

Jurisdictional Determination Report

Bridge 127.5 Eagle River

Eagle River, Alaska

December 14, 2021

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Acronyms and Abbreviations

APT	Antecedent Precipitation Tool
ARRC	Alaska Railroad Corporation
CWA	Clean Water Act
DTM	digital terrain model
GIS	geographic information system
GPS	global positioning system
HDR	HDR Engineering, Inc.
LiDAR	Light Detection and Ranging
MOA	Municipality of Anchorage
MP	milepost
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWPR	Navigable Waters Protection Rule
OHW	ordinary high water
ROW	right-of-way
SPN	Special Public Notice
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOUS	Waters of the U.S.

1.0 Introduction and Purpose

The Alaska Railroad Corporation (ARRC) is planning a track realignment and bridge replacement of ARRC Bridge 127.5 over Eagle River. ARRC has contracted HDR Engineering, Inc. (HDR) to assist with delineation of wetlands and waterbodies within the study area and to preliminarily determine whether those wetlands and waterbodies are subject to U.S. Army Corps of Engineers' (USACE) jurisdiction under authority of Section 404 of the Clean Water Act (CWA) of 1972 (as amended) or Section 10 of the Rivers and Harbors Act of 1899.

The purpose of this report is to present evidence that supports a preliminary determination that, other than Eagle River, wetlands and waterbodies identified within the study area are not subject to USACE jurisdiction. Information presented herein complies with the USACE guidance for jurisdictional determination reports, Special Public Notice (SPN) 2020-00399 (USACE 2020).

1.1. Study Area Description

The 36.4-acre study area is located in Eagle River within the Municipality of Anchorage (MOA; Inset 1) and consists of a 200-foot corridor along a 1.7-mile stretch of the rail line, between approximately ARRC mileposts (MP) 126.4 and 128.1. The study area is limited to the ARRC right-of-way (ROW). Land outside of the ROW is military land within Joint Base Elmendorf–Richardson (Figure 1). Within the study area the railroad alignment transects the Elmendorf Moraine, which consists of discontinuous, unconsolidated glacial till.



Inset 1. Study Area Location

The study area can be found on U.S. Geological Survey (USGS) quadrangles Anchorage B-7 and B-8 and is located in Sections 3, 9, 10 and 16 of Township 14 North, Range 4 West, Seward Meridian. The approximate center of the study area is at 61.316° North latitude and -149.621° West longitude (NAD 83). The study area is within the Cook Inlet ecoregion (USACE 2007) and the Lower Eagle River watershed (12-digit Hydrologic Unit Code 190204010306; USGS 2021a).

2.0 Methods

2.1. Field Work

On August 16, 2021, HDR wetland scientists Alena Gerlek (Professional Wetland Scientist #3144) and Ashley Hovis (Wetland Professional in Training) conducted an on-site investigation of wetlands and waterbodies within the study area. Soil conditions, hydrology, and plant communities were studied using methods described in the 1987 *Wetlands Delineation Manual* and the 2007 *Regional Supplement* (USACE 1987, 2007). The field work occurred within the

USACE recommended growing season for the Cook Inlet ecoregion (May 8 to October 5; USACE 2007).

Wetlands were identified where wetland scientists observed indicators of hydrophytic vegetation, wetland hydrology, and hydric soils. If any of the three requirements were not met under normal conditions, the site did not meet the USACE criteria for being classified as a wetland. Sites were characterized by completing standard USACE Wetland Determination Forms (2007 *Regional Supplement*). Photographs and observational data were collected at additional locations (Observation Points) to document sites that exhibited characteristics similar to those of areas where a data form had already been completed, or to document the presence (or absence) of a waterbody or stream. Locations of Wetland Determination Form sites and Observation Points were logged into a global positioning system (GPS)-enabled iPad.

The USACE Antecedent Precipitation Tool (APT) was used to determine the degree to which any recent climatic events (e.g., abnormally wet or dry conditions) may have influenced hydrology conditions during the time of the field investigation. The APT utilizes 30 years of data on precipitation, drought, and other climatic factors to determine “normal” conditions (Deters 2020). Hydrologic indicators observed in the field on August 16, 2021 would be expected to correlate with the APT output (Appendix A). The APT calculated that the field survey occurred during the dry season and that the antecedent precipitation conditions were wetter than normal, which is consistent with field observations.

2.2. Wetland Mapping and Classification

Upon returning from the field, scientists analyzed the field-collected data and reviewed the following datasets in a Geographic Information System (GIS) to delineate and classify wetlands and waterbodies in the study area:

- Digital color ortho-rectified aerial photography at sub-meter ground pixel resolution (MOA 2015a)
- Digital terrain model (DTM) raster dataset at a 3-foot ground pixel resolution (MOA 2015b)
- Light Detection and Ranging (LiDAR)-derived 1-foot topographic contours (MOA 2015c)
- National Hydrography Dataset (USGS 2021b)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping for USGS quadrangles Anchorage B-7 and B-8 (USFWS 2021; Figure 2)
- MOA wetland mapping (MOA 2021; Figure 2)
- Natural Resources Conservation Service (NRCS) soil survey mapping (NRCS 2020; Figure 2)

GPS locations of field-visited sites were overlaid on the aerial photography and other data layers in GIS to identify and classify wetlands and waterbodies present within the study area. Wetland/upland boundaries were digitized into GIS at a scale of 1:1,200. Surveyors with Kuna Engineering, LLC surveyed the wetted perimeter and ordinary high water (OHW) line of Eagle River within the study area on August 16, 2021. The results of the survey were incorporated into the mapping (Figure 3).



Mapped polygons identifying homogeneous wetland and waterbody areas were attributed with NWI mapping codes based on the USFWS' *Classification of Wetlands and Deepwater Habitats of the U.S.* (Cowardin et al. 1979).

3.0 Summary of Findings

3.1. Wetland and Waterbody Classification

Standard Wetland Determination Forms were completed at three sites within the study area (Appendix B). Observation Points were collected at an additional 12 locations (Appendix C). Data points are listed in Table 1 and shown on Figure 3.

Table 1. Summary of Field Data Points

Site ID	Plot Type ^a	NWI Type ^b	Latitude	Longitude
001	WDF	U	61.31130	-149.63857
002	OP	U	61.31217	-149.63659
003	OP	U	61.31284	-149.62970
004	WDF	PEM1Cx	61.31378	-149.62582
005	OP	PSS1/EM1Bx	61.31351	-149.62679
006	OP	PSS1/EM1Bx	61.31376	-149.62654
007	OP / WB	PEM1Cx / PUBHx	61.31407	-149.62487
008	WB	PUBHx	61.31549	-149.62170
009	OP	U	61.31678	-149.61962
010	OP	PUSC _x	61.31645	-149.62078
011	WB	R3USC	61.31802	-149.61938
012	OP	U	61.31800	-149.61903
013	WDF	U	61.32168	-149.61576
014	OP	U	61.32330	-149.61422
015	OP	U	61.32491	-149.61209

^a WDF = Wetland Determination Form; OP = Observation Point; WB = Waterbody

^b Cowardin et al. 1979. See Table 2 for full descriptions.

One of the three sites where Wetland Determination Forms were completed was determined to be wetland and the remaining two sites were determined to be upland. Both upland sites lacked indicators of hydrophytic vegetation, primary wetland hydrology, and hydric soils.

Ditches

Two wetland and waterbody complexes were identified in the ditches on either side of the railroad embankment. These complexes consist of excavated saturated and seasonally flooded wetlands and excavated seasonally flooded and permanently flooded ponds. Wetlands were documented to be dominated by emergent and shrub species including water horsetail (*Equisetum fluviatile*), tall cottongrass (*Eriophorum angustifolium*), paper birch saplings (*Betula papyrifera*) and balsam poplar saplings (*Populus balsamifera*). Evidence of regular vegetation clearing along the railroad embankment that inhibits shrub growth was observed. Soils consist of a thin layer of organic material overlying glacial till with minimal soil development. Hydrogen sulfide odor was detected within the first three inches of the soil surface at all sites where

wetlands were documented. Ponds are limited to the ditches and varied from approximately 2 to 8 feet wide.

The ditches are located between cut slopes and the railroad embankment. The wetlands and waterbodies in the ditches formed as a result of excavation into the water table and are wholly located in uplands. The complexes do not carry a relatively permanent flow of water and do not have a surface connection to naturally occurring wetlands or waterbodies. All wetlands and waterbodies in excavated ditches were given the x modifier (Table 2).

Eagle River

The study area includes the main channel of Eagle River and seasonally flooded unconsolidated shoreline below the OHW line.

Uplands

Undisturbed areas outside of the railroad embankment are primarily upland white spruce (*Picea glauca*) woodland and mixed conifer and broadleaf woodland dominated by white spruce, paper birch, and balsam poplar. Upland soils were well drained gravelly and cobbly silty loam with no redox features. Upland sites lacked any one primary indicator or two secondary indicators of wetland hydrology.

3.2. Mapping Results

Approximately 0.1 acre of excavated wetlands were mapped within the 36.4-acre study area. Wetland types include scrub-shrub and emergent. An additional 0.3 acre of excavated palustrine ponds and 0.5 acre of perennial stream (i.e. Eagle River) were mapped. The remaining 35.5 acres of the study area were determined to be upland. Wetland and waterbody classes found within the study area and acreages of each NWI classification are provided in Table 2.

Figure 3 displays wetland, upland, and waterbody boundaries. Locations of the Wetland Determination Form sites and Observation Points are also shown.



Table 2. Mapping Summary

NWI Code ^a	Description	Acres ^b
Wetlands		
PSS1/EM1Bx	Excavated saturated broad-leaved deciduous scrub-shrub/persistent emergent wetland	0.1
PEM1Cx	Excavated seasonally flooded persistent emergent wetland	<0.1
Total Wetlands		0.1
Waterbodies		
PUBHx	Excavated permanently flooded pond with an unconsolidated bottom	0.3
PUSCx	Excavated seasonally flooded pond with an unconsolidated shore	<0.1
R3UBH	Permanently flooded upper perennial stream with an unconsolidated bottom – Eagle River	0.4
R3USC	Seasonally flooded upper perennial streambank with an unconsolidated shore – Eagle River	0.1
Total Waterbodies		0.8
Uplands		
U	Upland	35.5
Total Uplands		35.5
Total Mapped Area		36.4

^a Cowardin et al. 1979

^b Total acreage presented may not reflect the sum of the individual cells due to rounding.

4.0 Jurisdictional Determination

The wetland delineation described in Section 2.0 was prepared in compliance with the USACE *Wetlands Delineation Manual* (USACE 1987) and the 2007 *Regional Supplement* (USACE 2007). The on-site delineation conducted by HDR indicated that there are approximately 0.1 acre of wetlands and 0.8 acre of waterbodies within the 36.4-acre study area. This section provides a likely determination of the jurisdictional status of the wetlands and waterbodies within the study area. The USACE will determine the total area of jurisdictional waters of the United States (WOUS) under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act.

4.1. Section 10

The Alaska District of the USACE has determined that Eagle River is a navigable water regulated under Section 10 of the Rivers and Harbors Act of 1899 (USACE 2021). The 0.5 acre of Eagle River within the study area is a jurisdictional WOUS.

4.2. Section 404

On June 22, 2020 the changes to the definition of WOUS contained in the Navigable Waters Protection Rule (NWPR; 85 FR 22250) came into effect. For the purposes of the CWA, the NWPR revised the definition of WOUS to include only territorial seas; tributaries; lakes and ponds, and impoundments of jurisdictional waters; and adjacent wetlands. On August 30, 2021, the U.S. District Court for the District of Arizona issued an order to the Environmental Protection Agency (USEPA) and the USACE vacating and remanding the NWPR. At the time of this report, the agencies are interpreting the definition of WOUS consistent with the pre-2015 regulatory regime until further notice (USEPA 2021).

The pre-2015 regulatory regime utilizes the 2008 joint guidance issue by USEPA and USACE to implement the U.S. Supreme Court's 2006 decision in the consolidated cases of *Rapanos v. United States* and *Carabell v. United States*, in which the Court addressed where the federal government can apply the CWA specifically by determining whether a wetland or tributary is a WOUS. Under the Rapanos guidance (USEPA and USACE 2008), ditches, including roadside ditches, excavated in uplands that drain only uplands and that do not carry a relatively permanent flow of water are not considered WOUS.

The two excavated wetland and waterbody complexes identified in the study area on either side of the railroad embankment would not be considered WOUS under the Rapanos guidance as they are ditches excavated in uplands that drain only uplands. The documented wetlands and waterbodies were formed when the railroad was realigned through the Elmendorf Moraine and excavation intersected the groundwater table. The ditches are approximately 15 to 20 feet lower in elevation than the original ground surface, and no naturally occurring wetlands were documented in the vicinity. At the north end of the complexes water in the ditches was observed to infiltrate into the embankment fill. The excavated waterbodies do not have a surface connection to Eagle River. The 0.3 acre of excavated waterbodies and 0.1 acre of excavated wetland are likely not WOUS subject to USACE jurisdiction under Section 404 of the CWA.

For the purposes of the CWA, the Rapanos guidance interpreted the definition of WOUS to include traditional navigable waters. Eagle River is a traditional navigable water and is subject to jurisdiction under Section 404 of the CWA.

5.0 References

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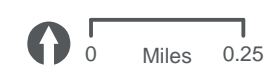
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Figures

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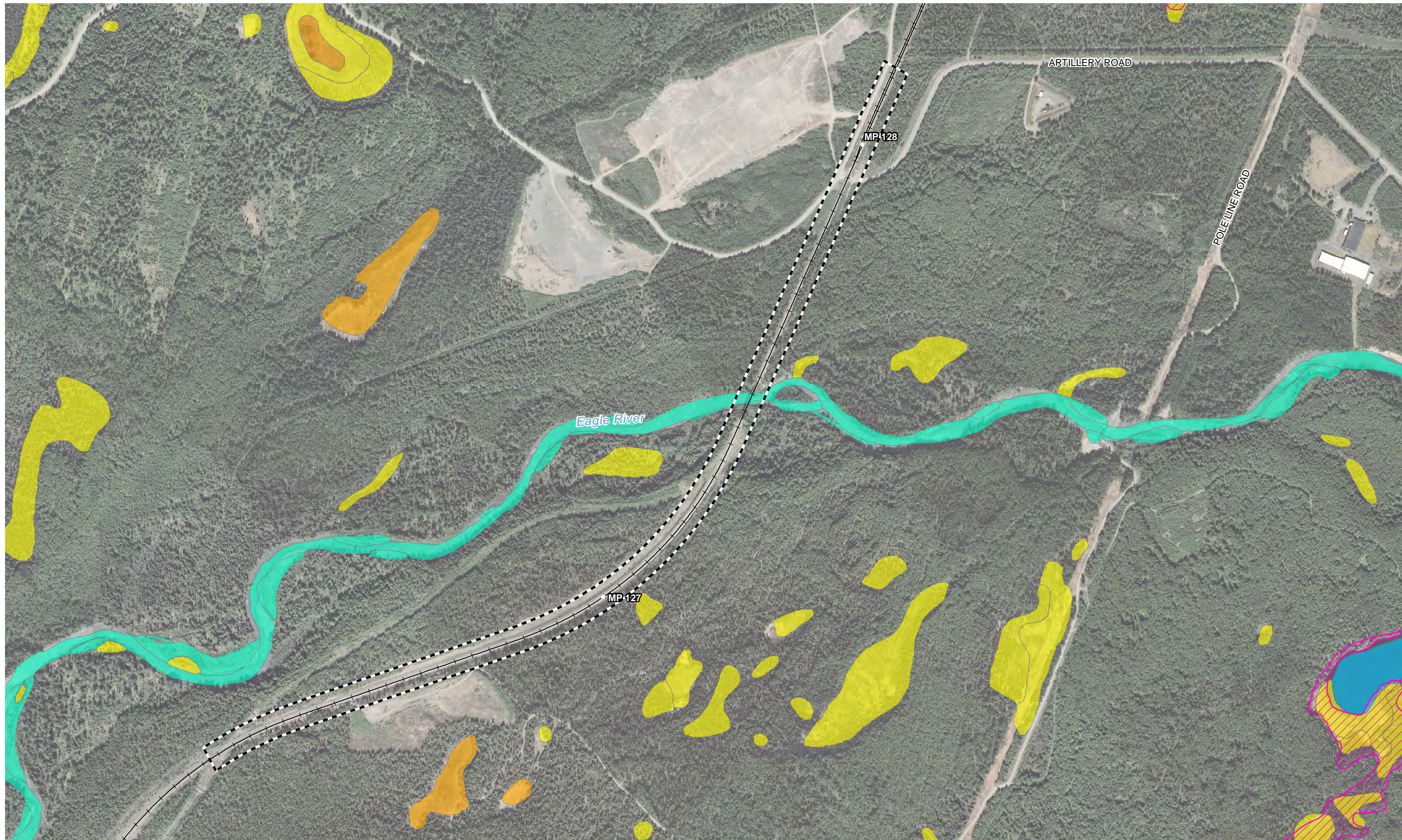


- Study Area
- ~ Streams
- Alaska Railroad Tracks
- Military Boundary
- Alaska Railroad Mileposts



**ALASKA RAILROAD MP 127.5 BRIDGE EAGLE RIVER
JURISDICTIONAL DETERMINATION REPORT**

FIGURE 1. STUDY AREA



- Study Area
- Alaska Railroad Mileposts
- Alaska Railroad Tracks

- MOA Wetland Designation**
- A - Higher Value Wetlands



- USFWS NWI Wetland Mapping**
- Freshwater Emergent Wetland
 - Freshwater Forested/Shrub Wetland


- Freshwater Pond
- Riverine



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 FIGURE 2. EXISTING WETLAND MAPPING



 Study Area
 Alaska Railroad Tracks

Field Points
 Upland



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FIGURE 3. WETLAND AND WATERBODY MAPPING, PAGE 1 OF 4



Study Area
 ○ Alaska Railroad Mileposts
 — Alaska Railroad Tracks

Field Points
 ● Upland
 ● Wetland

Waterbody
 Desktop Wetland Mapping by NWI Code
 ● PEM1Cx
 ● PSS1/EM1Bx
 ● PUBHx



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 JURISDICTIONAL DETERMINATION REPORT
 FIGURE 3. WETLAND AND WATERBODY MAPPING, PAGE 2 OF 4



Study Area
 Alaska Railroad Tracks

Field Points
 ● Upland
 ● Waterbody

Desktop Wetland Mapping by NWI Code
 PUBHx
 PUSCx

R3UBH
 R3USC



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FIGURE 3. WETLAND AND WATERBODY MAPPING, PAGE 3 OF 4



HR

Study Area
 Alaska Railroad Mileposts
 Alaska Railroad Tracks

Field Points
● Upland



ALASKA RAILROAD MP 127.5 BRIDGE EAGLE RIVER
JURISDICTIONAL DETERMINATION REPORT
 FIGURE 3. WETLAND AND WATERBODY MAPPING, PAGE 4 OF 4

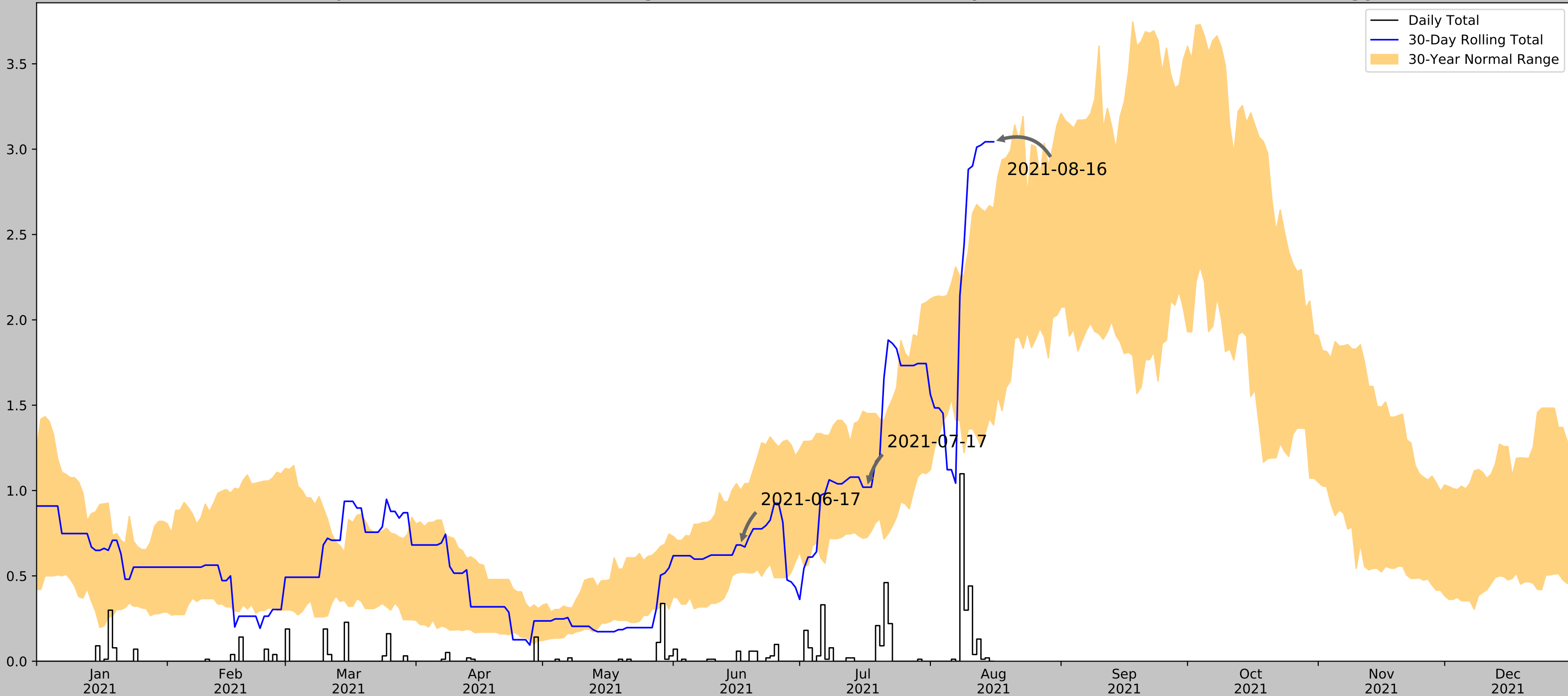
Appendix A

Antecedent Precipitation Tool Results

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Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network

Rainfall (Inches)



Coordinates	61.316450, -149.620775
Observation Date	2021-08-16
Elevation (ft)	183.48
Drought Index (PDSI)	Not available
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-08-16	1.384646	2.654331	3.043307	Wet	3	3	9
2021-07-17	0.725984	1.451575	1.019685	Normal	2	2	4
2021-06-17	0.52126	1.001969	0.681102	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
ANCHORAGE MERRILL FLD	61.2169, -149.855	138.123	10.384	45.357	5.144	8195	88
EAGLE RVR GAKONA CIRCLE	61.3192, -149.5436	566.929	2.566	383.449	2.139	24	0
ELMENDORF AFB	61.25, -149.8	191.929	7.515	8.449	3.445	2642	0
EAGLE RIVER 2.6 ESE	61.3122, -149.4958	798.885	4.155	615.405	4.427	0	2
FT RICHARDSON WTP	61.2272, -149.6503	470.144	6.244	286.664	4.6	492	0

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Appendix B

Wetland Determination Forms

August 16, 2021

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WETLAND DETERMINATION DATA FORM - Alaska Region

Project: MP 127.5 - Eagle River Bridge Borough/City: MOA Date: 8/16/21
 Applicant/Owner: ARRC Sampling Point #: 001
 Investigator(s): A. Geruk + A. Huns Firm: HDR Alaska, Inc.
 Lat. (dec.) 61.311304 Long. 149.638500 ± ' NAD 83 Recorded on GPS #: Marked on map? Field Map #:
 Subregion (circle one): SE (Southcentral) Western Aleutian Interior Northern Landform: gully Slope (%): 1 Aspect: E
 Local relief: Shape across slope: linear / convex / concave Shape up/downslope: linear / convex / concave NWI classification:
 Photo nos./descriptions: N, S, 5011 K2 Camera #: Paul Veg Type (Viereck Level 4 or other): IA2
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes: No: If no, explain. HGM type: N/A
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? If needed, explain answers here. wetter than normal

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the sampled area within a wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Remarks (e.g., marginal?):	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			

VEGETATION (Use scientific names.) Estimate absolute % cover (not relative cover). % can total >100%.

Tree Stratum (dbh ≥ 3")								Dominance Test worksheet:			
Species	Cov.%	Dom?	Ind.	Species	Cov.%	Dom?	Ind.				
1. <u>Pic mar</u>	<u>20</u>	<u>4</u>	<u>FACW</u>	5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Number of Dominant Species That are OBL, FACW, or FAC:	<u>3</u> (A)		
2. <u>Pic gla</u>	<u>5</u>	<u>4</u>	<u>FACW</u>	6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Total Number of Dominant Species Across All Strata:	<u>6</u> (B)		
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Percent of Dominant Species That are OBL, FACW, or FAC:	<u>50</u> (A/B)		
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Prevalence Index worksheet:			
Total Tree Cover: <u>25</u>				50% of total cover: <u>12.5</u>				20% of total cover: <u>5</u>		Total % Cover of:	Multiply by:
Sapling/Shrub Stratum (woody plants < 3" dbh)								OBL species		<u> </u> X1= <u> </u>	
Abs.Cov.%	Dom?	Ind.	Abs.Cov.%	Dom?	Ind.			FACW species		<u>27</u> X2= <u>54</u>	
1. <u>Pic mar</u>	<u>7</u>	<u> </u>	<u>FACW</u>	7. <u>Cor can</u>	<u> </u>	<u> </u>	<u> </u>	FAC species		<u>54</u> X3= <u>162</u>	
2. <u>Bot pap</u>	<u>5</u>	<u> </u>	<u>FACW</u>	8. <u>Vac vit</u>	<u>25</u>	<u>4</u>	<u>FAC</u>	FACU species		<u>44</u> X4= <u>176</u>	
3. <u> </u>	<u>3</u>	<u> </u>	<u> </u>	9. <u>Rho glo</u>	<u>5</u>	<u> </u>	<u>FAC</u>	UPL + NL species		<u> </u> X5= <u> </u>	
4. <u>Ros aci</u>	<u>5</u>	<u> </u>	<u>FACU</u>	10. <u>Lin bar</u>	<u>3</u>	<u> </u>	<u>FACU</u>	Column Totals:		<u>125</u> (A) <u>392</u> (B)	
5. <u>Spi ole</u>	<u>1</u>	<u> </u>	<u>FACU</u>	11. <u>Emp nig</u>	<u>3</u>	<u> </u>	<u>FAC</u>	Prevalence Index = B/A =		<u>3.14</u>	
6. <u>Sal bet</u>	<u>15</u>	<u>4</u>	<u>FAC</u>	12. <u>Vac ul</u>	<u>3</u>	<u> </u>	<u>FAC</u>				
Total Sapling/Shrub Cover: <u>74</u>				50% of total cover: <u>37</u>				20% of total cover: <u>14.8</u>			
Herb Stratum								Hydrophytic Vegetation Indicators:			
Abs.Cov.%	Dom?	Ind.	Abs. Cov.%	Dom?	Ind.			<u>N</u> Dominance Test is >50%			
1. <u>Cal can</u>	<u>3</u>	<u> </u>	<u>PAC</u>	12. <u> </u>	<u> </u>			<u>N</u> Prevalence Index is ≤3.0			
2. <u>Lup naup</u>	<u>1</u>	<u> </u>	<u>FACU</u>	13. <u> </u>	<u> </u>			Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)			
3. <u>Cha an</u>	<u>1</u>	<u> </u>	<u>FACU</u>	14. <u> </u>	<u> </u>			Problematic Hydrophytic Vegetation ¹ (Explain)			
4. <u>Spi ash</u>	<u>5</u>	<u>4</u>	<u>FACU</u>	15. <u> </u>	<u> </u>			¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.			
5. <u>Tric ev</u>	<u>7</u>	<u> </u>	<u>FACU</u>	16. <u> </u>	<u> </u>			Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			
6. <u>Geo liv</u>	<u>1</u>	<u> </u>	<u>FACU</u>	17. <u> </u>	<u> </u>						
7. <u>Cor can</u>	<u>15</u>	<u>4</u>	<u>FACU</u>	18. <u> </u>	<u> </u>						
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	19. <u> </u>	<u> </u>						
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>	20. <u> </u>	<u> </u>						
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>	21. <u> </u>	<u> </u>						
11. <u> </u>	<u> </u>	<u> </u>	<u> </u>	22. <u> </u>	<u> </u>						
Total Herb Cover: <u>26</u>				50% of total cover: <u>13</u>				20% of total cover: <u>5.2</u>			
Circular 1/10-ac plot <u> </u> or other plot dimension: <u>20x30</u> % of bare ground: <u>5</u>											
% Cover of Wetland Bryophytes <u>3</u> % Total Cover of Bryophytes <u>60</u> % (where applicable) <u>Sphagnum</u>											
Remarks: <u>plot limited to gully bottom</u> <u>squirrel midden - spruce cones</u>											

SOIL

Sampling Point #: 001

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

Depth (in.)	Horizon (opt.)	Soil Matrix		Redox Features				α,α dip. (pos/ neg)	Remarks (or use comment number)
		Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-2</u>	<u>O_i</u>								
<u>2-5</u>	<u>O_e</u>								
<u>5-13</u>	<u>A</u>	<u>10YR 7/2</u>	<u>100</u>					<u>S:L</u>	
<u>13-24</u>	<u>B</u>	<u>10YR 3M</u>	<u>70</u>					<u>S:L</u>	<u>25% cobbles</u>
		<u>10YR 4/2</u>	<u>30</u>					<u>S:L</u>	

¹Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS=Coated Sand Grains ²Location: PL = Pore Lining, RC = Root Channel, M = Matrix

Hydric Soil Indicators (check ones that apply, measure from top of mineral layers unless otherwise noted):

Standard Indicators:

- Histosol or Histel (A1)
- Histic Epipedon (A2) (8-16" organics, sat'd, underlain by mineral soil with chroma ≤2)
- Black Histic (A3)
- Hydrogen Sulfide (A4) (within 12" of mineral surface; @ _____" in this pit)
- Thick Dark Surface (A12)
- Alaska Gleyed (A13)
- Alaska Redox (A14)
- Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils³:

- Alaska Color Change⁴ (TA4)
- Alaska Alpine Swales (TA5)
- Alaska Redox with 2.5Y Hue
- Alaska Gleyed without Hue 5Y or Redder Underlying Layer
- Other (e.g., see p.91 of 2007 Supplement: explain in Remarks)

³One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
⁴Give details of color change in Remarks.

Restrictive Layer (if present) Type: _____ Depth (inches) _____	Drainage Class: <u>MWD</u> Soil Map Unit Name: _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
---	---	---

Comments:

- 1.
- 2.
- 3.

HYDROLOGY

Wetland Hydrology Indicators (check ones that apply, measure from soil surface):

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2) (w/in 12")
- Saturation (A3) (w/in 12")
- 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)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Dry-Season Water Table (C2)
- Other (explain)

Secondary Indicators (at least 2 are required)

- Water-Stained Leaves (B9)
- Drainage Patterns (B10)
- Oxid'd Rhizospheres on Living Roots (C3) (within 12")
- Presence of Reduced Iron (C4) (pos. α,α or soil color change w/in 12")
- Salt Deposits (C5)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3) (w/in 24", can perch H₂O w/in 12")
- Microtopographic Relief (D4) (caused by water)
- FAC Neutral Test (D5) (# OBL+FACW dominants > # FACU+UPL dominants)

Field Observations (in. from ground surface):

- Surface Water Present? Yes _____ No Depth of water (in.) _____
- Water Table Present? Yes _____ No Depth to water (in.) _____
- Seeping in at that depth but not yet filled?: _____
- Saturation Present? Yes _____ No Depth to sat. (in.) _____
- (includes capillary fringe) Epi Endo Unknown

Wetland Hydrology Present? Yes _____ No

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

Remarks:



Site 001. Vegetation, north view. August 16, 2021.



Site 001. Vegetation, south view. August 16, 2021.



Site 001. Soil. August 16, 2021.



Site 001. Soil. August 16, 2021.

WETLAND DETERMINATION DATA FORM – Alaska Region

Project: MP 1275 Eagle River Bridge Borough/City: MOA Date: 8/16/21
 Applicant/Owner: ARRC Sampling Point #: 004
 Investigator(s): A. Geruk + A. Davis Firm: HDR Alaska, Inc.
 Lat. (dec.) 61.313784 Long. 149.625805 ± ' NAD 83 Recorded on GPS #: Marked on map? Field Map #:
 Subregion (circle one): SE Southcentral Western Aleutian Interior Northern Landform: ditch Slope (%): - Aspect: -
 Local relief: Shape across slope: linear / convex / concave Shape up/downslope: linear / convex / concave NWI classification: PEM1C X
 Photo nos./descriptions: NE, SW, soil x1 Camera #: i Pad Veg Type (Viereck Level 4 or other): #183
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes: No: If no, explain. HGM type: slope
 Are Vegetation N, Soil Y, or Hydrology Y significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? If needed, explain answers here. wetter than normal

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the sampled area within a wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Remarks (e.g., marginal?):
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

VEGETATION (Use scientific names.) Estimate absolute % cover (not relative cover). % can total >100%.

Tree Stratum (dbh ≥ 3")							
Species	Cov.%	Dom?	Ind.	Species	Cov.%	Dom?	Ind.
1. _____	_____	_____	_____	5. _____	_____	_____	_____
2. _____	_____	_____	_____	6. _____	_____	_____	_____
3. _____	_____	_____	_____	7. _____	_____	_____	_____
4. _____	_____	_____	_____	8. _____	_____	_____	_____
Total Tree Cover: _____							

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (woody plants < 3" dbh)							
	Abs.Cov.%	Dom?	Ind.		Abs.Cov.%	Dom?	Ind.
1. <u>Bet pop</u>	<u>1</u>	_____	<u>FACU</u>	7. _____	_____	_____	_____
2. <u>Pop tre</u>	<u>1</u>	_____	<u>FACU</u>	8. _____	_____	_____	_____
3. _____	_____	_____	_____	9. _____	_____	_____	_____
4. _____	_____	_____	_____	10. _____	_____	_____	_____
5. _____	_____	_____	_____	11. _____	_____	_____	_____
6. _____	_____	_____	_____	12. _____	_____	_____	_____
Total Sapling/Shrub Cover: <u>included in trees</u>							

50% of total cover: _____ 20% of total cover: _____

Herb Stratum							
	Abs.Cov.%	Dom?	Ind.		Abs.Cov.%	Dom?	Ind.
1. <u>Egn sh</u>	<u>60</u>	<u>Y</u>	<u>OBL</u>	12. _____	_____	_____	_____
2. <u>Egn dry</u>	<u>25</u>	_____	<u>OBL</u>	13. _____	_____	_____	_____
3. <u>Pop ped</u>	<u>2</u>	_____	<u>FACU</u>	14. _____	_____	_____	_____
4. <u>Cal can</u>	<u>5</u>	_____	<u>FAC</u>	15. _____	_____	_____	_____
5. <u>Vio sp.</u>	<u>1</u>	_____	_____	16. _____	_____	_____	_____
6. <u>Egn ar</u>	<u>5</u>	_____	<u>FAC</u>	17. _____	_____	_____	_____
7. _____	_____	_____	_____	18. _____	_____	_____	_____
8. _____	_____	_____	_____	19. _____	_____	_____	_____
9. _____	_____	_____	_____	20. _____	_____	_____	_____
10. _____	_____	_____	_____	21. _____	_____	_____	_____
11. _____	_____	_____	_____	22. _____	_____	_____	_____
Total Herb Cover: <u>98</u>							

50% of total cover: 49 20% of total cover: 19.6

Circular 1/10-ac plot _____ or other plot dimension: 5x40 % of bare ground: 5
 % Cover of Wetland Bryophytes 35 % Total Cover of Bryophytes 70 %
 (where applicable)

Remarks: plot limited to ditch. Dead willows - browsed - 5% water
wetland. Algal in standing water

Dominance Test worksheet:	
Number of Dominant Species That are OBL, FACW, or FAC:	<u>1</u> (A)
Total Number of Dominant Species Across All Strata:	<u>1</u> (B)
Percent of Dominant Species That are OBL, FACW, or FAC:	<u>100</u> (A/B)

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species <u>85</u>	X1= <u>85</u>
FACW species <u>2</u>	X2= <u>4</u>
FAC species <u>10</u>	X3= <u>30</u>
FACU species <u>1</u>	X4= <u>4</u>
UPL + NL species <u>-</u>	X5= <u>-</u>
Column Totals: <u>98</u> (A)	<u>123</u> (B)
Prevalence Index = B/A = <u>1.25</u>	

Hydrophytic Vegetation Indicators:	
<input checked="" type="checkbox"/> Dominance Test is >50%	
<input checked="" type="checkbox"/> Prevalence Index is ≤3.0	
_____ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
_____ Problematic Hydrophytic Vegetation ¹ (Explain)	
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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SOIL

Sampling Point #: 004

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

Depth (in.)	Horizon (opt.)	Soil Matrix		Redox Features				α, α dip. (pos/ neg)	Remarks (or use comment number)
		Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-1	O ₁								
1-3	O ₂								
3-16	B/C	5Y 3/1	100					SAL	+ 95% coarse sand gravel L fill / Machine

¹Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS=Coated Sand Grains ²Location: PL = Pore Lining, RC = Root Channel, M = Matrix

Hydric Soil Indicators (check ones that apply, measure from top of mineral layers unless otherwise noted):

<p>Standard Indicators:</p> <p><input checked="" type="checkbox"/> Histosol or Histel (A1)</p> <p><input checked="" type="checkbox"/> Histic Epipedon (A2) (8-16" organics, sat'd, underlain by mineral soil with chroma ≤2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input checked="" type="checkbox"/> Hydrogen Sulfide (A4) (within 12" of mineral surface; @ <u>3</u>" in this pit)</p> <p><input checked="" type="checkbox"/> Thick Dark Surface (A12)</p> <p><input checked="" type="checkbox"/> Alaska Gleyed (A13)</p> <p><input checked="" type="checkbox"/> Alaska Redox (A14)</p> <p><input checked="" type="checkbox"/> Alaska Gleyed Pores (A15)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input checked="" type="checkbox"/> Alaska Color Change⁴ (TA4)</p> <p><input checked="" type="checkbox"/> Alaska Alpine Swales (TA5)</p> <p><input checked="" type="checkbox"/> Alaska Redox with 2.5Y Hue</p> <p><input checked="" type="checkbox"/> Alaska Gleyed without Hue 5Y or Redder Underlying Layer</p> <p><input type="checkbox"/> Other (e.g., see p.91 of 2007 Supplement: explain in Remarks)</p>	<p>³One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.</p> <p>⁴Give details of color change in Remarks.</p>
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Restrictive Layer (if present) Type: <u>—</u> Depth (inches) <u>—</u>	Drainage Class: <u>VPD</u> Soil Map Unit Name: <u>—</u>	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Comments:
1. toe of embankment - soils are fill/glacial moraine w/ minimal soil development
2.
3.

HYDROLOGY

<p>Wetland Hydrology Indicators (check ones that apply, measure from soil surface):</p> <p>Primary Indicators (any one indicator is sufficient)</p> <p><input checked="" type="checkbox"/> Surface Water (A1)</p> <p><input checked="" type="checkbox"/> High Water Table (A2) (w/in 12")</p> <p><input checked="" type="checkbox"/> Saturation (A3) (w/in 12")</p> <p><input checked="" type="checkbox"/> Water Marks (B1)</p> <p><input checked="" type="checkbox"/> Sediment Deposits (B2)</p> <p><input type="checkbox"/> Drift Deposits (B3)</p> <p><input checked="" type="checkbox"/> Algal Mat or Crust (B4)</p> <p><input checked="" type="checkbox"/> Iron Deposits (B5)</p> <p><input checked="" type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</p> <p><input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Marl Deposits (B15)</p> <p><input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input checked="" type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Other (explain) <u>—</u></p>	<p>Secondary Indicators (at least 2 are required)</p> <p><input checked="" type="checkbox"/> Water-Stained Leaves (B9)</p> <p><input checked="" type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Oxid'd Rhizospheres on Living Roots (C3) (within 12")</p> <p><input checked="" type="checkbox"/> Presence of Reduced Iron (C4) (pos. α, α or soil color change w/in 12")</p> <p><input checked="" type="checkbox"/> Salt Deposits (C5)</p> <p><input type="checkbox"/> Stunted or Stressed Plants (D1)</p> <p><input checked="" type="checkbox"/> Geomorphic Position (D2)</p> <p><input checked="" type="checkbox"/> Shallow Aquitard (D3) (w/in 24", can perch H₂O w/in 12")</p> <p><input type="checkbox"/> Microtopographic Relief (D4) (caused by water)</p> <p><input checked="" type="checkbox"/> FAC Neutral Test (D5) (# OBL+FACW dominants > # FACU+UPL dominants)</p>
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<p>Field Observations (in. from ground surface):</p> <p>Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth of water (in.) <u>4</u></p> <p>Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth to water (in.) <u>1</u></p> <p>Seeping in at that depth but not yet filled?: <u>—</u></p> <p>Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth to sat. (in.) <u>0</u></p> <p>(includes capillary fringe) Epi Endo Unknown</p>	<p>Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
cut for embankment intersects GW. no evidence of wetlands in undisturbed mixed forest above cut slope. wetlands also present on ditch on other side of tracks but no connectivity.

No evidence of flow throughout wet ~225 ft to WSW. wetland begins near culvert. Porcupine in culvert!



Site 004. Vegetation, north view. August 16, 2021.



Site 004. Vegetation, south view. August 16, 2021.



Site 004. Soil. August 16, 2021.

WETLAND DETERMINATION DATA FORM – Alaska Region

Project: MP1275 Eayle River Bridge Borough/City: MOA Date: 8/16/21
 Applicant/Owner: ARRC Sampling Point #: 013
 Investigator(s): A. Gerlek + A. Hovis Firm: HDR Alaska, Inc.
 Lat. (dec.) 61.321682 Long. 149.615755 ± ' NAD 83 Recorded on GPS #: Marked on map? Field Map #:
 Subregion (circle one): SE Southcentral Western Aleutian Interior Northern Landform: Transportation Corridor Slope (%): Aspect:
 Local relief: Shape across slope: linear / convex / concave Shape up/downslope: linear / convex / concave NWI classification: V
 Photo nos./descriptions: N, S, south AZ Camera #: Paul Veg Type (Viereck Level 4 or other): TIB4
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes: No: If no, explain. HGM type: N/A
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? If needed, explain answers here. wetter than normal

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the sampled area within a wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Remarks (e.g., marginal?):
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		

VEGETATION (Use scientific names.) Estimate absolute % cover (not relative cover). % can total >100%.

Tree Stratum (dbh ≥ 3")

Species	Cov.%	Dom?	Ind.	Species	Cov.%	Dom?	Ind.
1. _____	_____	_____	_____	5. _____	_____	_____	_____
2. _____	_____	_____	_____	6. _____	_____	_____	_____
3. _____	_____	_____	_____	7. _____	_____	_____	_____
4. _____	_____	_____	_____	8. _____	_____	_____	_____

Total Tree Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (woody plants < 3" dbh)

Species	Abs. Cov.%	Dom?	Ind.	Species	Abs. Cov.%	Dom?	Ind.
1. <u>Pop bal</u>	<u>60</u>	<u>Y</u>	<u>FACU</u>	7. _____	_____	_____	_____
2. <u>Pic glu</u>	<u>3</u>	_____	<u>FACU</u>	8. _____	_____	_____	_____
3. <u>Aln ten</u>	<u>16</u>	_____	<u>FAC</u>	9. _____	_____	_____	_____
4. <u>Lin bar</u>	<u>T</u>	_____	<u>FACU</u>	10. _____	_____	_____	_____
5. <u>Vac oae</u>	<u>T</u>	_____	<u>FACU</u>	11. _____	_____	_____	_____
6. <u>Ros ac</u>	<u>T</u>	_____	<u>FACU</u>	12. _____	_____	_____	_____

Total Sapling/Shrub Cover: 78

50% of total cover: 39 20% of total cover: 15.6

Herb Stratum

Species	Abs. Cov.%	Dom?	Ind.	Species	Abs. Cov.%	Dom?	Ind.
1. <u>Cha can</u>	<u>3</u>	<u>Y</u>	<u>FACU</u>	12. _____	_____	_____	_____
2. <u>Cal can</u>	<u>2</u>	<u>Y</u>	<u>FAC</u>	13. _____	_____	_____	_____
3. <u>Arn mil</u>	<u>T</u>	_____	<u>FACU</u>	14. _____	_____	_____	_____
4. <u>pur sec</u>	<u>T</u>	_____	<u>FACU</u>	15. _____	_____	_____	_____
5. <u>tar off</u>	<u>T</u>	_____	<u>FACU</u>	16. _____	_____	_____	_____
6. _____	_____	_____	_____	17. _____	_____	_____	_____
7. _____	_____	_____	_____	18. _____	_____	_____	_____
8. _____	_____	_____	_____	19. _____	_____	_____	_____
9. _____	_____	_____	_____	20. _____	_____	_____	_____
10. _____	_____	_____	_____	21. _____	_____	_____	_____
11. _____	_____	_____	_____	22. _____	_____	_____	_____

Total Herb Cover: 5

50% of total cover: 2.5 20% of total cover: 1

Circular 1/10-ac plot or other plot dimension: 10x40 % of bare ground: 10
 % Cover of Wetland Bryophytes 0 % Total Cover of Bryophytes 80 %
 (where applicable)

Remarks: plot limited to swale/gully leaf litter

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:

Species	Total % Cover of:	Multiply by:
OBL species	<u> </u>	X1= <u> </u>
FACW species	<u> </u>	X2= <u> </u>
FAC species	<u>17</u>	X3= <u>51</u>
FACU species	<u>66</u>	X4= <u>264</u>
UPL + NL species	<u> </u>	X5= <u> </u>
Column Totals:	<u>83</u> (A)	<u>315</u> (B)

Prevalence Index = B/A = 3.80

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%
N Prevalence Index is ≤3.0

____ Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ____ Problematic Hydrophytic Vegetation¹ (Explain)

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

Hydrophytic Vegetation Present? Yes No

SOIL

Sampling Point #: 013

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

Depth (in.)	Horizon (opt.)	Soil Matrix		Redox Features				α,α dip. (pos/ neg)	Remarks (or use comment number)
		Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	Oc								
2-4	A	10YR 2/1	100					Sil	
4-16	B1	10YR 3/2	100					Sal	50% rubble + gravel

¹Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS=Coated Sand Grains ²Location: PL = Pore Lining, RC = Root Channel, M = Matrix

Hydric Soil Indicators (check ones that apply, measure from top of mineral layers unless otherwise noted):

Standard Indicators:	Indicators for Problematic Hydric Soils ³ :	
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input checked="" type="checkbox"/> Alaska Color Change ⁴ (TA4)	³ One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. ⁴ Give details of color change in Remarks.
<input type="checkbox"/> Histic Epipedon (A2) (8-16" organics, sat'd, underlain by mineral soil with chroma ≤2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Alaska Redox with 2.5Y Hue	
<input type="checkbox"/> Hydrogen Sulfide (A4) (within 12" of mineral surface; @ _____" in this pit)	<input type="checkbox"/> Alaska Gleyed without Hue 5Y or Redder	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Underlying Layer	
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (e.g., see p.91 of 2007 Supplement: explain in Remarks)	
<input type="checkbox"/> Alaska Redox (A14)		
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

Restrictive Layer (if present) Type: _____ Depth (inches) _____	Drainage Class: <u>VWD</u> Soil Map Unit Name: _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
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Comments:
1. refusal on cobbles + gravel at 16"
2.
3.

HYDROLOGY

Wetland Hydrology Indicators (check ones that apply, measure from soil surface):

Primary Indicators (any one indicator is sufficient)	Secondary Indicators (at least 2 are required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input checked="" type="checkbox"/> Water-Stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2) (w/in 12")	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3) (w/in 12")	<input type="checkbox"/> Oxid'd Rhizospheres on Living Roots (C3) (within 12")
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4) (pos. α,α or soil color change w/in 12")
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input checked="" type="checkbox"/> Geomorphic Position (D2) <u>low spot / toeslope</u>
<input type="checkbox"/> Iron Deposits (B5)	<input checked="" type="checkbox"/> Shallow Aquitard (D3) (w/in 24", can perch H2O w/in 12")
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Microtopographic Relief (D4) (caused by water)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> FAC Neutral Test (D5) (# OBL+FACW dominants > # FACU+UPL dominants)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Marl Deposits (B15)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Other (explain)	

Field Observations (in. from ground surface): Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth of water (in.) _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth to water (in.) _____ Seeping in at that depth but not yet filled?: _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth to sat. (in.) _____ (includes capillary fringe) Epi Endo Unknown	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
plot at lowest spot in swale between ARK tracks + Artillery Road



Site 013. Vegetation, north view. August 16, 2021.



Site 013. Vegetation, south view. August 16, 2021.



Site 013. Soil. August 16, 2021.

Appendix C

Observation Point Photographs

August 16, 2021

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Site 002. Vegetation, south view. August 16, 2021.



Site 002. Soil. August 16, 2021.



Site 003. Vegetation, south view. August 16, 2021.



Site 003. Soil. August 16, 2021.



Site 005. Vegetation, northeast view. August 16, 2021.



Site 005. Vegetation, southwest view. August 16, 2021.



Site 006. Vegetation, southwest view. August 16, 2021.



Site 006. Soil. August 16, 2021.



Site 007. Waterbody, northeast view. August 16, 2021.



Site 007. Vegetation, southwest view. August 16, 2021.



Site 008. Waterbody, north view. August 16, 2021.



Site 008. Waterbody, south view. August 16, 2021.



Site 009. Swale, west view. August 16, 2021.



Site 009. Swale, east view. August 16, 2021.



Site 010. Waterbody, south view. August 16, 2021.



Site 010. Waterbody, north view. August 16, 2021.



Site 011. Waterbody, northeast view. August 16, 2021.



Site 011. Waterbody, northwest view. August 16, 2021.



Site 012. Vegetation, northeast view. August 16, 2021.



Site 012. Vegetation, southwest view. August 16, 2021.



Site 014. Vegetation, north view. August 16, 2021.



Site 014. Vegetation, south view. August 16, 2021.



Site 015. Vegetation, north view. August 16, 2021.



Site 015. Soil. August 16, 2021.