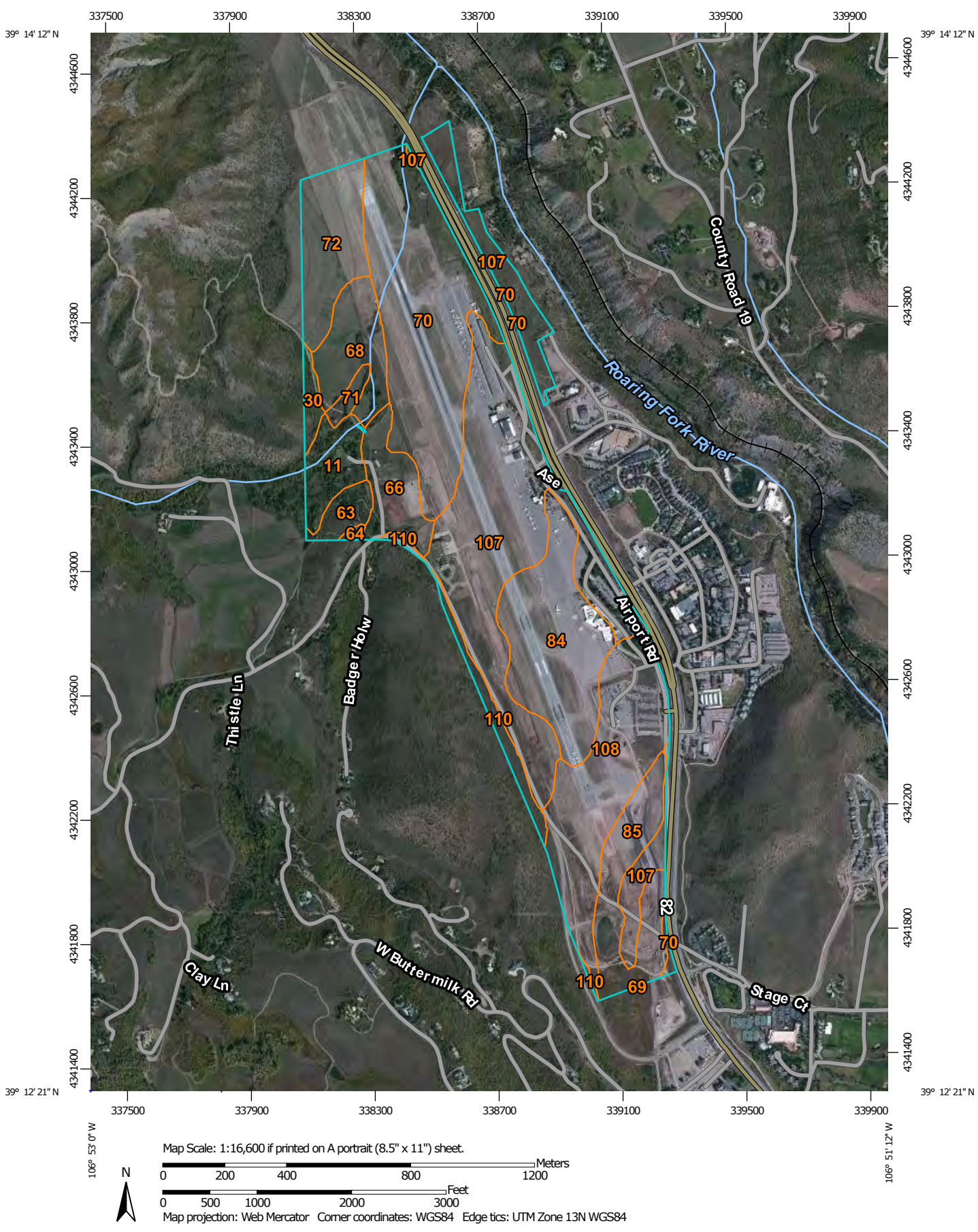
- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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

User Remarks:

Figure 6a. NRCS Soil Map

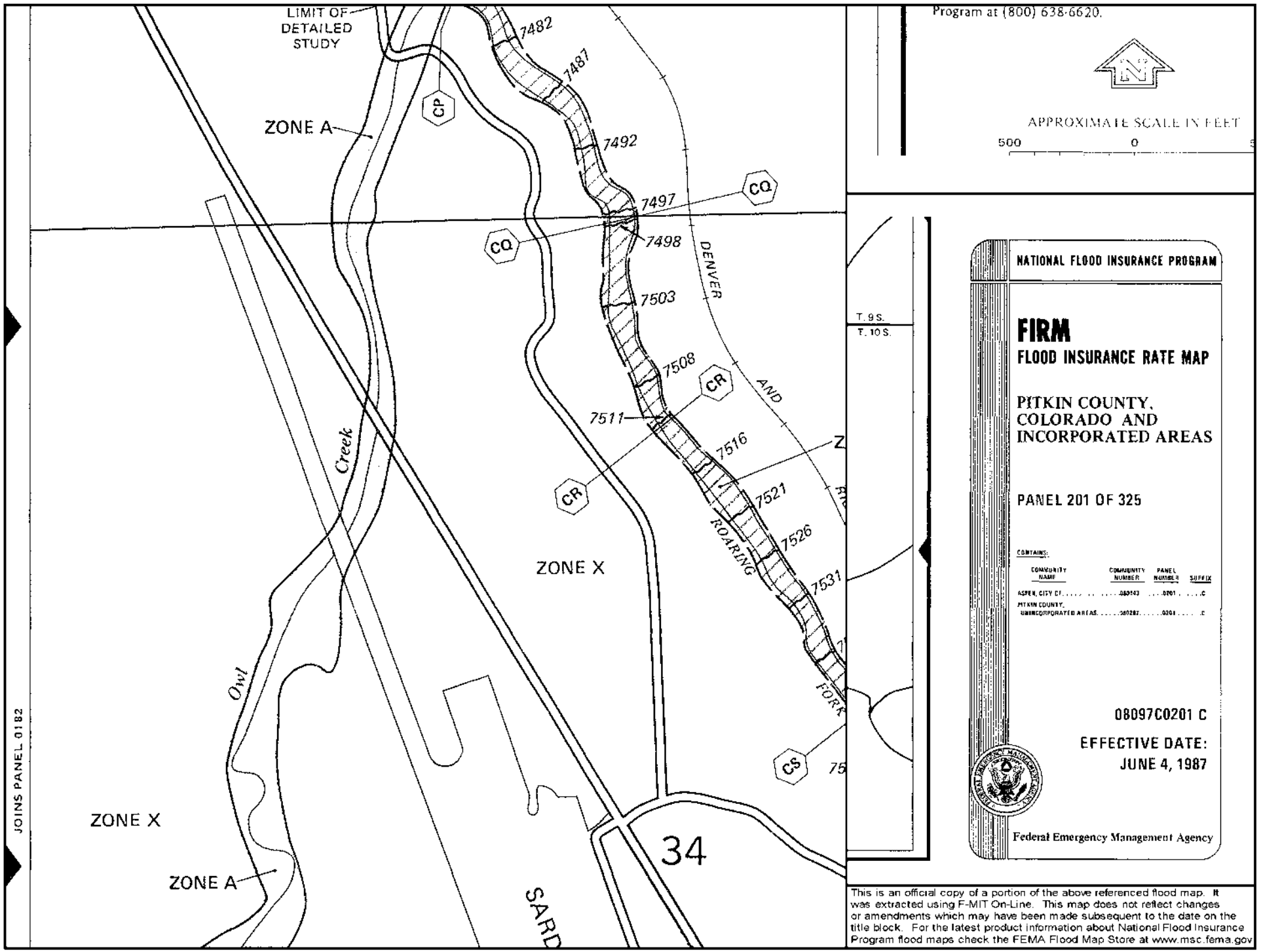
Soil Map—Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties
(Project Area LL84)



Map Unit Legend

Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties (CO655)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
11	Anvik-Skylick-Sligting association, 25 to 50 percent slopes	11.7	3.1%
30	Dollard-Rock outcrop, shale complex, 25 to 65 percent slopes	3.5	0.9%
63	Jerry loam, 12 to 25 percent slopes	5.6	1.5%
64	Jerry loam, 25 to 65 percent slopes	0.6	0.2%
66	Jerry-Millerlake loams, 6 to 25 percent slopes	15.1	3.9%
68	Jodero loam, 1 to 12 percent slopes	18.1	4.7%
69	Kilgore silt loam	0.0	0.0%
70	Kobar silty clay loam, 1 to 6 percent slopes	72.4	18.9%
71	Kobar silty clay loam, 6 to 12 percent slopes	2.7	0.7%
72	Kobar silty clay loam, 12 to 25 percent slopes	23.5	6.1%
84	Morval loam, 1 to 6 percent slopes	44.0	11.5%
85	Morval loam, 6 to 25 percent slopes	25.9	6.8%
107	Uracca, moist-Mergel complex, 1 to 6 percent slopes, extremely s	104.8	27.3%
108	Uracca, moist-Mergel complex, 6 to 12 percent slopes, extremely	48.0	12.5%
110	Uracca, moist-Mergel complex, 25 to 65 percent slopes, extremely	7.7	2.0%
Totals for Area of Interest		**383.7**	**100.0%**

Figure 7. FEMA Mapping-Owl Creek



APPENDIX A

PHOTOGRAPHS

Photograph 1. Photograph taken September 9, 2015 looking west up the Owl Creek drainage near Sample Pt. A-4 wetland (Aspen/ Pitkin County Airport EA Project Area).

Photograph 2. Photograph taken September 9, 2015 looking east down the Owl Creek drainage near Sample Pt. A-4 wetland (Aspen/ Pitkin County Airport EA Project Area).

Photograph 3. Photograph taken September 9, 2015 looking west at Sample Pt. A-4 upland (Aspen/ Pitkin County Airport EA Project Area).

Photograph 4. Photograph taken September 9, 2015 looking north along Wetland A near Data Pt. A-28 (Aspen/ Pitkin County Airport EA Project Area).

Photograph 5. Photograph taken September 9, 2015 looking north along the riparian and Wetland Area A, near Data Pt. A-43 (Aspen/ Pitkin County Airport EA Project Area).

Photograph 6. Photograph taken September 9, 2015 looking north down the Owl Creek drainage as it approaches the AOA perimeter (Aspen/ Pitkin County Airport EA Project Area).

Photograph 7. Photograph taken September 9, 2015 looking east at the culvert that conveys water from Owl Creek into the AOA (Aspen/ Pitkin County Airport EA Project Area).

Photograph 8. Photograph taken September 9, 2015 looking east down Owl Creek within Wetland Area A (Aspen/ Pitkin County Airport EA Project Area).

Photograph 9. Photograph taken September 9, 2015 looking northeast along a portion of Owl Creek that is within the AOA on the western side of the runway (Aspen/ Pitkin County Airport EA Project Area).

Photograph 10. Photograph taken September 9, 2015 looking east at the culvert and pipe within the AOA that conveys water associated with Owl Creek underneath the runway (Aspen/ Pitkin County Airport EA Project Area).

Photograph 11. Photograph taken September 9, 2015 looking north along the reach of Owl Creek after exiting the underground pipe on the east side of the runway within the AOA (Aspen/ Pitkin County Airport EA Project Area).

Photograph 12. Photograph taken September 9, 2015 looking north at the riparian area that exists along the eastern portion of Owl Creek within the AOA (Aspen/ Pitkin County Airport EA project Area).

Photograph 13. Photograph taken September 9, 2015 looking south at D-1 which drains surface waters form the south into Owl Creek (Aspen/ Pitkin County Airport EA project Area).

Photograph 14. Photograph taken September 9, 2015 looking north at the D-2 and the excavated area of open water before flowing into Owl Creek (Aspen/ Pitkin County Airport EA project Area).

APPENDIX B

DATA SHEETS

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

Project/Site: ASE Development EA City/County: Pitkin Sampling Date: 9/8/15

Applicant/Owner: ASE State: CO Sampling Point: A4 wet

Investigator(s): T Lapello L Cudlip Section, Township, Range: Sec 34 T 9S R 85W 6th PM

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

Subregion (LRR): LRR F Lat: 39°13'28.3"N Long: 106°52'28.11"W Datum: WGS84

Soil Map Unit Name: Anvik-Skylick-Sligfon assoc. NWI classification: Riverine

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: along side Owl Creek

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	40		FAC
2.			
3.			
4.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix bebbiana	15	Y	FACW
2. Distegia involucrata	10	Y	FAC
3. Alnus tenuifolia	5	N	FACW
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: _____)	15.6		
1. Carex utriculata	30	Y	OBL
2. Glyceria striata	20	Y	OBL
3. Equisetum arvense	30	Y	FAC
4. Taraxacum officinale	5	N	FACU
5. Agrostis stolonifera	10	N	
6. Aster sp.	1	N	
7.			
8.			
9.			
10.			
11.			
	96 = Total Cover		
	48 19.2		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (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 X No _____

Remarks:

SOIL

Sampling Point: A-1 wet

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 %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR2/1	100	—	—	—	—	slty cly lm w/ some gravels	
>12								cobble

[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)
- X 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 X No ____

Remarks:

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 X Depth (inches): _____

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

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): sfc

Wetland Hydrology Present? Yes X No ____

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

Remarks: at edge of Owl Creek. Owl Creek flowing. Wetland extends ~ 5-10' from edge of Owl Creek

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

Project/Site: ASE Development EA City/County: Pitkin Sampling Date: 9/8/15

Applicant/Owner: ASE State: CO Sampling Point: A-4up

Investigator(s): T Lapello L Cudlip Section, Township, Range: Sec 34 T9S R85W 6th P.M

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

Subregion (LRR): LRR E Lat: 39° 13' 27.6"N Long: 106° 52' 27.1"W Datum: WGS 84

Soil Map Unit Name: Arvik-Skylick-Slighting assoc. NWI classification: none

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 ____		
Hydric Soil Present? Yes ____ No X	**Is the Sampled Area within a Wetland?**	Yes ____ No X
Wetland Hydrology Present? Yes ____ No X		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	30	Y	FAC
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Dactylis glomerata	50	Y	FACU
2. Bromopsis inermis	50	Y	FACU
3. Cirsium arvense	15	N	–
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (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 X

Remarks:

SOIL

Sampling Point: A-1 up

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR2/2	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 X

Remarks: dark rich loamy soil in between Gul Creek & D-1

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 X Depth (inches): _____

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks: