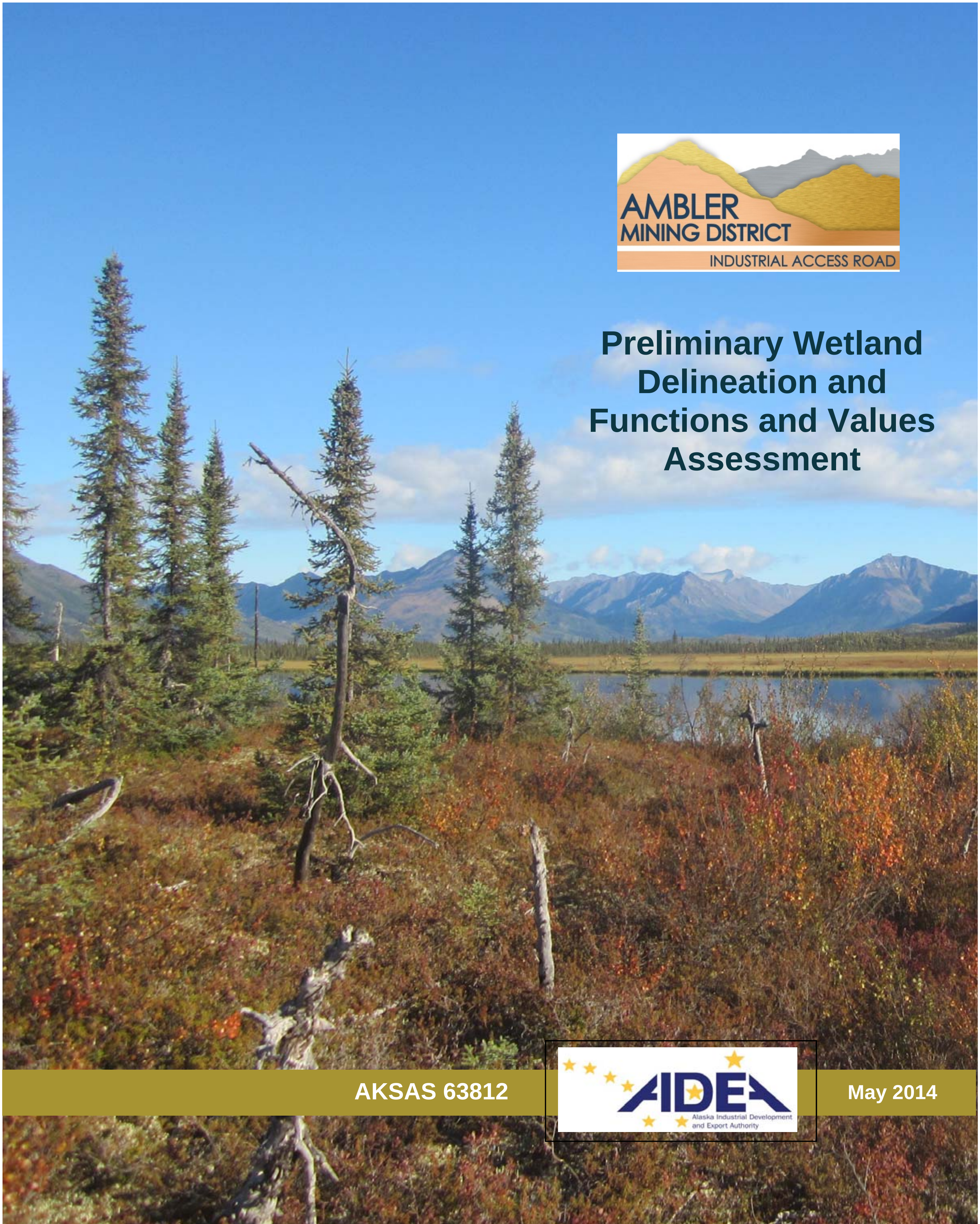

AMBLER MINING DISTRICT
INDUSTRIAL ACCESS ROAD

Preliminary Wetland Delineation and Functions and Values Assessment

AKSAS 63812

AIDEA
Alaska Industrial Development and Export Authority

May 2014

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AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

PRELIMINARY WETLAND DELINEATION AND FUNCTIONS AND VALUES ASSESSMENT

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LIST OF ACRONYMS

AIDEA .... Alaska Industrial Development and Export Authority
AMDIAR .... Ambler Mining District Industrial Access Road
CWA .... Clean Water Act
DOT&PF .... State of Alaska Department of Transportation and Public Facilities
FAA .... Federal Aviation Administration
FAC .... Facultative
FACW .... Facultative wetland
GANPP .... Gates of the Arctic National Park and Preserve
GIS .... Geographic Information Systems
HUC .... hydrological unit code
KNWR .... Kanuti National Wildlife Refuge
LiDAR .... Light Detection and Ranging
MP .... milepost
NA .... not applicable
OHWM .... ordinary high water mark
PFC .... proper functioning condition
PUBH .... Open Water Ponds
PWD .... Preliminary Wetland Delineation
RGL .... *Alaska Regulatory Guidance Letter*
RPW .... relatively permanent waters
TNW .... traditionally navigable waterway
U.S. .... United States
USDOI .... United States Department of the Interior
USACE .... United States Army Corps of Engineers
USEPA .... United States Environmental Protection Agency

EXECUTIVE SUMMARY

The Alaska Industrial Development and Export Authority is proposing a controlled-access industrial road from the Dalton Highway to the Ambler Mining District in Northwest Alaska. The industrial access road is designed to provide needed surface access to this District, which is a highly mineralized area with known deposits of copper, zinc, lead, silver, and gold. Mineral exploration and mine development in the District have been limited by the lack of surface access.

The State of Alaska Department of Transportation and Public Facilities initiated reconnaissance studies on the Ambler Mining District Industrial Access Road in 2010. The State of Alaska Department of Transportation and Public Facilities studied several potential surface corridors from the Ambler Mining District to road or rail infrastructure to the east and to potential port sites to the west. The reconnaissance studies identified the Brooks East Corridor as the most feasible surface transportation corridor for the Ambler Mining District Industrial Access Road project.

A wetland delineation study was completed for the project's Study Area in 2012 and 2013. The Study Area is defined as a 2,000-foot-wide corridor centered on the proposed road alignment. The Study Area also includes areas proposed for maintenance stations and material sites, as well as access roads to the material sites.

The 68,067-acre Study Area is comprised of: 39,949 acres of potentially jurisdictional wetlands, 1,115 acres of Waters of the United States, and 27,003 acres of uplands.

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1.0 INTRODUCTION

The Alaska Industrial Development and Export Authority (AIDEA) is proposing a controlled-access industrial road from the Dalton Highway to the Ambler Mining District in Northwest Alaska. The industrial access road is designed to provide needed surface access to the District, which is a highly mineralized area with known deposits of copper, zinc, lead, silver, and gold. Mineral exploration and mine development in the District have been limited by the lack of surface access.

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) initiated reconnaissance studies on the Ambler Mining District Industrial Access Road (AMDIAR) in 2010. DOT&PF studied several potential surface corridors from the Ambler Mining District to road or rail infrastructure to the east and to potential port sites to the west. The reconnaissance studies identified the Brooks East Corridor as the most feasible surface transportation corridor for the AMDIAR project.

This report documents the preliminary wetland delineation (PWD) completed for the project's Study Area in 2012 and 2013. This PWD details the classification and mapping of wetland and upland habitat types observed within the project Study Area. It also includes a functional value assessment for both wetland and riverine habitat types.

1.1 Project Background

1.2 Study Area

The Study Area is defined as a 2,000-foot-wide corridor centered on the proposed road alignment, beginning at the Ambler River and ending 200 miles east at the Dalton Highway (Figure 1). It also includes ancillary sites proposed for maintenance stations, landing strips, and material sites, as well as access roads to the material sites.

The route begins at the Ambler River and extends east along the northern edge of the Cosmos Hills. Prior to reaching the Gates of the Arctic National Park and Preserve (GANPP), the proposed road diverges into two alternative routes through the GANPP, referred to as the northern and southern alignments. The alternative alignments converge into a single route again on the north side of the Helpmejack Hills, east of the GANPP. The proposed road continues east, remaining north of the Alatna Hills. The proposed road would cross the Koyukuk River downstream from the John River confluence. It continues south of Bettles and Evansville, following the existing winter trail, bearing to the east/southeast along the northern boundary of the Kanuti National Wildlife Refuge (KNWR), terminating at the Dalton Highway near milepost (MP) 136. Communities closest to the Study Area include: Ambler, Kobuk, Shungnak, Alatna, Allakaket, Bettles, and Evansville.

1.2.1 Ancillary Sites

Ancillary sites include proposed material sites, maintenance stations, landing strips, and access roads, all of which connect to the proposed road alignment at various intervals throughout the Study Area. Material sites are spaced approximately every 10 miles along the proposed roadway. Landing strips are located near proposed maintenance facilities (approximately every 60 miles). Study Area boundaries for access roads connecting ancillary sites to the main project are 500-feet-wide and centered on the proposed access road centerline.

1.2.2 Ecological Regions

The 68,067-acre (106.4-square-mile) Study Area crosses two North American ecological regions (Level I): Tiaga and Northwestern Forested Mountains (Figure 2). These ecological regions are further divided into ecological sub-regions (Level III), based on climate, topography, soils, vegetation, and landform. The Study Area crosses two sub-regions: Interior Forested Lowlands and Uplands and Interior Highlands. The Study Area traverses rolling lowlands (0 to 5 percent slopes) and rounded low mountains (slopes greater than 5 percent). The lowlands are dominated by thick organic bryophyte mats with permafrost and a continental climate. These low mountains share characteristics of the lowlands (permafrost and a continental climate) but tend to have shallower mineral soils. Each ecological sub-region is prone to and/or exhibits natural fire succession; however, fire was most prevalent within the Interior Highlands.

1.2.3 Watershed Boundaries

The Study Area bisects watershed boundaries of both the Koyukuk River and Kobuk-Selawik Rivers basins. Surface water flows from the Koyukuk River basin drain into the Pacific Ocean. Flows from the Kobuk-Selawik Rivers basin drain to the Arctic Ocean. Each watershed basin is further divided into distinct sub-basins (Figure 3), distinguished by an 8-digit hydrological unit code (HUC). Seven sub-basins are contained within the Study Area (Table 2).

Table 1: Hydrological Unit Codes

HUC	Sub-basin Name
19040601	Upper Koyukuk River
19040602	South Fork Koyukuk River
19040603	Alatna River
19040605	Allakaket
19040608	Koyukuk Flats
19050302	Upper Kobuk River
19050303	Middle Kobuk River

1.2.4 Precipitation

Two weather stations are in close proximity to the Study Area; one is located approximately 1.5 miles northeast at the Bettles Airport[1], and the second is approximately 45 miles northeast in Wiseman[2].

Precipitation recorded at the Bettles Airport station during spring months preceding the 2012 and 2013 field seasons was below average (both 54 percent). Recorded summer precipitation was normal (99 percent of average) in 2012 and below normal (59 percent of average) in 2013. Overall annual precipitation for both 2012 and 2013 was normal (93 and 103 percent of average), indicating a healthy winter snowpack to make up for spring and summer deficits.

2.0 METHODS

This PWD was completed in accordance with *Part IV of the Corps of Engineers Wetlands Delineation Manual* (United States Army Corps of Engineers (USACE), 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)* (USACE, 2007). This effort included preliminary data gathering and analysis, a

[1] Bettles Federal Aviation Administration (FAA) Airport Weather Station No. 500761
[2] Wiseman Weather Station No. 509869

field investigation, post-field data review, and mapping using Geographic Information Systems (GIS) tools.

2.1 Preliminary Mapping and Classification

High-resolution aerial imagery from Aero-Metric (2012) was used to extrapolate and map potential wetland and upland habitat types within the Study Area. Information gathered from the preliminary data review and analysis was used to develop the preliminary sampling plan for the field investigation.

2.2 Field Methods

Environmental Specialists conducted field investigations of the Study Area in the summers of 2012 and 2013. The Study Area was divided into 110 perpendicular transects off the centerline, including the northern and southern alignments through the GANPP. Teams consisted of two environmental specialists and one subsistence advisor. Each field team was responsible for sampling pre-determined locations. Such locations were assigned based upon preliminary aerial interpretation of distinct vegetation communities and verified by ground truthing. Larger tracts of a particular habitat type received more sample points than smaller tracts. Photographs were taken at each sampling location (one photo per cardinal direction and one for the soil pit) to document vegetation, hydrology, topography, and other general community characteristics.

At each full sample point, soil pits were excavated to depths of at least 20 inches, or to the presence of a restrictive layer (e.g., permafrost, bedrock, or clay). Sample locations were considered a full sample point only upon excavation of a soil pit. In areas where vegetation was similar to a previously observed full sample point, it was assumed soil and hydrologic characteristics would be similar, and, thus, a photograph point was recorded. Photograph points were used to extrapolate site characteristics from full sample points to project map units across the larger Study Area.

Soil characteristics of texture, color, redoximorphic concentrations, organic depths, and sulfuric odor were recorded to document hydric indicators. Soil color was determined using *Munsell Soil-Color Charts* (2000). Hydrologic indicators documented ordinary high water marks (OHWM) and the presence or absence of inundation, high water table, soil saturation, and permafrost.

Vegetation species, stratum (tree, shrub, or herbaceous), and percent aerial coverage of each species were recorded on wetland determination data forms specific for the Alaska Region (Appendix B). Taxonomic nomenclature and the wetland indicator for each species followed the USACE's published guide, *The National Plant List: 2013 Wetland Rating* (Lichvar, R.W., 2013). Data sheets were reviewed and habitat boundaries were subsequently mapped using GIS.

2.3 Classification Systems of Habitats

Wetland habitats were dually classified according to the system guidelines outlined in the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin, et al., 1979) and the *Alaska Vegetation Classification* (Viereck, et al., 1992).

The Cowardin classification differentiates distinct wetland types by evaluating landscape position, plant community structure, and hydrologic conditions. Cowardin wetland systems include: Marine, Estuarine, Riverine, Lacustrine, and Palustrine habitats, whereas upland habitats are grouped into a single community.

Contrastingly, the Viereck classification system does not distinguish between wetland and upland habitat types; however, it allows for a hierarchical evaluation of distinct vegetation communities based on dominant growth forms (tree, shrub, or herbaceous), canopy height, percent aerial cover, general soil moisture, salinity, and dominant vegetation. Viereck was used to characterize both wetland and upland habitats.

2.4 Functions and Values Assessment

Wetland functions result from both biotic and abiotic processes performed within a wetland ecosystem (e.g., flood attenuation, nutrient cycling, etc.). The value of a particular wetland function is based on human use and judgment of the worth, merit, quality, and importance attributed to those processes performed by the wetland (USACE, 1999).

The functional rating of a wetland was recorded on data sheets using criteria outlined in the *Alaska Regulatory Guidance Letter (RGL), ID No. 09-10* (USACE, 2009). The ratings are a qualitative approach to assess wetland habitats, based upon ten processes or attributes. Results rank wetland habitats as having low, moderate, or high value, which subsequently allows comparisons of wetland habitat types within hydrologic units.

Riverine habitats are areas with defined channel beds, banks, or flowing water. These habitats were assessed using the U.S. Department of the Interior (USDOI), Bureau of Land Management, Technical Report 1737-15, *Riparian Area Management: A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas* (USDOI, 1998). The proper functioning condition (PFC) assesses whether streams/rivers are functioning properly, functioning at risk, non-functional, or unknown.

2.5 Final Mapping

Using ArcMap GIS, a geo-referenced aerial photograph from 2012 was used as a base to digitally map wetlands, vegetation community boundaries, and riverine habitats and to then calculate habitat size. Final mapping was based on aerial photograph interpretation, site photographs, Light Detection and Ranging (LiDAR) two-foot contours, and 1:24,000 scale hydrologic stream data. Field data was used to ground truth aerial photograph interpretations of preliminarily mapped communities.

2.6 Preliminary Jurisdictional Determination

Waters of the United States (U.S.), including wetlands, were analyzed to determine whether they are subject to Clean Water Act (CWA) jurisdiction under the USACE/U.S. Environmental Protection Agency (USEPA) 2007 CWA Guidance. The 2007 guidance requires a hydrological connection between wetlands and a traditionally navigable waterway (TNW): in this case, both the Kobuk and the Koyukuk Rivers.

2.7 Limitations to Methods

Limitations to the methods employed for this delineation have been identified as the following:

1. Size of project

- Sole access to this widely varying terrain occurred via helicopter
  - Data collection was limited to available and suitable landing sites
  - Helicopter landings were restricted within 0.5 miles of known raptor nests
- Aerial interpretation - densely vegetated habitats precluded identification of small drainages (less than 12 feet wide)

- The Viereck forest standard was used to map Viereck and Cowardin forest habitats

2. Multiple land owners

- Access was restricted to primarily State and Federal lands

3. Fire effects in the Study Area

- Consumed vegetation cover (mainly tree stratum)
- Devastated organic soil layers
- Increased depth to permafrost
- Altered hydrologic paths

4. Data collection spanned a two-year period

- Data was collected at different times within the growing season
  - Late-season field identification of vegetation was difficult, as vegetation inflorescence was lacking or absent
- Willow species were identified only to the genus level (based on consultation with the USACE). Field teams chose to identify wetland indicator status of willow species as:
  - Facultative wetland (FACW) in 2012, based on half of all willow species present in Alaska being ranked as FACW
  - Facultative (FAC) in 2013, based on examination of willow species inventory for Arctic Alaska, which identifies over half of observed willow species in the region as FAC

5. Technological complications

- Moisture inhibited camera function

3.0 RESULTS

The 68,067-acre Study Area is comprised of: 39,949 acres of potentially jurisdictional wetlands, 1,115 acres of Waters of the U.S., and 27,003 acres of uplands (Table 2).

Table 2: Wetland, Upland, and Waters of the United States Summary

Habitat Type	Acres	Percentage of Study Area
Wetlands	39,949	58.7
Waters of the United States	1,115	1.6
Uplands	27,003	39.7
Total	**68,067**	100.0

During field investigations, wetland classifications were grouped by larger reoccurring vegetation communities. Results are discussed according to Cowardin class of the larger habitat type and then distinguished by subclass.

3.1 Wetland, Waters of the United States, and Upland Habitat Classification

Table 3 summarizes the acreages of wetlands, waters of the U.S., and upland habitats within the Study Area. Each of these habitats can be classified based on topography, vegetation, hydrology, and soils. Classification is based on Cowardin and Viereck classification systems. The Cowardin Classification system distinguishes between wetland types based on observed vegetation, soils, and hydrologic characteristics. The Viereck classification system distinguishes between community types based on a top-down assessment of dominant vegetation by height and aerial cover.

Table 3: Wetlands, Waters of the United States, and Uplands Acreages

Habitat Type	Acres	Cowardin	Viereck
Wetlands			
Forest	18,965	PFO	IA1, IA2, IA3, IC1, IC2, IC3
Scrub-shrub	19,042	PSS	IIA1, IIA2, IIA3, IIB1, IIB2, IIC1, IIC2
Emergent Marsh	1,942	PEM	IIIA2, IIIA3
Subtotal	**39,949**	--	--
Waters of the United States			
Lake	9	L1UB	--
Pond	145	PUBH	--
River	961	R2, R3	--
Subtotal	**1,115**	--	--
Uplands			
Upland Forest	21,213	Upland	IA1, IA2, IA3, IB1, IB2, IB3, IC1, IC2, IC3
Upland Scrub-shrub	5,556	Upland	IIA1, IIA2, IIA3, IIB1, IIB2, IIC1, IIC2
Upland Meadow	163	Upland	IIIA1
Barren	71	Upland	Bare
Subtotal	**27,003**	--	--
Total	**68,067**	--	--

Cowardin Classifications:

PFO4 - Palustrine Forested Needle-leaved Evergreen
PSS1 - Palustrine Scrub-shrub Broad-leaved Deciduous
PSS4 - Palustrine Scrub-shrub Needle-leaved Evergreen
PEM1 - Palustrine Emergent Marsh Persistent
PUBH - Palustrine Open Water Unknown Bottom
L1UB - Lacustrine Limnetic Unconsolidated Bottom
R2 - Riverine Lower Perennial
R3 - Riverine Upper Perennial

Viereck Classifications:

IA1 - Closed Needle-leaved Forest
IA2 - Open Needle-leaved Forest
IA3 - Needle-leaved Woodland
IB1 - Closed Broad-leaved Forest
IB2 - Open Broad-leaved Forest
IB3 - Broad-leaved Woodland
IC1 - Closed Mixed Forest
IC2 - Open Mixed Forest
IC3 - Mixed Woodland
IIA1 - Closed Dwarf Tree Scrub
IIA2 - Open Dwarf Tree Scrub
IIA3 - Dwarf Tree Scrub Woodland
IIB1 - Closed Tall Scrub
IIB2 - Open Tall Scrub
IIC1 - Closed Low Scrub
IIC2 - Open Low Scrub
IIIA1 - Dry Graminoid Herbaceous
IIIA2 - Mesic Graminoid Herbaceous
IIIA3 - Wet Graminoid Herbaceous

Wetland habitats account for just over half of the Study Area (58.7 percent). Uplands make up 39.7 percent, and waters of the U.S. account for the remaining 1.6 percent of the Study Area. The following sections discuss each habitat type in more detail.

3.1.1 Wetland Habitats

Wetland habitat types comprise 58.7 percent of the Study Area and are identified as areas established with hydrophytic vegetation, hydric soils, and positive wetland hydrology. Wetlands consist of: 47.5 percent Palustrine Forest (PFO), 47.7 percent Palustrine Scrub-shrub (PSS), and 4.9 percent Palustrine Emergent (PEM). These habitats are correlated to the Viereck classification system.

3.1.1.1 Palustrine Forested Wetlands (PFO)

The Palustrine Forested habitat is dominated by woody vegetation greater than six (6) meters (19.7 feet) tall and exceeding 25 percent aerial cover. Forested habitats occur at higher elevations and are influenced by high water tables, instead of by prolonged inundation during the growing season. Three distinct subclasses of the forested wetland habitat type occur: 1 percent Forest Needle-leaved (PFO4), 91 percent Needle-leaved Forest/Broad-leaved Scrub-shrub (PFO4/SS1), and 8 percent Needle-leaved Forest/Needle-leaved Scrub-shrub (PFO4/SS4). These subclasses are distinguished by type of understory observed.

Viereck classifications for forested wetland habitats include: needle-leaf forest (IA) and mixed forest (IC). Modifiers describing vegetation cover consist of: 1 (closed canopy)[3], 2 (open canopy)[4], and 3 (woodland)[5].

Water regimes for forested wetlands exhibit one of two hydrologic modifiers: saturated (B) or temporarily flooded (C).

3.1.1.1.1 Needle-leaved Forest (PFO4)

This needle-leaved forest habitat is interspersed within PFO4/SS1 habitat, where aerial interpretation of dominant vegetation within this habitat consists of: Black Spruce (*Picea mariana*) and White Spruce (*Picea glauca*) with no understory.

[3] 60 – 100 percent aerial cover
[4] 25 – 59 percent aerial cover
[5] 10 – 24 percent aerial cover

3.1.1.1.2 Needle-leaved Forest/Broad-leaved Scrub-shrub (PFO4/SS1)

This needle-leaved forest/broad-leaved scrub-shrub habitat is typically located on floodplains, moderate slopes, and along the edges of open water ponds. The dominant vegetation understory consists of: Black Spruce, Cloudberry (*Rubus chamaemorus*), Alpine Blueberry (*Vaccinium uliginosum*), Rusty Labrador-Tea (*Rhododendron groenlandicum*), Swamp Birch (*Betula nana*), and multiple Willow species (*Salix spp.*). Representative sample points for this habitat include: T4-18, T5-33, T11-72, T36-230, T36-234, T41-258, T110-574, T125-663, and T144-760.

3.1.1.1.3 Needle-leaved Forest/Needle-leaved Scrub-shrub (PFO4/SS4)

This needle-leaved forest/needle-leaved scrub-shrub habitat is typically located near a transition of a PFO4/SS1 habitat with an upland. Dominant vegetation observed within this habitat consists of: Black Spruce, Northern Mountain Cranberry (*Vaccinium vitis-idaea*), Alpine Blueberry, and Swamp Birch. Representative sample points for this habitat include: T116-604, T138-739, and T142-773.

3.1.1.2 Palustrine Scrub-shrub Wetlands (PSS)

The Palustrine Scrub-Shrub wetland habitat is dominated by woody vegetation less than 3 meters (9.8 feet) tall with more than 30 percent aerial cover and a tree canopy with less than 25 percent aerial cover. This habitat is located at lower elevations, in drainages, and on the fringes of open-water ponds. Five Cowardin subclasses occur within this larger habitat type: 32 percent Broad-leaved Deciduous Shrubs (PSS1), 18 percent Broad-leaved Deciduous/Needle-leaved Evergreen Shrubs (PSS1/4), 6 percent Needle-leaved Evergreen Shrubs (PSS4), 44 percent Broad-leaved Deciduous/Persistent Emergent Marshes (PSS1/EM1), and less than 1 percent Needle-leaved Evergreen/Persistent Emergent Marshes (PSS4/EM1).

Viereck classifications for wetland scrub-shrub habitats include: dwarf trees (IIA), tall shrub (IIB), and low shrub (IIC). Vegetation modifiers for all habitats are 1 (closed canopy) and 2 (open canopy). Modifier 3 (woodland) is only for dwarf trees.

Each of these subclasses exhibit one of three hydrologic modifiers: saturated (B), temporarily flooded (C), or permanently flooded (H).

3.1.1.2.1 Broad-leaved Deciduous Shrubs (PSS1)

This scrub-shrub habitat type is typically located on hillsides and drainages. Dominant vegetation observed within this habitat consists of: Rusty Labrador-Tea, Swamp Birch, Black Spruce, White Spruce, Sitka Alder (*Alnus viridis*), and Alpine Blueberry. Representative sample points for this habitat include: T1-1, T5-28, T27-159, T126-664, and T146-803.

3.1.1.2.2 Broad-leaved Deciduous/Needle-leaved Evergreen Shrubs (PSS1/4)

Similarly, the mixed scrub-shrub habitat type also occurs in depressions and drainages. Dominant vegetation observed within this habitat consists of: Swamp Birch, Northern Mountain Cranberry, Swollen Beaked Sedge (*Carex rostrata*), Alpine Blueberry, Black Crowberry (*Empetrum nigrum*), Rusty Labrador-Tea, Tussock Cotton-Grass (*Eriophorum vaginatum*), Cloudberry, Black Spruce, Tall Cotton-Grass (*Eriophorum angustifolium*), White Spruce, Bluejoint (*Calamagrostis Canadensis*), Willow species, Woodland Horsetail (*Equisetum sylvaticum)*, Leatherleaf (*Chamaedaphne calyculata)*, Field Horsetail (*Equisetum arvense*), and Running Ground-Pine (*Lycopodium clavatum*). Representative sample points for this habitat include: T2-9, T4-27, T5-34, T100-503, T123-651, T127-678, T128-684, and T143-752.

3.1.1.2.3 Needle-leaved Evergreen Shrubs (PSS4)

This habitat occurs on flat terrain at lower elevations. Dominant vegetation observed within this habitat consists of: Small Cranberry (*Vaccinium oxycoccos*), Black Spruce, Cloudberry, Rusty Labrador-Tea, and Alpine Blueberry. Representative sample points for this habitat include: T2-10, T35-193, T147-774, and T142-746.

3.1.1.2.4 Broad-leaved Deciduous/Persistent Emergent Marsh (PSS1/EM1)

The mixed broad-leaved scrub-shrub and emergent herbaceous understory is typically associated with drainages, small streams, and open-water ponds with more than 30 percent aerial vegetation cover. Dominant vegetation consists of: Willow species, Bluejoint, Northwest Territory Sedge (*Carex utriculata*), Tall Cottongrass, Black Spruce, Alpine Blueberry, Black Crowberry, Montana Sedge (*Carex media*), Purple Marshlocks (*Comarum palustre*), Sweetgale (*Myrica gale*), Swollen Beaked Sedge, Dwarf Red Raspberry (*Rubus pubescens*), Field Horsetail, and

Small Cranberry. Representative sample points for this habitat include: T3-14, T5-29, T37-207, T43-266, T109-564, T130-691, T136-731, and T146-770.

3.1.1.2.5 Needle-leaved Evergreen/Persistent Emergent Marsh (PSS4/EM1)

This needle-leaved evergreen scrub-shrub/persistent emergent marsh habitat is located sporadically as depressions within PFO habitats and as raised mounds within PEM1 habitats. Dominant vegetation observed within this habitat type consists of: Black Spruce, Alpine Blueberry, Tussock Cotton-Grass, Bog-Rosemary (*Andromeda polifolia*), Small Cranberry, Rusty Labrador-Tea, Swamp Birch, and Northern Mountain Cranberry. Representative sample points for this habitat include: T6-36, T127-673, T130-690, T144-756, and T145-762.

3.1.1.3 Palustrine Emergent Wetlands (PEM)

Emergent persistent habitats are located in depressions, along stream banks, and along the fringes of open-water ponds where groundwater is above or near the surface for most of the growing season. Two Cowardin subclasses compose the emergent wetlands within the Study Area: 33 percent Emergent Persistent (PEM1) and 67 percent Emergent Persistent/Scrub-shrub (PEM1/SS1).

The Viereck classification for emergent marsh habitats is wet graminoid herbaceous (IIIA3).

Water regimes for emergent wetlands exhibit one of three hydrologic modifiers: saturated (B), temporarily flooded (C), or permanently flooded (H).

3.1.1.3.1 Emergent Persistent (PEM1)

Emergent habitats occur mainly along streams and open water ponds. Dominant vegetation observed within this habitat consists of: Alpine Blueberry, Willow species, Purple Marshlocks, Swollen Beaked Sedge, Dwarf Red Raspberry, Dwarf Birch (*Betula nana*), Tussock Cotton-Grass, Bluejoint, Black Spruce, Northwest Territory Sedge, Field Horsetail, Tall Cotton-Grass, Bog-Rosemary, and Mud Sedge (*Carex limosa)*. Representative sample points for this habitat include: T2-11, T3-19, T8-49, T36-238, T41-260, T110-583, and T124-656.

3.1.1.3.2 Emergent Persistent/Broad-leaved Shrubs (PEM1/SS1)

This wetland type occurs equally along the fringes of open-water ponds and streams. Dominant vegetation observed within this habitat consists of: multiple Willow species, Dwarf Red Raspberry, and Bluejoint. Sample points taken within this habitat type include: 210 and T103-521.

3.1.2 Waters of the United States Habitats

The CWA's definition of "Waters of the U.S." includes wetlands. The habitats identified in this report as Waters of the U.S. are floatable water bodies per 33 CFR (Code of Federal Regulations) Part 328, Definition of Waters of the U.S. Waters of the U.S. comprise 1.6 percent of the Study Area (see Table 3). The Cowardin classifications within this habitat consist of: 1 percent Lacustrine Littoral Unconsolidated Bottom (L1UB), 13 percent Palustrine Unconsolidated Bottom (PUB), less than 1 percent Riverine Lower Perennial (R2), and 86 percent Riverine Upper Perennial (R3).

The Viereck classification does not apply to waters of the U.S., as it is designed to classify vegetation communities.

3.1.2.1 Lacustrine Littoral Unconsolidated Bottom (L1UB)

Lacustrine littoral unconsolidated bottom is characterized by areas inundated with over six inches of water and surface area larger than 20 acres. Only small portions (9.4 acres) of L1UB occur within the Study Area.

3.1.2.2 Palustrine Unconsolidated Bottom (PUB)

Palustrine unconsolidated bottoms (ponds) are areas inundated for prolonged periods during the growing season by six or more inches of water for areas less than 20 acres in size. These depressional features are geographically dispersed across the Study Area. Representative photographic points include: T8-49, T17-122, T17-124, T18-105, 181, T104-526, T104-529, T107-557, and T108-563.

3.1.2.3 Riverine Lower Perennial (R2)

Riverine lower perennials identified by aerial interpretation are streams or rivers characterized by low to moderate gradients, moderate to high sinuosity, moderate to high width/depth ratios, and substrates varying from silts to gravels.

3.1.2.4 Riverine Upper Perennial (R3)

Riverine upper perennials are streams or rivers characterized by moderate to high gradients, typically low sinuosity, low width/depth ratios, and substrates varying from organic matter to boulders. Representative photographic points include: D-5, D-10, T6-39, T11-69, T17-101, T26-178, T101-509, T109-573, and T142-775.

3.1.3 Upland Habitats

Upland areas comprise 39.7 percent of the Study Area (see Table 3) and are typically located at higher elevations and on steeper slopes. The Viereck classification system is used to distinguish changes in vegetation, as the Cowardin system lumps all uplands into one classification.

Forest habitats account for the majority (78.5 percent) of the uplands in the Study Area. Scrub-shrub habitats make up another 20.6 percent of the uplands. Meadow and barren habitats comprise less than 1 percent of the upland habitats in the Study Area.

3.1.3.1 Upland Forest (IA, IB, and IC)

Upland forested habitats are dominated by woody vegetation greater than meters (19.7 feet) tall, with more than 25 percent aerial cover. These habitats are located at higher elevations and exhibit increased depths to permafrost, have mineral soil, or lack soil development. This habitat contains Viereck classifications of: 85 percent needle-leaved forest (IA), 2 percent broad-leaved forest (IB), and 13 percent mixed forest (IC). This classification is further defined by the amount of aerial cover of the tree stratum: greater than 60 percent (1), between 25 to 59 percent (2), and between 10 to 24 percent (3).

IA habitats have a minimum of 10 percent aerial coverage of needle-leaved trees and are located upslope from Palustrine forests, Palustrine shrubs, and on elevated floodplains. Dominant vegetation observed within this habitat consists of: Prickly Rose (*Rosa acicularis*), Dwarf Marsh Violet (*Viola epipsila*), Willow spp., Mountain Deathcamas (*Zigadenus elegans*), Elegant Milk-

Vetch (*Astragalus eucosmus*), Small-Flower Thimbleweed (*Anemone parviflora*), Fowl Bluegrass (*Poa palustris*), Alaska Paper Birch (*Betula neoalaskana*), Steven's Meadowsweet (*Spiraea stevenii*), Interrupted Club-Moss (*Lycopodium annotinum, also known as Spinulum annotinum*), Black Spruce, Sitka Alder, Swamp Birch, Alpine Blueberry, Field Horsetail, Running Ground-Pine, Northern Mountain Cranberry, Black Crowberry, Cloudberry, Rusty Labrador-Tea, White Spruce, and Bluejoint. Sample points for this habitat include: 26, 30, 147, 208, T10-64, T27-155, T28-161, T28-186, T35-222, T100-504, T101-511, and T120-631.

IB habitats range from 10 to greater than 60 percent of broad-leaved tree stratum located on steep slopes or ridgelines. Dominant vegetation observed within this habitat consists of: Alaska Paper Birch, Black Spruce, Swamp Birch, Bluejoint, White Spruce, Alpine Blueberry, Field Horsetail, Northern Bog Club-Moss (*Lycopodium inundata)*, Rusty Labrador-Tea, Cloudberry, Black Crowberry, Interrupted Club-Moss, Norway Sedge (*Carex norvegica)*, Sitka Alder, Common Red Raspberry (*Rubus idaeus*), Narrow-leaf Fireweed (*Chamaenerion angustifolium)*, Willow species, False Toadflax (*Geocaulon lividum*), Balsam Poplar (*Populus balsamifera*), Dwarf Red Raspberry, Larkspur-Leaf Monkshood (*Aconitum delphiniifolium*), Russet Buffalo-Berry (*Shepherdia Canadensis*), Quaking Aspen (*Populus tremuloides*), Northern Mountain Cranberry, Meadow Fescue (*Festuca pratensis*), American Twinflower (*Linnaea borealis*), and Mountain Deathcamas. Representative observation points for this habitat include: 7, 129, 169, 191, T11-67, T110-585, T110-592, T120-633, and T123-646.

IC habitats range from 10 to greater than 60 percent mixed tree stratum located upslope from Palustrine forests and Palustrine shrubs and on elevated floodplains. Dominant vegetation observed within this habitat consists of: White Spruce, Quaking Aspen, Alpine Blueberry, Northern Mountain Cranberry, Black Crowberry, False Toadflax, Rusty Labrador-Tea, Balsam Poplar, Prickly Rose, American Twinflower, Bluejoint, Dwarf Marsh Violet, Black Spruce, Swamp Birch, Willow species, and Norway Sedge. Representative observation points for this habitat include: T14-83, T21-140, T21-146, T22-127, and T22-131.

3.1.3.2 Upland Scrub-shrub (IIB, IIC, and IID)

The upland shrub habitats are dominated by woody vegetation less than six meters (19.7 feet) tall. These habitats are located where groundwater is typically greater than 12 inches beneath the ground surface for most of the growing season. This habitat contains Viereck classifications of 50 percent tall shrub (IIB), 50 percent low shrub (IIC), and less than 1 percent dwarf shrub (IID). This classification is defined by aerial coverage of the shrub stratum being greater than 75 percent as closed (1) and as open (2) when aerial coverage is between 25 and 75 percent.

IIB habitats consist of woody vegetation greater than 1.2 meters (four feet) tall and occur in a variety of locations ranging from flat floodplains to steep slopes. Dominant vegetation observed within this habitat consists of: Willow species, Fowl Bluegrass, Purple Marshlocks, Field Horsetail, Black Spruce, Norway Sedge, Sitka Alder, Meadow Horsetail (*Equisetum pretense)*, Small-Flower Thimbleweed, Alaska Paper Birch, Black Crowberry, Alpine Blueberry, and Bluejoint. Representative observation points for this habitat include: 108, 141, T1-2, T104-531, and T107-555.

IIC habitats consist of woody vegetation ranging from 0.25 to 1.2 meters (ten inches to four feet) high in locations varying from flat floodplains to steep slopes. Dominant vegetation observed within this habitat consists of: Alpine Blueberry, Black Crowberry, Swollen Beaked Sedge, Swamp Birch, Golden-Hardhack (*Dasiphora fruticosa*), Tall Cotton-Grass, Serpent-Grass (*Bistorta vivipara*), Black Spruce, Black Crowberry, Northern Mountain Cranberry, Cloudberry, Rusty Labrador-Tea, Dwarf Red Raspberry, Bluejoint, Balsam Poplar, Willow species, Narrow-leaf Fireweed, and Woodland Horsetail. Representative observation points for this habitat include: 112, 115, 137, T4-21, T10-68, T45-247, T102-517, and T124-654.

IID habitats consist of woody vegetation less than 0.25 meters (ten inches) tall and located at higher elevations with shallow soil development. Dominant vegetation observed within this habitat consists of: Black Spruce, Swamp Birch, Alpine Blueberry, Rusty Labrador-Tea, Interrupted Club-Moss, and Norway Sedge. Representative observation points for this habitat include: 214 and T10-66.

3.1.3.3 Upland Meadow (IIIA)

This upland habitat is dominated by non-woody herbaceous vegetation. These habitats are located where groundwater is typically greater than 12 inches beneath the ground surface for most of the growing season. Dominant vegetation observed within this habitat consists of:

Bluejoint, Alpine Blueberry, Tussock Cotton-Grass, Swollen Beaked Sedge, and Common Mare's-Tail (*Hippuris vulgaris*). A representative observation point for this habitat is: T5-35.

3.2 Hydrologic Connection

Waters of the U.S., including wetlands, were analyzed under the USACE/USEPA June 2007 CWA Guidance, to evaluate the hydrologic connection to TNW. Based on 2012 and 2013 observations, tributaries flow throughout most of the growing season and are relatively permanent waters (RPW). Wetlands within each HUC are adjacent to these RPW, which eventually flow into a TNW.

The Study Area crosses seven hydrologic sub-basins based on eight-digit HUC boundaries (Figure 3). Half of the mapped wetlands are connected to the Kobuk River via tributaries or RPW. The remaining wetlands are connected to the Koyukuk River via tributaries or RPW. TNWs within the Study Area are the Kobuk and Koyukuk Rivers, flowing to the Arctic and Pacific Oceans respectively.

HUC hierarchy is based on common draining points:

- Alaska (19) Region

  Yukon River Basin (1904) Sub-region

  - Koyukuk River (190406) Basin

    Upper Koyukuk (19040601)

    South Fork Koyukuk (19040602)

    Alatna River (19040603)

    Allakaket (19040605)

    Koyukuk Flats (19040608)

  Northwest Basin (1905) Sub-region

  - Kobuk-Selawik Rivers (190503) Basin

    Middle Kobuk River (19050303)

    Upper Kobuk River (19050302)

3.3 Functions and Values Assessment

Functions performed by wetlands and waters of the U.S. are biotic (e.g., general habitat suitability, native plant species richness) and abiotic (e.g., sediment removal, nutrient and toxicant removal) processes. The value of wetland functions is based on human use of these habitats and judgment of worth, merit, quality, and importance of the processes they perform. Wetland and pond (PUB) habitats are evaluated using the *Alaska Regulatory Guidance Letter (RGL), ID No. 09-01* (USACE, 2009). Riverine habitats are evaluated using the *Technical Report 1737-15* (USDOI, 1998).

Functions and values worksheets for wetlands, ponds, and riverine habitats can be found in Appendix C.

3.3.1 Wetland and Pond Habitats

Wetland habitats and ponds were evaluated based on ten attributes and were rated as low, moderate, high, or not applicable (NA). Attributes include: flood flow attenuation, sediment removal, nutrient and toxicant removal, erosion control and shoreline stabilization, production of organic matter and its exports, general habitat suitability, general fish habitat, native plant species richness, education and scientific, and uniqueness and heritage.

3.3.1.1 Forested Wetland Assessment

Forested wetland habitats account for 47 percent of wetlands. Highest-rated functions provided by this habitat include: nutrient and toxicant removal, general habitat suitability, and native plant richness. The overall functional value for this habitat range is low, except in HUCs 19050303, 19050302, and 19060402, where it has been adjusted based on rarity within these HUCs ranging from moderate to high.

3.3.1.2 Scrub-shrub Wetland Assessment

Scrub-shrub wetland habitat accounts for 48 percent of wetlands. Highest-rated functions provided by this habitat include: flood flow alteration, nutrient and toxicant removal, and general habitat suitability. The overall functional value for this habitat is moderate to high, except in HUCs 19050303 and 19050302, where it is low, since it is the most common wetland type.

3.3.1.3 Emergent Wetland Assessment

Emergent wetland habitat is the least abundant (5 percent) wetland. Highest-rated functions provided by this habitat include: flood flow alteration, nutrient and toxicant removal, erosion control and shoreline stabilization, and general habitat suitability. The overall functional value for this habitat is high, due to its relative rarity, except in HUC 19050303 where it is more common and thus considered of moderate value.

3.3.1.4 Pond Assessment

Pond habitats account for 13 percent of waters of the U.S., which comprise less than 2 percent of the total Study Area. Highest-rated functions provided by this habitat include: sediment removal, nutrient and toxicant removal, erosion control and shoreline stabilization, and general habitat suitability. The overall functional value for this habitat is considered high due to its relative rarity.

3.3.2 Riverine Habitats

Riverine habitats were evaluated based on three attributes (hydrology, vegetation, and erosion/deposition) and were rated as proper functioning condition (PFC), functional-at risk, nonfunctional, or unknown.

3.3.2.1 Riverine Upper Perennial Assessment

Riverine upper perennial are the most common (86 percent) waters of the U.S. encountered in the Study Area. The majority of these rivers and streams are rated as PFC, except for rivers and streams located mainly along the eastern portion of the Study Area, where fires have occurred within the past five (5) years.

3.3.2.2 Riverine Lower Perennial Assessment

Riverine lower perennial are the least common (0.1 percent) waters of the U.S. These low-gradient streams have high beaver activity and are rated as PFC.

3.3.3 Functions and Values Modification

Wetland and riverine values are also a function of their prevalence within a HUC boundary. Waters of the U.S. (PUBH, L1UB, R2, and R3) and wetland habitats were ranked by prevalence as abundant (≥ 50 percent), common (between 15 and 50 percent), or rare (≤ 15 percent). Wetland habitats rare in a given HUC have their functional rating increased by one classification (e.g., from low to moderate). Wetland habitats abundant in a given HUC have their functional rating decreased by one classification (e.g., from high to moderate).

4.0 DISCUSSION

4.1 Fire Effects

Fire is a natural or man-made disturbance, capable of transforming landscapes by altering chemical, biological, and/or physical processes. Common transformations observed after a fire include:

- removal of vegetation strata(s),
- loss of organic soils,
- increased depth to permafrost,
- higher soil temperatures, and
- intensified erosion.

Features most commonly disturbed by fire are key indicators used to delineate wetlands. With the removal or alteration of these indicators, a wetland could mistakenly be delineated as upland habitat, and additional care must be taken during the examination of these disturbed areas. However, once chemical, biological, and/or physical processes surpass key thresholds, the changes become permanent, and the habitat stabilizes as upland.

Based on differences between aerial mapping and field observations, potential wetland habitats affected by fire are in one of three states: initial, stabilizing, or final. In the initial state, typically zero (0) to nine (9) years after a fire, drastic shifts are observed from hydrophytic to non-hydrophytic vegetation, loss of organic soils, and depth to permafrost. During the stabilization state, typically ten (10) to nineteen (19) years after a fire, the chemical, biological, and physical processes have begun to stabilize by increasing shrub/tree stratum and/or accumulation of surface organics; however, significant features (e.g., forested areas or organic layers) may not have returned to pre-fire levels. The final state typically occurs 20 years or longer after the fire occurs. The original landscape habitat will have transitioned back to pre-fire condition, to another wetland habitat (e.g., from forested wetland to emergent), or permanently converted to an upland habitat, except for forested wetlands. Forested wetland areas have been observed to be woodlands or young forests, fifty (50) years after a fire event.

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APPENDIX A

Tables and Figures

Table A1................................Precipitation Data Compared to 1981 to 2010 Average Precipitation
Table A2..Vegetation within the Study Area
Table A3...Bryophytes in the Study Area

Figure 1 ....Location Vicinity Map
Figure 2 .... North America Ecological Regions: Alaska Region
Figure 3 ....Hydrologic Sub-basins
Figures 4-6 ....Fire Coverage

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Table A1: Precipitation Data Compared to 1981 to 2010 Average Precipitation

Month	Precipitation Average 1981 to 2010		Precipitation Data 2012		Precipitation Data 2013	
	Bettles	**Wiseman**	**Bettles**	**Wiseman**	**Bettles**	**Wiseman**
January	0.81	0.92	0.56	Δ	1.86	Δ
February	0.85	0.85	0.63	Δ	0.35	Δ
March	0.58	0.38	0.29	Δ	0.68	0.16
April	0.60	0.58	0.10	Δ	0.38	0.04
May	0.88	1.09	0.72	0.47	0.06	0.10
June	1.40	1.81	**1.09**	**2.80**	0.77	0.66
July	2.36	2.43	**1.98**	**1.50**	**1.77**	**2.47**
August	2.64	2.13	**3.27**	**4.63**	**1.23**	**1.66**
September	1.91	1.67	4.07	5.49	**1.84**	**2.46**
October	1.04	0.82	0.80	1.00	3.03	3.11
November	0.91	0.73	0.00	0.00	2.83	2.88
December	0.92	0.87	0.30	0.05	0.55	1.00
Annual	**14.90**	**14.28**	**13.81**	**15.94**	**15.35**	**14.54**

Δ = Missing Data

Bolded Numbers indicate Data recorded during Field Investigation

Bettles FAA Airport Weather Station (500761)

Wiseman Weather Station (509869)

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Table A2: Vegetation within the Study Area

Scientific Name	Common Name	Wetland Indicator Status
Achillea sibirica	Siberian yarrow	NI
Aconitum delphiniifolium	Larkspur-Leaf Monkshood	FAC
Acrtagrostis latifolia	Broad-Leaf Arctic-Bent	FACW
Adoxa moschatellina	Muskroot	FAC
Alnus viridis	Sitka Alder	FAC
Andromeda polifolia	Bog-Rosemary	OBL
Anemone parviflora	Small-Flower Thimbleweed	FACU
Anemone spp.	Thimbleweed	FAC-FACU
Arctostaphylos rubra	Red Torpedoberry	FAC
Arctostaphylos uva-ursi	Red Bearberry	UPL
Arctous alpinus	Black Torpedoberry	FACU
Arnica chamissonis	Leafy Leopardbane	FACW
Arnica sp.	Leopardbane	FAC-FACW
Astragalus alpinus	Alpine Milk-Vetch	FAC
Astragalus australis	Indian Milk-Vetch	NI
Astragalus eucosmus	Elegant Milk-Vetch	UPL
Betula glandulosa	Resin Birch	FAC
Betula nana	Dwarf or Swamp Birch	FAC
Betula neoalaskana	Alaska Paper Birch	FACU
Betula papyrifera	Paper Birch	FAC
Boschniakia rossica	Northern Groundcone	FACU
Calamagrostis Canadensis	Bluejoint	FAC
Calamagrostis deschampsioides	Circumpolar Reed Grass	FACW
Carex aquatilis	Leafy Tussock Sedge	OBL
Carex capillaris	Hair-Like Sedge	FACW
Carex fuliginosa	Short-Leaf Sedge	FAC
Carex interior	Inland Sedge	OBL
Carex laeviculmis	Smooth-Stem Sedge	FACW
Carex limosa	Mud Sedge	OBL
Carex livida	Livid Sedge	OBL
Carex macrochaeta	Alaska Long-Awn Sedge	FACW
Carex media	Montana Sedge	FACW
Carex norvegica	Norway Sedge	FACW
Carex rostrata	Swollen Beaked Sedge	OBL
Carex sp.	Sedge	FAC-OBL
Carex stylosa	Long-Style Sedge	FACW

Scientific Name	Common Name	Wetland Indicator Status
Carex utriculata	Northwest Territory Sedge	OBL
Carex viridula	Little Green Sedge	OBL
Chamaedaphne calyculata	Leatherleaf	FACW
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Comarum palustre	Purple Marshlocks	OBL
Coptis trifolia	Three-Leaf Goldthread	FAC
Cornus Canadensis	Canadian Bunchberry	FACU
Cornus suecica	Dwarf Bog Bunchberry	FAC
Dasiphora fruticosa	Golden-Hardhack	FAC
Delphinium glaucum	Tower Larkspur	FACW
Dryas drummondii	Yellow Mountain-Avens	FACU
Dryas integrifolia	White Mountain-Avens	FACU
Dryas octopetala	Eightpetal Mountain-Avens	UPL
Elymus lanceolatus	Streamside Wild Rye	UPL
Elymus sp.	Wild Rye	FAC-UPL
Empetrum nigrum	Black Crowberry	FAC
Epilobium anagallidifolium	Pimpernel Willowherb	FAC
Epilobium lactiflorum	White Flower Willowherb	FACW
Equisetum arvense	Field Horsetail	FAC
Equisetum fluviatile	Water Horsetail	OBL
Equisetum hyemale	Tall Scouring-Rush	FACW
Equisetum palustre	Marsh Horsetail	FACW
Equisetum pretense	Meadow Horsetail	FACW
Equisetum scirpoides	Dwarf Scouring-Rush	FACU
Equisetum sylvaticum	Woodland Horsetail	FAC
Eriophorum angustifolium	Tall Cotton-Grass	OBL
Eriophorum scheuchzeri	White Cotton-Grass	OBL
Eriophorum vaginatum	Tussock Cotton-Grass	FACW
Festuca altaica	Rough Fescue	FAC
Festuca pratensis	Meadow Fescue	FACU
Festuca sp.	Fescue	FAC-FACU
Galium boreale	Northern Bedstraw	FACU
Geocaulon lividum	False Toadflax	FACU
Geranium bicknellii	Bicknell's Cransbill	NI
Glyceria grandis	American Manna Grass	OBL
Hedysarum alpinum	Alpine Sweet-Vetch	FACU
Hippuris vulgaris	Common Mare's-Tail	OBL
Juniperus communis	Common Juniper	UPL

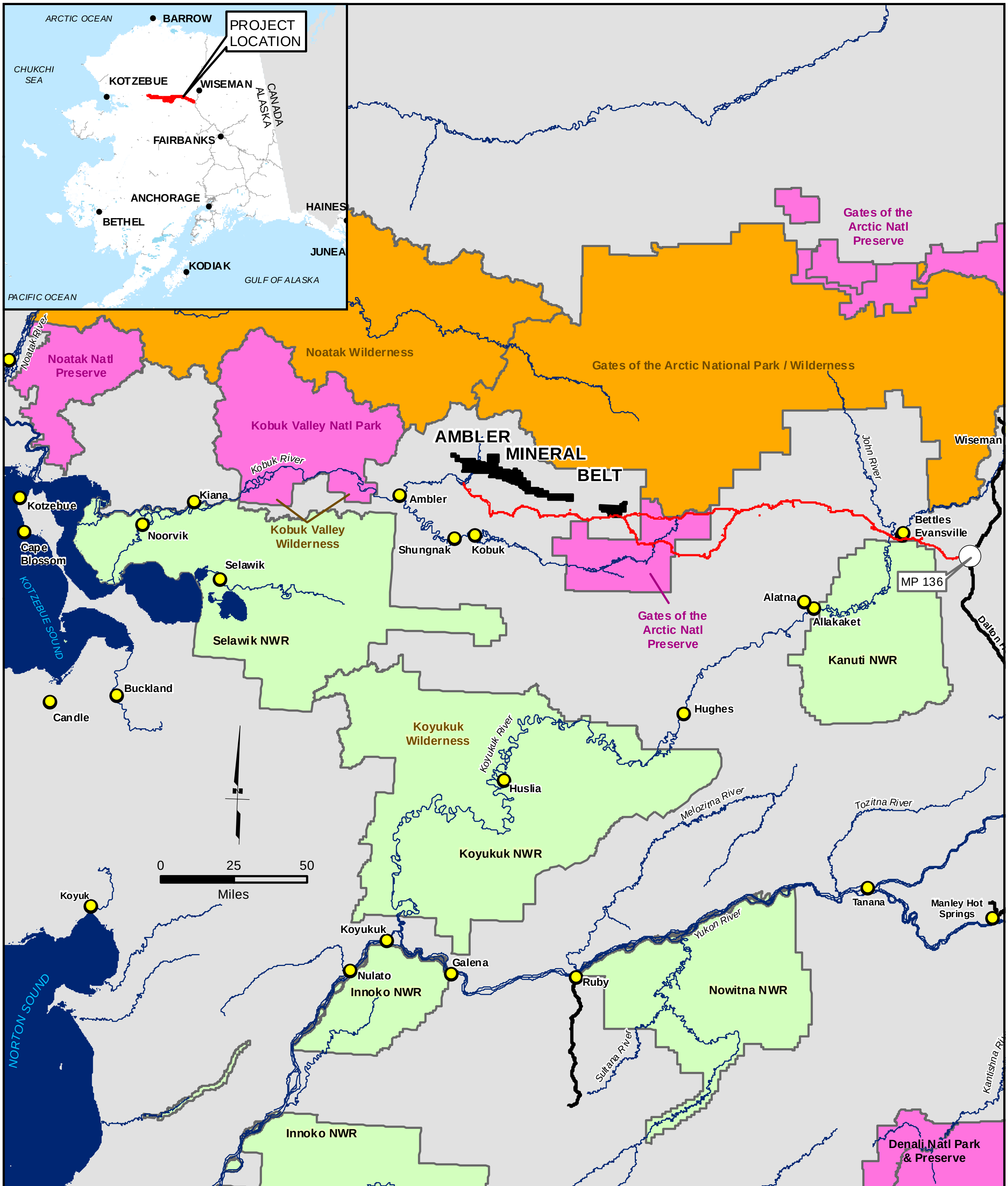
Scientific Name	Common Name	Wetland Indicator Status
Larix laricina	American Larch	FACW
Ledum groenlandicum	Bog Labrador Tea	FAC
Linnaea borealis	American Twinflower	FACU
Lupinus arcticus	Arctic Lupine	FACU
Lycopodium annitonium	Interrupted Club-Moss	FACU
Lycopodium inundata	Northern Bog Club-Moss	OBL
Lycopodium clavatum	Running Ground-Pine	FACU
Mertensia paniculata	Tall Bluebells	FACU
Moneses uniflora	Single-Delight	FACU
Myrica gale	Sweetgale	OBL
Orthilia secunda	Sidebells	FACU
Parnassia palustris	Marsh Grass-of-Parnassus	FACW
Pedicularis labradorica	Labrador Lousewort	FACW
Petasites frigidus	Arctic Sweet-Colt's-Foot	FACW
Picea glauca	White Spruce	FACU
Picea mariana	Black Spruce	FACW
Picea sitchensis	Sitka Spruce	FACU
Picea sp.	Spruce	FACU-FACW
Platanthera aquilonis	Northern green orchid	TBD
Poa palustris	Fowl Blue Grass	FAC
Poa species	Blue Grass	FAC-UPL
Polemonium acutiflorum	Tall Jacob's-Ladder	FAC
Polygonum viviparum	Serpent-Grass	FAC
Populus balsamifera	Balsam Poplar	FACU
Populus tremuloides	Quaking Aspen	FACU
Potamogeton gramineus	Grassy Pondweed	OBL
Potentilla nivea	Snow Cinquefoil	FACU
Pulsatilla patens	Eastern Pasqueflower	NI
Pyrola asarifolia	Pink Wintergreen	FACU
Pyrola minor	Snowline Wintergreen	FAC
Ranunculus abortivus	Kidney-Leaf Buttercup	FAC
Ranunculus cymbalaria	Alkali Buttercup	OBL
Ranunculus lapponicus	Lapland Buttercup	OBL
Ranunculus occidentalis	Western Buttercup	FACW
Rhododendron groenlandicum	Rusty Labrador-Tea	FAC
Rhododendron lapponicum	Lapland Rhododendron	FAC
Ribes triste	Swamp Red Currant	FAC
Rosa acicularis	Prickly Rose	FACU

Scientific Name	Common Name	Wetland Indicator Status
Rubus arcticus	Northern Blackberry	FACU
Rubus chamaemorus	Cloudberry	FACW
Rubus idaeus	Common Red Raspberry	FACU
Rubus pedatus	Strawberry-Leaf Raspberry	FAC
Rubus pubescens	Dwarf Red Raspberry	FACW
Rumex occidentalis	Western Dock	OBL
Salix barclayi	Barclay's Willow	FAC
Salix bebbiana	Gray Willow	FAC
Salix species	Willow	FACU-OBL
Schedonorus pratensis	Meadow False Rye Grass	FACU
Senecio lugens	Small Black-Tip Ragwort	FAC
Shepherdia Canadensis	Russet Buffalo-Berry	FACU
Sium suave	Hemlock Water-Parsnip	OBL
Solidago multiradiata	Rocky Mountain Goldenrod	FACU
Spinulum annotinum	Interrupted Club-Moss	FACU
Spiraea stevenii	Steven's Meadowsweet	FACU
Stellaria calycantha	Northern Bog Starwort	FACW
Streptopus amplexifolius	Clasping Twistedstalk	FACU
Symphyotrichum boreale	Boreal American-Aster	OBL
Symphyotrichum species	Aster species	FACU-OBL
Thalictrum occidentale	Western Meadow-Rue	FACU
Trientalis europaea	Arctic Starflower	FACU
Vaccinium alaskaense	Alaska Blueberry	FAC
Vaccinium caespitosum	Dwarf Blueberry	FACW
Vaccinium oxycoccos	Small Cranberry	OBL
Vaccinium uliginosum	Alpine Blueberry	FAC
Vaccinium vitis-idaea	Northern Mountain Cranberry	FAC
Valeriana sitchensis	Sitka Valerian	FAC
Viburnum edule	Squashberry	FACU
Viola epipsila	Dwarf Marsh Violet	FACW
Viola palustris	Alpine-Marsh Violet	FAC
Viola species	Violet	FAC
Zigadenus elegans	Mountain Deathcamas	FACU

FAC Facultative: species equally likely to occur in wetlands and non-wetlands
FACU Facultative Upland: species usually occurs in non-wetlands
FACW Facultative Wetland: species usually occurs in wetlands
OBL Obligate: species almost always occurs in wetlands
NI No Indicator: species is not listed in National List of Plant Species that Occur in Wetlands
UPL Upland: species almost always occurs in non-wetlands
TBD To be determined

Table A3: Bryophytes in Study Area

Scientific Name	Common Name
Cladonia borealis	Boreal Cup Lichen
Cladonia chlorophaea	Cup Lichen
Cladina mitis	Reindeer Lichen
Cladina stellaris	Star Reindeer Lichen
Lichen species	Lichen species
Moss species	Moss Species
Peltigera aphthosa	Felt Lichen
Sphagnaceae species	Sphagnum Species
Stereocaulon tomentosum	Tomentose Snow Lichen



Study Area
Ambler Mineral Belt
National Wildlife Refuge
Wilderness
National Park
Water

Source:
Admin Boundaries DNR 2013
Rivers and Streams DNR 2013
Communities DNR 2013
Note: Ambler Mineral Belt represents State of Alaska Mining Claims within the Ambler Mining District.

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

DOWL HKM

AIDEA

Location Vicinity Map

Ambler Mining District Industrial Access Road

May 13, 2014

Figure 1

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Study Area
Communities

2 Tundra
102 Arctic Foothills
103 Brooks Range
109 Subarctic Coastal Plains

3 Tiaga
104 Interior Forested Lowlands and Uplands
106 Interior Bottomlands

6 Northwestern Forested Mountains
105 Interior Highlands

Source:
Eco Regions EPA
Communities DNR

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

DOWL HKM

AIDEA

North America Ecological Regions
Alaska Region

Ambler Mining District
Industrial Access Road

May 12, 2014

Figure 2

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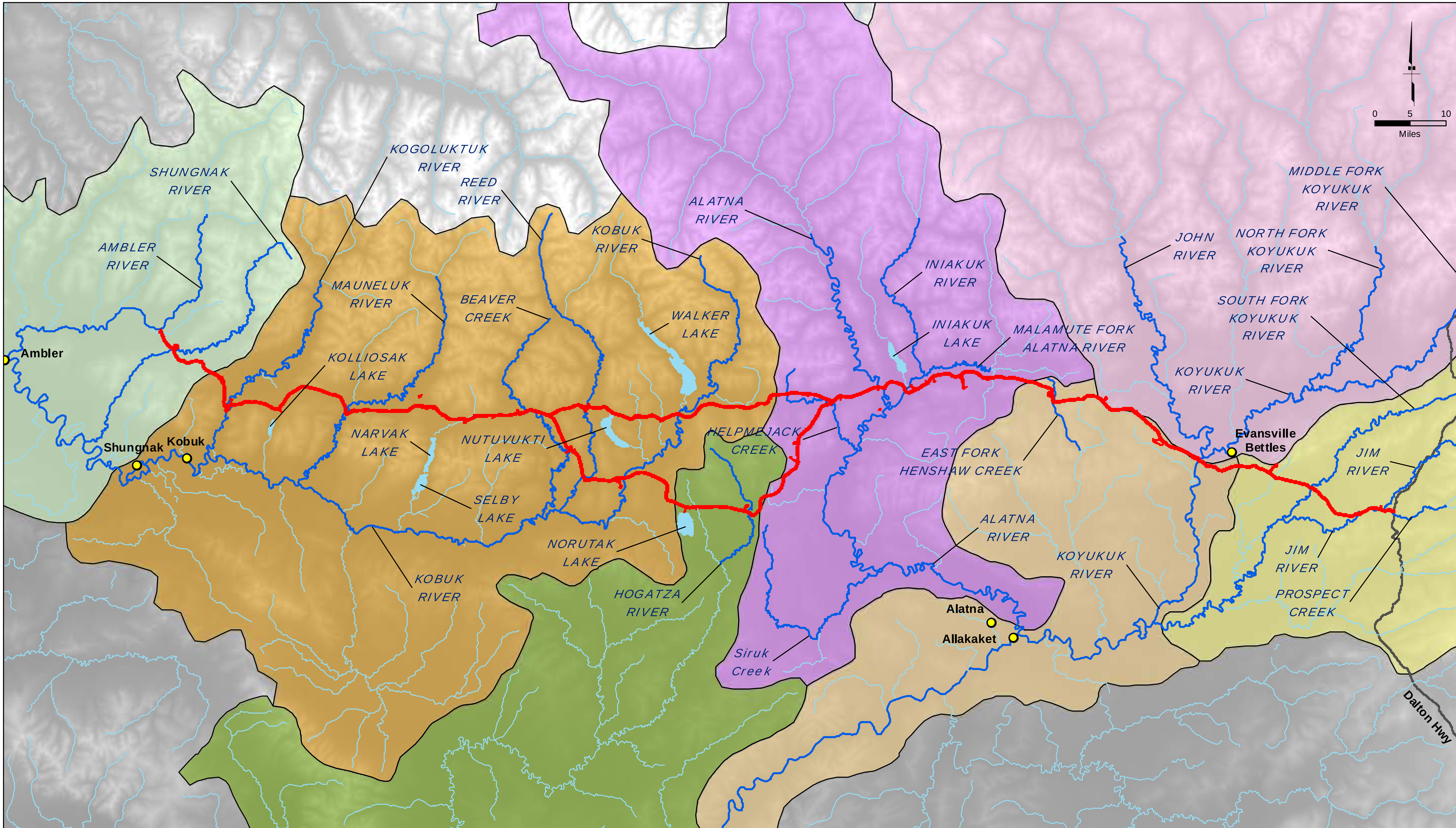

	Sub-Basin Name	HUC 8 ID	Sub-Basin Name	HUC 8 ID
Study Area			Alatna	19040603
Communities	Middle Koyuk	19050303	Allakaket	19040605
River and Streams	Upper Kobuk	19050302	Koukukuk Flats	19040608
			Upper Koyukuk	19040601
			SF Koyukuk	19040602

Source:
Sub-Basins USGS
Rivers and Streams DNR
Communities DNR

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

DOWL HKM

AIDEA

Hydrologic Sub-basins

Ambler Mining District Industrial Access Road

May 12, 2014

Figure 3

Study Area
Communities

DNR Fire History
- 2010-2013 within 3 years
- 2000-2010 within 13 years
- 1990-1999 within 23 years
- 1980-1989 within 33 years
- 1970-1979 within 43 years
- 1965-1969 within 53 years

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD
DOWL HKM
AIDEA

Fire Coverage

Ambler Mining District
Industrial Access Road

May 12, 2014 | Figure 4

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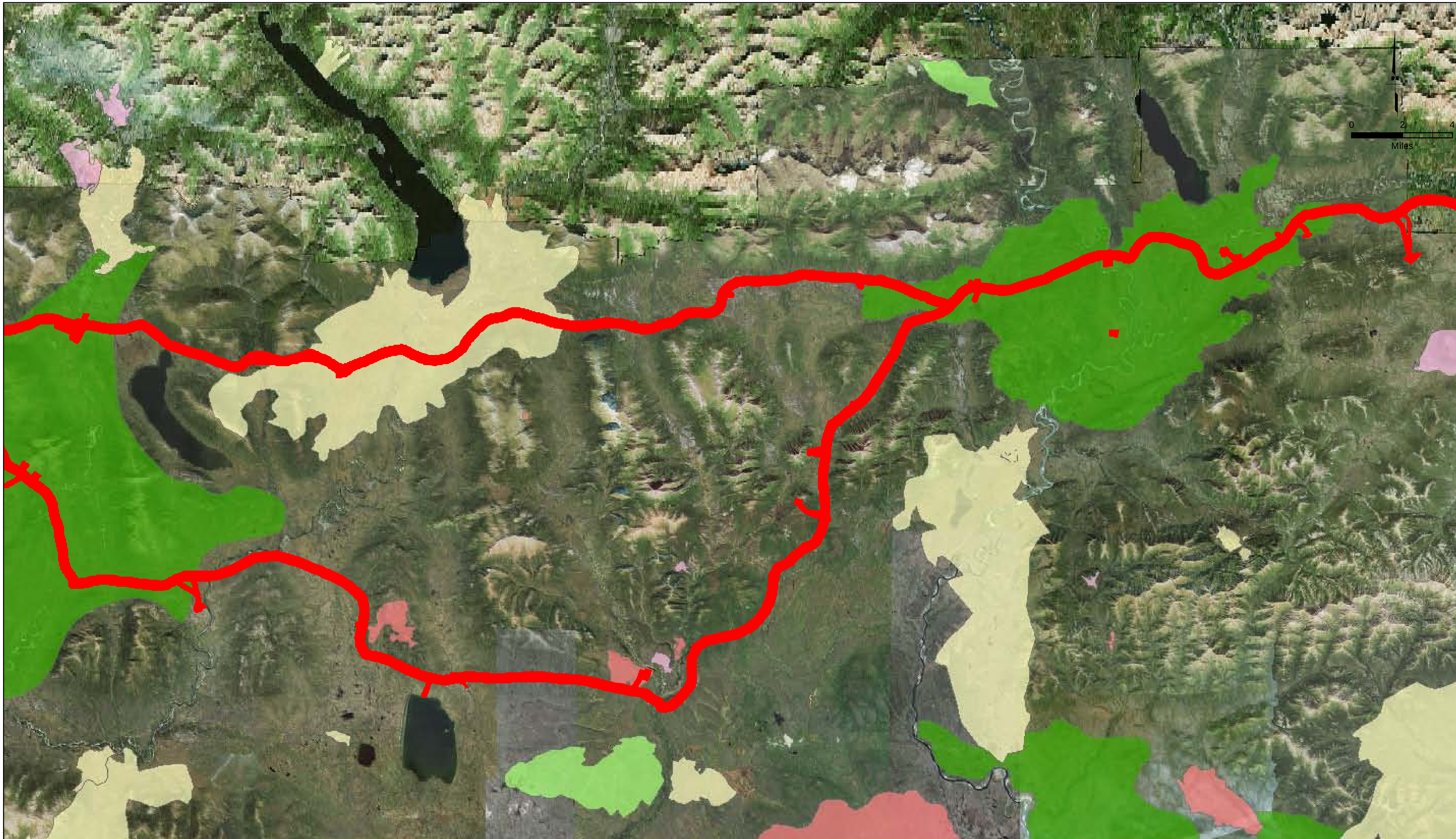

Study Area
Communities

DNR Fire History

- 2010-2013 within 3 years
- 2000-2010 within 13 years
- 1990-1999 within 23 years
- 1980-1989 within 33 years
- 1970-1979 within 43 years
- 1965-1969 within 53 years

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

DOWL HKM

AIDEA

Fire Coverage

Ambler Mining District
Industrial Access Road

May 12, 2014

Figure 5

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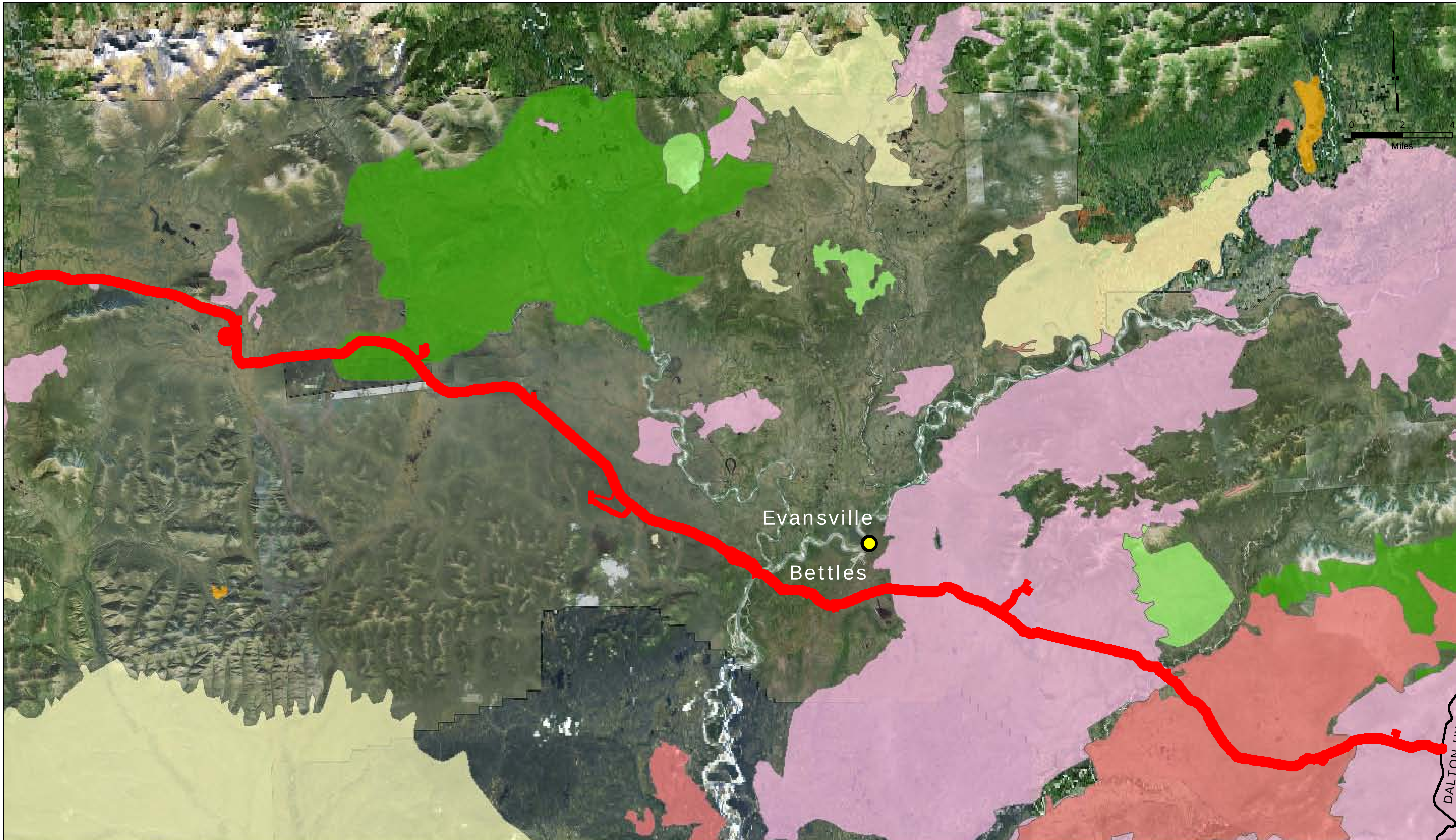
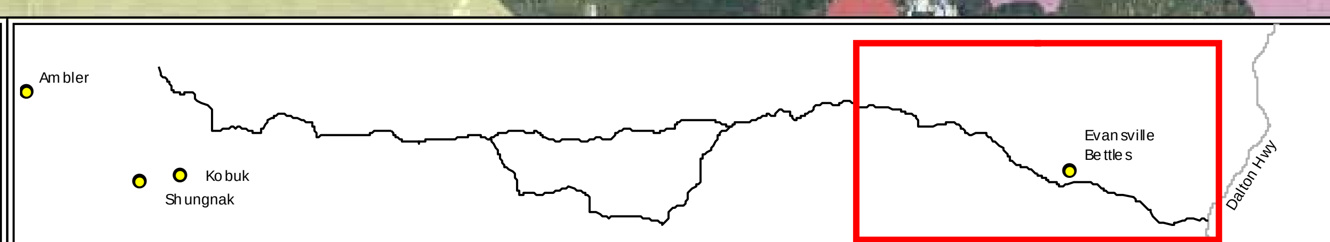


Study Area
Communities

DNR Fire History

- 2010-2013 within 3 years
- 2000-2010 within 13 years
- 1990-1999 within 23 years
- 1980-1989 within 33 years
- 1970-1979 within 43 years
- 1965-1969 within 53 years



AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

DOWL HKM

AIDEA

Fire Coverage

Ambler Mining District
Industrial Access Road

May 12, 2014

Figure 6

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APPENDIX B

Full Sample Points and Photograph Points

B1 .... 2012 Wetland Determination Data Forms
B2 .... 2012 Photograph Points
B3 .... 2013 Wetland Determination Data Forms
B4 .... 2013 Photograph Points

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2012 WETLAND DETERMINATION DATA FORMS

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Point ID	Cowardin	Vierick	Sheet
1	UPLAND	IIB2	251
2	PFO4/SS1B	IA1	251
3	UPLAND	IA2	251
5	PSS1C	IIB1	251
7	UPLAND	IB2	251
8	UPLAND	IB3	251
9	UPLAND	IA2	249, 250
10	PEM1C	IIIA3	249, 250
11	PSS1/4B	IA3	249, 250
12	UPLAND	IB2	239, 240
13	PSS1/4B	IIC2	247
14	PFO4B	IA2	AUX
15	PSS4/EM1B	IIA2	247
16	PFO4/SS1B	IA2	244
17	UPLAND	IA3	AUX
18	PEM1B	IIIA3	AUX
19	UPLAND	IIC2	AUX
21	UPLAND	IA2	AUX
26	UPLAND	IA3	175
27	UPLAND	IIB2	175
28	PSS1/EM1B	IIC2	175
29	UPLAND	IA2	168, 169, 170
30	PFO4/SS1C	IA3	168, 169, 170
31	R3UB	W	AUX
32	UPLAND	IA2	70, 71
33	UPLAND	IA3	62
100	UPLAND	IA3	56
101	PEM1B	IIIA3	56
102	UPLAND	IA3	62
103	PSS1C	IA3	62
104	UPLAND	IA2	69
105	UPLAND	IA3	69
106	UPLAND	IA2	106
107	PFO4/SS1B	IA1	106
108	UPLAND	IIB1	213, 214
109	UPLAND	IA2	214
110	PEM1B	IIIA3	1
111	PEM1B	IIIA3	1
112	UPLAND	IIC2	1
113	PSS1B	IIC1	3
114	PSS1B	IIC2	3
115	UPLAND	IIC2	3
116	UPLAND	IA3	3
117	UPLAND	IA3	8
118	PSS1/EM1C	IIB2	8, 9
119	PSS1/EM1B	IIC2	8, 9

Point ID	Cowardin	Vierick	Sheet
120	UPLAND	IIC2	8, 9
121	UPLAND	IA3	15, 16
122	PEM1C	IIIA3	15
123	PSS1/4B	IIC2	15, 16
124	PSS1/EM1B	IIC2	22, 23
125	PSS1B	IIC1	22
126	PEM1B	IIIA3	22
127	UPLAND	IIB1	28
128	UPLAND	IIC2	28
129	UPLAND	IB2	28
130	PEM1C	IIIA3	28
131	PEM1B	IIIA3	28
132	UPLAND	IA2	33
133	PSS1C	IIB1	33
134	PSS1/4B	IA2	AUX
135	UPLAND	IA3	AUX
136	PSS1C	IIB2	AUX
137	UPLAND	IIC2	AUX
138	PEM1C	IIB2	AUX
139	PSS4/EM1B	IIC2	AUX
140	PSS1/EM1B	IIC2	42
141	UPLAND	IIB2	42
142	PEM1C	IIIA3	42
143	UPLAND	IAI	42
144	UPLAND	IA2	36, 37
145	UPLAND	IA3	36, 37
146	PEM1B	IIIA3	36, 37
147	UPLAND	IA2	133
148	R3UB	W	AUX
149	PFO4/SS1B	IA3	133
150	PEM1C	IIIA3	133
151	UPLAND	IA2	101
152	PSS1/EM1C	IA3	101
153	PSS1/EM1C	IIB2	101
154	UPLAND	IIC2	101
155	PSS1/EM1C	IIB2	101
156	PEM1H	IIIA3	101
157	UPLAND	IA2	101
158	UPLAND	IA3	96
159	UPLAND	IA3	96
160	UPLAND	IA3	95, 96
161	PEM1C	IIIA3	205
162	PSS1/EM1B	IIB2	205
163	UPLAND	IB1	205
164	UPLAND	IB1	205
165	UPLAND	IA3	196

Point ID	Cowardin	Vierick	Sheet
166	UPLAND	IA3	196
167	UPLAND	IC3	192
168	PSS3/EM1B	IIC2	192
169	UPLAND	IB2	192
170	PSS1B	IIB2	187, 188
171	PSS1/4B	IIC2	187, 188
172	PSS4/EM1B	IA3	187
173	UPLAND	IIC2	187
174	PEM1H	IIIA3	187, 188
175	PSS1/EM1B	IA3	178
176	UPLAND	IIC2	178
177	PSS1/EM1C	IIC2	178
178	UPLAND	IIIA3	72
179	PEM1C	IIC2	72
180	UPLAND	IIIA3	72
181	PEM1H	IA3	72
182	PSS1/4B	IIB2	76
183	PSS1C	IA3	76
184	PSS4B	IID2	76
185	UPLAND	IIC2	79
186	PSS3H	IIB1	AUX
187	PSS1H	IIB2	AUX
188	PSS1/EM1C	IC3	79
189	PSS4B	IA2	83
190	UPLAND	IB3	83
191	UPLAND	IB3	83
192	UPLAND	IA3	83
193	PSS1/FO4C		AUX
194	PSS1/FO4C	IA3	AUX
195	PEM1B	IIC2	86
196	PSS1C	IIC2	86
197	PSS1C	IIC2	86
198	UPLAND	IIC1	86
199	PSS1B	IIC1	88
200	PSS1/EM1C	IIB2	88
201	PSS1/EM1C	IIB1	88
202	PSS1B	IA3	88

Point ID	Cowardin	Vierick	Sheet
203	PSS1/FO4B	IA3	88
204	UPLAND	IA3	91
205	PFO4/SS1B	IA3	91
206	UPLAND	IIIA3	91
206-2	Photo Point		126
207	PEM1B	IA3	126
208	UPLAND		125, 126
209	PSS1/EM1C	IIB2	125
210	PEM1/SS1B	IIIA3	125
211	UPLAND	IIC2	128
212	PSS1/EM1B	IIC2	128
213	PFO4/SS1B	IA2	128
214	PFO4/SS1B	IA3	117, 118
215	PSS1C	IIC1	117, 118
216	UPLAND	IA3	117, 118
217	PSS1/FO4C	IA3	AUX
218	R3UB	W	AUX
219	UPLAND	IA2	118
220	PSS1C	IIC2	117, 118
221	PEM1C	IIIA3	117, 118
222	PSS1/EM1B	IA3	114
223	PSS1/EM1B	IA3	114
224	UPLAND	IB2	114
225	UPLAND	IB2	114
226	PFO4/SS1B	IA2	114
227	PSS1/FO4C	IA3	AUX

WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: Ambler Mining District Access   Borough/City: Yukon-Koyukuk   Sampling Date: 6/13/2012

Applicant/Owner: Alaska Department of Transportation & Public Facilities - Northern Region   Sampling Point: 1

Investigator(s): EG, JC, HL   Landform (hillside, terrace, hummocks, etc.): streambank

Local relief (concave, convex, none): concave   Slope (%): 2

Subregion: Interior Alaska   Lat: 66.79396791   Long: -150.7122623   Datum: NAD83

Soil Map Unit Name: ______   NWI classification: ______

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.

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

Remarks:
Sample point taken approximately 10 feet from Prospect Creek.

VEGETATION – Use scientific names of plants. List all species in the plot.

Tree Stratum		Absolute % Cover	Dominant Species?	Indicator Status
1.				
2.				
3.				
4.				
	Total Cover:	0		
	50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum				
1. salsp.	Salix sp.	35	Yes	FACW
2. ledgro	Ledum groenlandicum	10	No	FACW
3. betneo	Betula neoalaskana	5	No	FACU
4. vaculi	Vaccinium uliginosum	5	No	FAC
5. picmar	Picea mariana	5	No	FACW
6. shecan	Shepherdia canadensis	3	No	FACU
	Total Cover:	63		
	50% of total cover: 31.5	20% of total cover: 12.6		
Herb Stratum				
1. parpal	Parnassia palustris	3	No	FACW
2. chaang	Chamerion angustifolium	40	Yes	FACU
3. equsci	Equisetum scirpoides	40	Yes	FACU
4. equsyl	Equisetum sylvaticum	10	No	FAC
5. calcan	Calamagrostis canadensis	20	No	FAC
6. eriang	Eriophorum angustifolium	5	No	OBL
7. carnor	Carex norvegica	3	No	FACW
8. erivag	Eriophorum vaginatum	3	No	FACW
9.				
10.				
	Total Cover:	124		
	50% of total cover: 62	20% of total cover: 24.8		

Plot size (radius, or length x width) 15 foot radius   % Bare Ground ______

% Cover of Wetland Bryophytes ______ (Where applicable)   Total Cover of Bryophytes ______

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	5	x 1 =	5
FACW species	59	x 2 =	118
FAC species	35	x 3 =	105
FACU species	88	x 4 =	352
UPL species	0	x 5 =	0
Column Totals:	187 (A)		580 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

No Dominance Test is >50%

No 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 ___ No x

Remarks:

SOIL

Sampling Point: 1

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 %	Type[1]	Loc[2]	Texture	Remarks
0-2								organic
2-17	6/10Y gley1	95					clay	homogenous

[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:

- ___ Histosol or Histel (A1)
- ___ Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- _x_ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[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.

Restrictive Layer (if present):

Type: Rocks

Depth (inches): 17

Hydric Soil Present? Yes _x_ No ___

Remarks:

Gravel and redox features observed throughout the entire profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ 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)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- _x_ FAC-Neutral Test (D5)

Field Observations:

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

Water Table Present? Yes ___ No _x_ Depth (inches): >17

Saturation Present? (includes capillary fringe) Yes ___ No _x_ Depth (inches): >17

Wetland Hydrology Present? Yes ___ No _x_

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

Remarks:

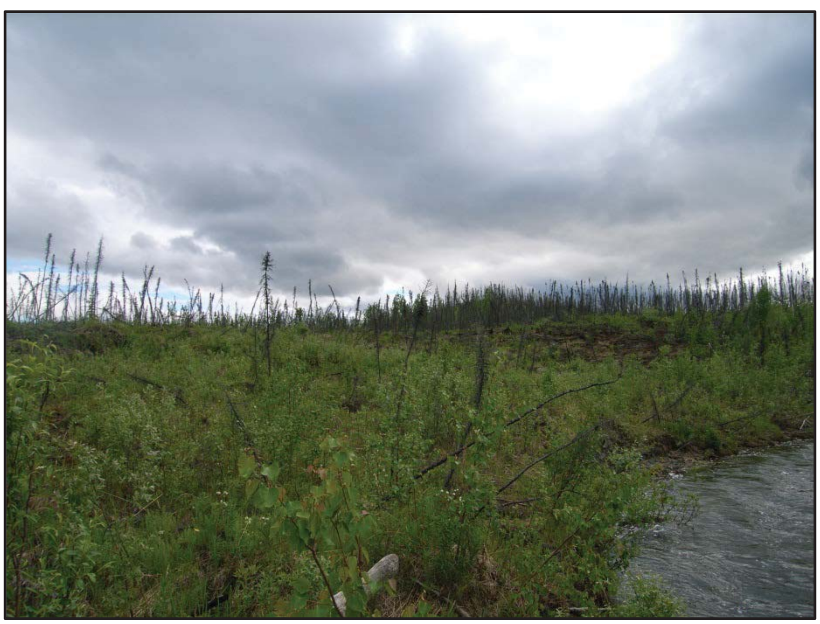
No field indication of wetland hydrology.

2012 PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

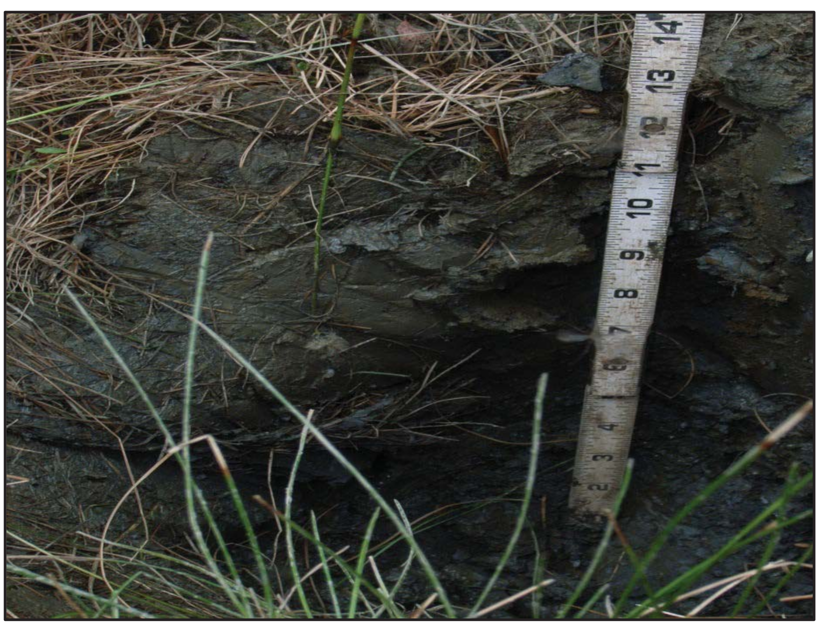
Ambler Mining District Access	**Wetland Delineation** State of Alaska Department of Transportation & Public Facilities – Northern Region	**DOT&PF Project No.** 63812

Transect: 001 **Sample Point:** 001 **Date:** 06/13/2012 **Investigators:** EG, JC, HL	**Notes:**	Northern end of Transect 1. Sample point was taken approximately 10 feet from the banks of Prospect Creek.



PHOTOGRAPHIC LOG

Ambler Mining District Access	**Wetland Delineation** State of Alaska Department of Transportation & Public Facilities – Northern Region	**DOT&PF Project No.** 63812
Transect: 1 **Sample Point:** 002 **Date:** 06/13/2012 **Investigators:** EG, JC, HL	**Notes:**	



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2013 WETLAND DETERMINATION DATA FORMS

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Point ID	Cowardin	Vierick	Sheet
T1-1	PSS1B	IIC1	1
T1-2	UPLAND	IIB2	1
T1-3	PEM1C	IIIA3	1
T1-5	PSS4B	IIB1	1
T2-6	PSS1/EM1C	IIB2	5
T2-8	PSS1/EM1C	IIB1	5
T2-9	PSS1/4B	IIC2	2
T2-10	PSS4B	IID1	5
T2-11	PEM1C	IIIA3	2
T3-12	PSS1/EM1B	IIB1	7
T3-13	UPLAND	IA3	7
T3-14	PSS1/EM1C	IIB1	7
T3-16	PSS1/EM1B	IIB1	7
T3-17	UPLAND	IA2	7
T3-19	PEM1B	IIIA3	7
T4-18	PFO4/PSS1B	IA2	9
T4-20	PEM1C	IIIA3	9
T4-21	UPLAND	IIC1	9, 10
T4-23	UPLAND	IA2	9, 10
T4-25	UPLAND	IIB1	9
T4-26	PSS1B	IIB1	9
T4-27	PSS1/4B	IIC2	9
T5-28	PSS1B	IIC1	11
T5-29	PSS1/EM1B	IIB1	11
T5-30	PSS4C	IIB1	11
T5-31	PSS1B	IIC1	11
T5-32	PSS1/EM1C	IIB2	11
T5-33	PFO4/SS1B	IA2	11
T5-34	PSS1/4B	IIC2	11
T5-35	PEM1B	IIIA3	11
T6-36	PSS4/EM1B	IID2	14
T6-37	PFO4/SS4B	IA2	14
T6-38	UPLAND	IA2	14
T6-40	PSS1/EM1B	IIC1	14
T6-42	UPLAND	IC2	14
T8-44	PSS4/EM1B	IIC1	27
T8-45	UPLAND	IB2	27
T8-46	PSS1/EM1B	IIC1	27
T8-47	PSS1/EM1B	IIC1	27
T8-48	UPLAND	IA3	27
T8-49	PEM1B	IIIA3	27
T8-50	PSS1/EM1B	IIB1	27
T9-52	PSS1B	IIB1	29

Point ID	Cowardin	Vierick	Sheet
T9-53	UPLAND	IIB1	29
T9-54	PSS1B	IIC1	29
T9-55	PSS3/EM1B	IIC1	29
T9-56	PSS1B	IIB1	29
T9-57	PSS1/EM1B	IIB1	29
T9-58	PSS1B	IIC1	29
T9-60	PSS1B	IIC2	29
T9-61	PSS1/EM1B	IIB2	29
T10-62	UPLAND	IC2	31
T10-63	UPLAND	IC1	31
T10-64	UPLAND	IA3	31
T10-66	UPLAND	IID2	31
T10-68	UPLAND	IIC1	31
T11-65	UPLAND	IA3	34
T11-67	UPLAND	IB2	34
T11-70	UPLAND	IC2	34
T11-72	PFO4/SS1B	IA2	34
T11-74	PSS4/EM1B	IIC1	AUX
T12-73	PSS1B	IIB1	AUX
T12-75	UPLAND	IIC1	AUX
T12-76	PFO4/SS1B	IA2	AUX
T12-77	PFO4/SS1B	IA2	AUX
T12-78	UPLAND	IB3	AUX
T12-80	UPLAND	IB2	AUX
T12-82	UPLAND	IC2	AUX
T12-84	PSS4/EM1B	IIB1	AUX
T12-86	PSS1C	IA3	AUX
T13-79	UPLAND	IA2	AUX
T13-81	UPLAND	IA2	AUX
T13-88	UPLAND	IA2	AUX
T13-90	UPLAND	IA2	AUX
T13-92	UPLAND	IIB1	AUX
T14-83	UPLAND	IC2	AUX
T14-85	UPLAND	IA2	AUX
T14-87	PSS1/EM1B	IIC1	AUX
T14-94	PSS1/EM1C	IIB1	AUX
T14-96	PSS1B	IIC1	AUX
T14-98	UPLAND	IA2	AUX
T14-100	UPLAND	IB2	AUX
T15-102	UPLAND	IA2	AUX
T15-106	UPLAND	IIB2	AUX
T15-106	UPLAND	IIB2	AUX
T15-108	R3UB1	W	AUX

Point ID	Cowardin	Vierick	Sheet
T15-110	UPLAND	IC1	AUX
T16-112	UPLAND	IA3	AUX
T16-114	PEM1B	IIIA3	AUX
T16-116	PEM1	IIIA3	AUX
T16-118	UPLAND	IA3	AUX
T16-120	UPLAND	IIB1	AUX
T16-89	UPLAND	IA2	AUX
T16-91	PEM1C	IIIA3	AUX
T16-93	PSS1/EM1B	IIC1	AUX
T16-97	PSS1/EM1C	IIB2	AUX
T17-99	PSS1C	IIC1	AUX
T17-103	PSS1B	IIC1	AUX
T17-124	PSS4/EM1H	IID2	AUX
T17-126	PSS4/EM1C	IID1	AUX
T18-105	PEM1B	IIIA3	AUX
T18-107	UPLAND	IB2	AUX
T18-109	UPLAND	IA1	AUX
T18-128	UPLAND	IC1	AUX
T18-130	UPLAND	IB1	AUX
T19-111	PSS1/EM1B	IIC1	38
T19-113	UPLAND	IC2	38
T19-132	PSS1/EM1C	IIB1	38
T19-134	UPLAND	IB3	38
T20-117	PSS1/EMB	IIB1	39
T20-119	UPLAND	IC2	39
T20-136	UPLAND	IC2	39
T20-138	PSS1/EM1B	IIC1	39
T21-121	PEM1C	IIIA3	42
T21-123	UPLAND	IA2	42
T21-125	PSS1/EM1B	IIB2	42
T21-140	UPLAND	IC2	42
T21-142	PSS1/EM1C	IIB2	42
T21-144	PSS1/EM1C	IIC1	42
T21-146	UPLAND	IC2	42
T21-148	PSS1C	IIB1	42
T22-127	UPLAND	IC2	43
T22-129	UPLAND	IC2	43
T22-131	UPLAND	IC1	43
T22-150	UPLAND	IA2	43
T22-152	PEM1C	IIIA3	43
T22-158	UPLAND	IA2	43
T23-135	PSS1/EM1B	IIC2	45
T23-137	PSS1B/EM1B	IIC1	45

Point ID	Cowardin	Vierick	Sheet
T23-139	UPLAND	IIC2	45
T23-160	PSS1/EM1B	IIC1	45
T23-162	PEM1H	IIIA3	45
T24-141	PSS1B/EM1B	IIB1	47
T24-143	PSS1B/EM1B	IIB2	47
T24-168	PSS1C/EM1C	IIB1	47
T24-170	PFO4/SS1B	IA2	47
T25-145	UPLAND	IA2	48
T25-147	PSS1/EM1B	IA2	AUX
T25-149	UPLAND	IC2	AUX
T25-172	UPLAND	IC2	48
T25-174	UPLAND	IIB1	48
T25-176	PSS4/EM1B	IIC1	48
T26-151	UPLAND	IA2	53, 54
T26-153	UPLAND	IA2	53, 54
T26-178	UPLAND	IA2	53
T27-155	UPLAND	IA2	59
T27-157	UPLAND	IA2	59
T27-159	PSS1B	IA3	59
T27-180	UPLAND	IA2	59
T27-182	PSS1/EM1B	IIB2	59
T27-184	PFO4/SS1B	IA2	59
T28-161	PFO4/SS1B	IA1	105
T28-163	UPLAND	IA3	105
T28-186	UPLAND	IA1	105
T29-165	UPLAND	IA1	63
T29-167	PFO4/SS1B	IA2	63
T30-169	PSS1/EM1C	IIB1	107
T30-171	UPLAND	IA3	107
T30-173	UPLAND	IC2	107
T30-175	PEM1B	IIIA3	107
T30-188	UPLAND	IA3	63
T30-190	PSS1/EM1C	IIB1	63
T30-194	UPLAND	IA2	63
T30-196	PSS1B	IIB1	63
T31-177	UPLAND	IA3	108
T31-179	UPLAND	IC2	108
T31-181	UPLAND	IA3	108
T31-198	UPLAND	IIB2	107
T31-200	UPLAND	IA2	107
T31-202	PSS1/EM1B	IIC2	107
T32-183	PSS1/EM1C	IIB1	115
T32-185	UPLAND	IA2	115

Point ID	Cowardin	Vierick	Sheet
T32-206	UPLAND	IA2	108
T32-208	PSS1,B	IIC1	108
T32-210	PEM1C	IIIA3	108
T33-212	UPLAND	IC1	115
T34-187	UPLAND	IA2	119, 122
T34-214	PEM1B	IIIA3	119, 122
T34-216	UPLAND	IA2	119, 122
T34-218	UPLAND	IA2	119, 122
T35-191	UPLAND	IA3	125
T35-193	PSS4B	IA3	125
T35-195	PEM1B	IIIA3	125
T35-220	PEM1C	IIIA3	124
T35-222	PFO4/SS1B	IA2	124
T35-224	PSS1/PEM1C	IIC2	124
T35-226	PFO4/SS1B	IA2	124
T35-228	PSS1/EM1C	IA3	124
T36-197	PFO4/SS1B	IA2	130
T36-199	PSS1C	IIB1	130
T36-203	UPLAND	IA2	130
T36-230	PFO4/SS1B	IA2	130
T36-232	UPLAND	IA2	130
T36-234	PFO4/SS1B	IA2	130
T36-236	UPLAND	IA2	130
T36-238	PEM1B	IIIA3	130
T37-205	PSS1/4B	IA3	141
T37-207	PSS1/EM1B	IIC1	141
T37-240	UPLAND	IA1	141
T38-209	UPLAND	IA2	161
T38-211	UPLAND	IA3	161
T38-213	UPLAND	IC2	161
T39-215	UPLAND	IC2	143
T39-217	UPLAND	IA2	143
T39-219	UPLAND	IA2	142, 143
T39-246	UPLAND	IA2	143
T39-250	UPLAND	IA2	143
T40-221	UPLAND	IA2	146
T40-223	PFO4/SS1B	IA2	146
T40-225	UPLAND	IA1	146
T40-252	UPLAND	IA2	146
T40-254	UPLAND	IA2	146
T41-227	UPLAND	IA2	150
T41-229	UPLAND	IA2	150
T41-256	UPLAND	IA2	150

Point ID	Cowardin	Vierick	Sheet
T41-258	PFO4/SS1B	IA2	150
T41-260	PEM1C	IID1	150
T42-262	UPLAND	IA2	70
T43-235	UPLAND	IA2	154
T43-237	UPLAND	IA3	154
T43-264	PEM1C	IIIA3	154
T43-266	PSS1/EM1B	IIC1	154
T43-268	UPLAND	IA2	154
T44-239	PFO4/SS1B	IA2	160
T44-241	R3UB3	W	160
T44-243	UPLAND	IA2	160
T44-270	PFO4/SS1	IA2	160
T44-272	PFO4/SS1	IA2	160
T44-274	UPLAND	IA2	160
T45-245	UPLAND	IA2	103, 162
T45-247	UPLAND	IIC2	103
T45-276	PSS1B	IIB2	103
T45-278	PEM1C	IIIA3	103, 164
T100-500	PSS1/EM1H	IIC2	72
T100-501	PSS1/EM1B	IIC2	72
T100-502	PSS1B	IIC1	72
T100-503	PSS1/4B	IA3	72
T100-504	UPLAND	IA3	72
T100-505	UPLAND	IA3	72
T100-506	PEM1B	IIIA3	72
T101-507	UPLAND	IC2	75
T101-508	PSS1B	IA3	75
T101-511	UPLAND	IA2	75
T101-512	PSS1/EM1C	IIC1	75
T101-513	UPLAND	IA2	75
T101-514	PFO4/SS1B	IA2	75
T101-516	UPLAND	IA3	75
T102-515	UPLAND	IA2	77
T102-517	UPLAND	IIC1	77
T102-519	UPLAND	IIC1	77
T103-223	UPLAND	IA2	80
T103-518	UPLAND	IA2	77
T103-520	PFO4/SS1B	IA2	77
T103-521	PEM1/SS1B	IIB2	80, 81
T103-522	UPLAND	IA2	77
T103-525	PSS1/EM1B	IIB1	80
T104-527	UPLAND	IIC1	84, 85
T104-530	UPLAND	IA3	80, 81

Point ID	Cowardin	Vierick	Sheet
T104-531	PSS1/EM1B	IIB1	84
T104-532	UPLAND	IIB1	80, 81
T104-533	PSS1/EM1B	IA3	84
T104-534	PEM1	IIIA3	80, 81
T104-535	PFO4/SS1B	IA2	84
T105-537	UPLAND	IIC1	87
T105-539	UPLAND	IA2	87
T105-541	UPLAND	IA2	87
T105-543	UPLAND	IIC1	87
T106-536	PSS1/EM1B	IIC1	84
T106-538	PSS1/EM1B	IIB1	84
T106-540	PSS1/EM1C	IIB1	84
T106-545	PFO4/SS1B	IA2	89
T106-547	PEM1B	IIIA3	89
T106-549	PFO4/SS1B	IA2	89
T106-551	PSS1/EM1B	IIC2	89
T107-542	PSS1/EM1	IIB1	87
T107-544	UPLAND	IA3	87
T107-546	R3UB	W	87
T107-548	UPLAND	IA3	87
T107-553	PSS3B	IA2	91, 92
T107-555	PSS1B	IIB1	92
T107-557	PUBH	W	92
T108-550	PEM1C	IIIA3	89
T108-552	PFO4/SS1	IA2	89
T108-554	PFO4/SS1B	IA2	89
T108-556	PFO4/SS1B	IA2	89
T108-559	UPLAND	IA2	94, 95
T108-561	PSS1/EM1B	IIB1	94, 95
T108-563	PEM1C	IIIA1	94, 95
T108-563b	UPLAND	IA3	94, 95
T108-565	UPLAND	IC2	95
T108-567	PFO4/SS1B	IA2	95
T109-558	PSS1/EM1B	IIC1	91, 92
T109-560	PSS1B	IB3	92
T109-562	PSS1/EM1B	IIB1	92
T109-564	PSS1/EM1B	IIC2	91, 92
T109-569	UPLAND	IA2	97
T109-571	UPLAND	IA2	97
T109-573	R3UBH	W	97
T109-575	PSS1/EM1B	IIB1	97
T109-579	PFO4/SS1B	IA2	97
T110-568	UPLAND	IA2	94
T110-570	UPLAND	IA2	94
T110-572	UPLAND	IA2	94
T110-574	PFO4/SS1B	IA2	94
T110-576	UPLAND	IA2	94
T110-581	PFO4/SS4B	IA2	251
T110-583	PEM1B	IIIA3	251
T110-585	UPLAND	IB1	251
T110-587	UPLAND	IIB2	251
T111-578	PFO4/SS1B	IA2	97
T111-580	UPLAND	IA2	97
T111-582	UPLAND	IA2	97
T111-584	PFO4/SS1B	IA2	97
T112-588	UPLAND	IC1	251
T112-590	UPLAND	IC1	251
T112-592	UPLAND	IB1	251
T114-589	UPLAND	IA2	249, 250, 251
T114-591	UPLAND	IA2	249, 250, 251
T114-593	UPLAND	IA2	249, 251
T114-595	PEM1B	IIIA3	249, 250
T114-596	UPLAND	IA1	249, 250
T114-598	UPLAND	IA1	249
T114-600	UPLAND	IA3	249
T115-597	PFO4B	IA2	247
T116-599	PFO4/SS1B	IA2	245
T116-601	PSS1/EM1B	IIC1	245
T116-603	PSS4/EM1B	IIA2	245
T116-604	PFO4/SS4B	IA2	245
T116-606	PEM1B	IIA3	245
T117-605	PSS4B	IA3	240
T117-607	UPLAND	IA2	240
T117-608	PSS1/EM1C	IIC2	240
T117-609	UPLAND	IA3	240
T117-610	PFO4/SS1B	IA2	240
T117-612	PEM1B/PSS1B	2	240
T118-620	PFO4/SS1B	IA2	98
T118-621	PSS1B	IIB2	98
T118-622	UPLAND	IA2	98
T118-623	PSS1B	IIC1	98
T118-624	UPLAND	IA2	98
T119-627	UPLAND	IA2	100
T119-628	PFO4/SS1B	IA2	100
T119-629	PSS1	IIB	100
T120-631	UPLAND	IA2	165

Point ID	Cowardin	Vierick	Sheet
T120-632	PSS1B	IIB1	165
T120-633	UPLAND	IB1	165
T120-634	PSS1B	IIC1	165
T120-635	UPLAND	IA2	165
T120-636	PEM1	IIIA3	165
T120-637	PSS1B	IIB1	167
T121-639	UPLAND	IC1	167
T121-640	UPLAND	IA1	167
T121-641	PSS1B	IIB1	167
T122-642	UPLAND	IA3	169, 170
T122-643	PSS1B	IA3	169, 170
T122-644	UPLAND	IC1	169, 170
T123-646	UPLAND	IB1	172
T123-647	UPLAND	IA2	172
T123-648	UPLAND	IIB1	172
T123-649	UPLAND	IA3	172
T123-650	PSS1B	IA3	172
T123-651	PSS1/4H	IIC1	172
T123-652	UPLAND	IB1	172
T123-653	PEM1C	IIIA3	172
T124-654	PSS1C	IIC1	174
T124-655	PSS1B	IIC1	174
T124-656	PEM1C	IIIA3	174
T124-657	UPLAND	IB1	174
T124-659	UPLAND	IA2	174
T125-660	UPLAND	IC2	175
T125-662	UPLAND	IA2	175
T125-663	PFO4/SS1B	IA2	174, 175
T126-664	PSS1B	IIC1	176
T126-665	PSS1/EM1B	IA3	176
T126-666	UPLAND	IA3	176
T126-667	UPLAND	IA2	176
T126-668	UPLAND	IIB1	176
T126-669	PSS1/EM1B	IIC1	176
T126-670	PSS1/EM1B	IA3	176
T126-672	UPLAND	IC1	176
T127-673	PSS4/EM1C	IID	183
T127-674	PSS1/EM1B	IIC2	183
T127-675	UPLAND	IA2	183
T127-676	UPLAND	IA2	183
T127-677	PSS1/EM1B	IIC1	183
T127-678	PSS1/4B	IA3	183
T128-683	UPLAND	IIB1	189

Point ID	Cowardin	Vierick	Sheet
T128-684	PSS1/4B	IIA1	189
T128-685	PFO4/SS1	IA2	189
T128-686	UPLAND	IA2	189
T128-687	PFO4/SS1/4B	IA2	189
T128-688	UPLAND	IC2	189
T128-689	PSS1/EM1C	IIC1	189
T129-679	PEM1	IIIA3	190
T129-680	PSS1/EM1B	IIA2	190
T129-682	PFO4/SS4B	IC2	190
T130-690	PSS4/EM1B	IIC1	191
T130-691	PSS1/EM1B	IIC2	191
T136-729	PSS1B	IIB1	233
T136-731	PSS1/EM1B	IIB	232, 233
T138-718	UPLAND	IB1	193
T138-722	PSS1B	IIB1	193
T138-739	PFO4/PSS4B	IA3	193
T138-741	PSS4/EM1B	IIB1	193
T138-743	UPLAND	IA2	193
T138-745	PSS1/EM1B	IIB1	193
T139-724	PSS4B	IIC2	194
T139-730	UPLAND	IA2	194
T139-732	PSS4/EM1B	IIC2	194
T139-747	UPLAND	IA2	194
T139-751	PSS1B	IIC2	194
T139-755	UPLAND	IA2	194, 195
T139-757	PSS1/EM1B	IIB1	194, 195
T140-734	PSS1/EM1B	IIC1	200
T140-736	UPLAND	IA2	197, 198, 199
T140-738	PFO4/SS1B	IA2	197, 198, 198
T140-761	PEM1B	IIIA3	198, 199
T140-763	PSS1/EM1B	IIB1	198, 199
T140-765	UPLAND	IC2	197, 198
T141-740	PSS1B	IA3	201
T141-742	PSS1/EM1B	IIC2	201
T141-767	UPLAND	IA3	201
T141-769	PSS1/EM1B	IIB1	201
T142-744	UPLAND	IA3	203
T142-746	PSS4C	W	203
T142-773	PFO4/PSS4B	IA	203
T142-777	UPLAND	IA2	203
T143-750	PSS1/EM1B	IIB1	206
T143-752	PSS1/4B	IIB1	206
T143-779	UPLAND	IA1	206

Point ID	Cowardin	Vierick	Sheet
T143-785	PSS1/EM1B	IIB1	206
T143-787	PEM1B	IIIA3	206
T144-754	PSS4/EM1B	IIB1	209
T144-756	PSS4/EM1	IA2	209
T144-760	PFO4/SS1C	IA2	209
T144-791	UPLAND	IIC1	209
T144-793	UPLAND	IA2	209
T145-760	UPLAND	IA2	221
T145-762	PSS4/EM1B	IIA2	221
T145-764	PFO4/SS1B	IA2	221
T145-795	UPLAND	IA2	221

Point ID	Cowardin	Vierick	Sheet
T145-797	UPLAND	IC1	221
T145-799	UPLAND	IA3	221
T146-766	PSS4/EM1C	IA3	217
T146-768	PSS1/4B	IIA2	217
T146-770	PSS1/EM1C	IID2	217
T146-801	PFO4/PSS1B	IA2	217
T146-803	PSS1B	IA2	217
T147-772	UPLAND	IC2	215
T147-774	PSS4B	IIA1	215
T147-805	PFO4/PSS1B	IA2	215
T147-807	UPLAND	IA3	215

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D1	21
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D41	134
D42	137
D42b	137
D43	134
D44	137
D45	134, 135
D47	135
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Photo Point	Sheet
D53	135
D54	136
D55	135
D56	136
D57	135
D59	135
D60	136
D61	135
D62	136
D64	136
D70	136
T2-7	2
T6-39	14
T7-43	17
T8-51	27
T11-69	34
T22-133	43
T33-185	115
T34-189	119, 122
T37-242	141
T38-244	161
T41-231	150
T42-233	70
T101-509	75
T103-524	77
T104-526	80, 81
T104-528	80, 81
T104-529	84, 85
T109-577	97
T112-586	251
T113-594	251
T115-595	247
T115-602	247
T118-625	98
T118-626	98
T119-630	100
T121-638	167
T122-645	168, 169, 170
T124-658	174
T125-661	175
T126-671	176
T129-681	190
T139-726	194
T139-749	194
T139-753	194, 195
T140-759	198, 199

Photo Point	Sheet
T141-771	201
T142-775	203
T143-781	206
T143-783	206
T144-758	209
T144-789	209

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WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: Ambler   Borough/City: Northwest Arctic Borough   Sampling Date: 07/17/2013
Applicant/Owner: State of Alaska - AIDEA   Sampling Point: T1-1
Investigator(s): EG, AM, JG, CF   Section, Township, Range:
Landform (hillslope, terrace, etc.): Flats   Local relief (concave, convex, none): none   Slope (%): 0
Subregion (LRR): Interior Alaska   Lat: 67.15066190   Long: -157.04350300   Datum: WGS84
Soil Map Unit Name: _   NWI classification: PSS1B, IIC1
Are climatic/hydrologic conditions on the site typical for this time of year? yes   (if no, explain in Remarks.)
Are Vegetation ___ , Soil ___, or Hydrology ___ significantly disturbed?   Are "Normal Circumstances" present? Yes
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 Hydric Soil Present? Yes Wetland Hydrology Present? Yes	**Is the Sampled Area within a Wetland? Yes**
Remarks: The sample point was taken at the transition between an emergent area and scrub\shrub vegetation on the north side of transect 1	

VEGETATION – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0 20% of total cover: 0			
Sapling/Shrub Stratum			
1. Vaccinium uliginosum	85	Yes	FAC
2. Dasiphora fruticosa	20	No	FAC
3. Juniperus communis	1	No	UPL
4. salix spp	22	No	FAC
5. Arctostaphylos alpina	30	Yes	FACU
6. Dryas integrifolia	15	No	FACU
Total Cover: 173			
50% of total cover: 86 20% of total cover: 34			
Herb Stratum			
1. Equisetum arvense	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 5			
50% of total cover: 2 20% of total cover: 1			

Plot size (radius, or length x width): 15   % Bare ground: 0
% Cover of Wetland Bryophytes: 0   Total Cover of Bryophytes: 30
(Where applicable)

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	132	x 3 = 396
FACU species	45	x 4 = 180
UPL species	1	x 5 = 5
Column Totals:	178 (A)	581 (B)

Prevalence Index = B/A = 3.26

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
__ Prevalence Index is ≤3.0
X 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

Remarks: The sample point was taken on the north side of the transect near a transition area between an emergent area and a scrub\shrub area. Vegetation is problematic and exhibits morphological adaptations. Hydric soils were present as well as wetland hydrology.

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

	Matrix		Redox Features					
Depth (in.)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2		100		0				organics w\ roots
2-7	2.5Y 3/1	90	10YR 5/6	10	RM	M	Sandy Loam	saturated, prominent redox
7-16	10YR 4/2	80	10YR 5/8	20	RM	M	Loamy Fine Sand	prominent redox

[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:

__Histosol or Histel(A1)
__Histic Epipedon (A2)
__Hydrogen Sulfide (A4)
__Thick Dark Surface (A12)
__Alaska Gleyed (A13)
__Alaska Redox (A14)
__Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

__Alaska Color Change (TA4)[4]
__Alaska Alpine Swales (TA5)
X Alaska Redox With 2.5Y Hue
__Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
__Other (Explain in Remarks)

[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.

Restrictive Layer (if present):
Type: permafrost
Depth (inches): 16

Hydric Soil Present? Yes

Remarks: Saturation occured at 7 inches. The soils are problematic, likley due to geomorphic position.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__Surface Water (A1)
X High Water Table (A2)
X 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)
__Marl Deposits (B15)
__Hydrogen Sulfide Odor (C1)
__Dry Season Water Table (C2)
__Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__Water-stained Leaves (B9)
__Drainage Patterns (B10)
__Oxidized Rhizospheres along Living Roots (C3)
__Presence of Reduced Iron (C4)
__Salt Deposits (C5)
__Stunted or Stressed Plants (D1)
__Geomorphic Position (D2)
X Shallow Aquitard (D3)
__Microtopographic Relief (D4)
__FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? No   Depth (inches):
Water Table Present? Yes   Depth (inches): 10
Saturation Present? Yes   Depth (inches): 7
(includes capillary fringe)

Wetland Hydrology Present? Yes

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

Remarks:

2013 PHOTOGRAPHIC LOG

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PHOTOGRAPHIC LOG

Ambler Mining District Access	**Wetland Delineation** Alaska Industrial Development and Export Authority	**DOWL HKM Project No.** 60693

Transect: 1 **Sample Point:** 1 **Date:** 07/17/2013 **Investigators:** EG, AM, JG, CF	**Notes:**	Scrub shrub flat with vegetation dominated by Alpine Blueberry. Observation view point is oriented to the southeast.

PHOTOGRAPHIC LOG

<table>
<tr><td>Ambler Mining District Access</td><td colspan="2">Wetland Delineation
Alaska Industrial Development and Export Authority</td><td>DOWL HKM Project No. 60693</td></tr>
<tr><td>Transect: 1
Sample Point: 2
Date: 07/17/2013
Investigators:
EG, AM, JG, CF</td><td>Notes:</td><td colspan="2">Sample location was taken on the north side of the transect, within a Willow thicket upland. A drainage feature ran north-south through the sampling location. Observation view point is oriented to the west.</td></tr>
</table>

APPENDIX C

Functions and Values Assessment

C1 .... Wetland and Ponds Functions and Values Tables
C1-A.. Forested Wetland Functional Value Rating per HUC 8
C1-B...Scrub-shrub Wetland Functional Value Rating per HUC 8
C1-C...Emergent Wetland Functional Value Rating per HUC 8
C1-D...Open-Water Ponds Functional Rating per HUC 8
C1-E ....Wetland Acreage per Hydrological Unit Code
C1-F .... Functions and Values Adjusted by Habitat Prevalence
C2 ....Functions and Values Forms
C3 ....Criteria Used to Evaluate Wetland and Riverine Habitats

Attributes used to evaluate wetlands and pond habitats include:

A. Flood flow alteration
B. Sediment removal
C. Nutrient and toxicant removal
D. Erosion control and shoreline stabilization
E. Production of organic matter and its exports
F. General habitat suitability
G. General fish habitat
H. Native plant species richness
I. Education and Scientific
J. Uniqueness and heritage

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Table C1-A: Forested Wetland Functional Value Ratings per HUC8

HUC	A	B	C	D	E	F	G	H	I	J	Overall
19040601*	M	L-M	M-H	NA	L	M-H	NA	H	M	M	**M**
19040602	M-H	M	M-H	NA	L	H	NA	M-H	M-H	L-M	**M-H**
19040603	M	L-M	M-H	NA	L	H	NA	H	M	L-M	**M**
19040605*	M	L-M	M-H	NA	L	M-H	NA	H	M	M	**M**
19040608	M	L-M	M-H	NA	L	H	NA	H	M	L-M	**M**
19050302	M	L-M	M	NA	L-H	H	NA	H	M	L-M	**M**
19050303	M	L	M	NA	L	H	NA	H	M	M	**M**

L = Low Function
M = Medium Function
H = High Function

*Transportation corridor follows ridge between HUC boundaries

Table C1-B: Scrub-shrub Wetland Functional Value Ratings per HUC8

HUC	A	B	C	D	E	F	G	H	I	J	Overall
19040601*	M-H	L-M	M-H	NA	L	M-H	NA	M-H	M	L-M	**M-H**
19040602	M-H	L-M	M-H	NA	L	M-H	NA	M	M	L	**M-H**
19040603	M-H	L-M	M-H	NA	L-M	H	NA	M-H	M	L	**M-H**
19040605*	M-H	L-M	M-H	NA	L	M-H	NA	M-H	M	L-M	**M-H**
19040608	H	L-M	M	NA	L	H	NA	M-H	M	L	**M**
19050302	M-H	L-H	M-H	NA	L-H	M-H	NA	M-H	M	L	**M-H**
19050303	M	L-M	M-H	NA	L	M-H	NA	M	M	L	**M**

L = Low Function
M = Medium Function
H = High Function

*Transportation corridor follows ridge between HUC boundaries

Table C1-C: Emergent Wetland Functional Value Ratings per HUC8

HUC	A	B	C	D	E	F	G	H	I	J	Overall
19040601*	M	M	H	H-NA	L-M	M-H	H-NA	M	M	L	**M-H**
19040602	M	M	H	NA	L	H	NA	M	M	L	**M-H**
19040603	M	L-M	M-H	NA	L	M-H	NA	M	M	L	**L-M**
19040605*	M	M	H	H-NA	L-M	M-H	H-NA	M	M	L	**M-H**
19040608	M	M	H	NA	L	H	NA	M	M	L	**M**
19050302	M-H	L-H	H	H-NA	L-H	H	M-NA	M	M	L	**M-H**
19050303	M	M	M-H	NA	L	H	NA	M	M	L	**M**

L = Low Function
M = Medium Function
H = High Function

*Transportation corridor follows ridge between HUC boundaries

Table C1-D: Open-Water Ponds (PUBH) Functional Value Ratings per HUC8

HUC	A	B	C	D	E	F	G	H	I	J	Overall
19040601*	M	M-H	H	H	H	H	M-H	M	M	L	**H**
19040602	M	H	H	H	H	H	M	M	M	L	**M-H**
19040605*	M	M-H	H	H	H	H	M-H	M	M	L	**H**
19050303	M	M-H	H	H	L-M	H	M-H	M	M	L	**M-H**

L = Low Function
M = Medium Function
H = High Function

*Transportation corridor follows ridge between HUC boundaries

PUBH data not available regarding 19040603, 19040608, and 19050302

Table C1-E: Wetland Acreage per Hydrological Unit Code

HUC	PEM	PFO	PSS	PUB	L1UB	R2	R3	Total
19050303	401	95	1,713	20	0	0	49	**2,278**
19050302	921	7,771	9,642	62	2	0	456	**18,854**
19040608	10	1,259	364	0.2	7	0	30	**1,670.2**
19040605	59	3,132	1,420	20	0	0.1	80	**4,711.1**
19040603	109	4,653	3,493	27	0	0.4	164	**8,446.4**
19040602	434	1,072	2,105	12	0	0	129	**3,752**
19040601	7	974	316	4	0	0	52	**1,353**

Table C1-F: Functions and Values Adjusted by Habitat Prevalence

HUC	PEM	PFO	PSS	PUB	L1UB	R2	R3
19050303	Moderate	High	Low	High	High	High	High
19050302	High	Moderate	Low-Moderate	High	High	High	High
19040608	High	Low	Moderate	High	High	High	High
19040605	High	Low	Moderate-High	High	High	High	High
19040603	Moderate-High	Low	Moderate-High	High	High	High	High
19040602	High	Moderate-High	Low-Moderate	High	High	High	High
19040601	High	Low	Moderate-High	High	High	High	High

HUC 19040601 and 19040605 Riverine Functions and Values

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Standard Checklist

Name of Riparian-Wetland Area: T138-SC

Date: 9/05/2013 Segment/Reach ID: 67.0890191 N 152.5909199 W

Miles: 0.33 Acres: 0.25

ID Team Observers: A. Morrill & J. Graham

Yes	No	N/A	HYDROLOGY
X			1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
X			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
	X		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
X			6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery)
X			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
X			11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
X			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
		X	14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
X			16) System is vertically stable
	X		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1998)

Remarks

Stream deposition, potentially from fire affected landscapes.

Summary Determination

Functional Rating:

Proper Functioning Condition ___X___
Functional—At Risk ________
Nonfunctional ________
Unknown ________

Trend for Functional—At Risk:

Upward _____
Downward _____
Not Apparent __X__

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No ___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)________________________

Standard Checklist

Name of Riparian-Wetland Area: T141-771 tributary to East Fork Henshaw Creek

Date: 9/05/2013 Segment/Reach ID: 67.0405179 N 152.4079555 W

Miles: 0.33 Acres: 0.25

ID Team Observers: A. Morrill & J. Graham

Yes	No	N/A	HYDROLOGY
X			1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
X			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
X			6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery)
X			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
X			11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
X			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
		X	14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
X			16) System is vertically stable
X			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1998)

Remarks

____
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____

Summary Determination

Functional Rating:

Proper Functioning Condition ___X___
Functional—At Risk ________
Nonfunctional ________
Unknown ________

Trend for Functional—At Risk:

Upward _____
Downward _____
Not Apparent __X__

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No ___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)________________________________

Standard Checklist

Name of Riparian-Wetland Area: T141-789

Date: 9/06/2013 Segment/Reach ID: 67.0264409 N 152.1309217 W

Miles: 0.33 Acres: 0.5

ID Team Observers: A. Morrill & J. Graham

Yes	No	N/A	HYDROLOGY
X			1) Floodplain above bankfull is inundated in "relatively frequent" events
	X		2) Where beaver dams are present they are active and stable
X			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
X			6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery)
X			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
X			11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
X			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
		X	14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
X			16) System is vertically stable
X			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1998)

Remarks

Beaver dam downstream is abandoned.

Summary Determination

Functional Rating:

Proper Functioning Condition ___X___
Functional—At Risk ______
Nonfunctional ______
Unknown ______

Trend for Functional—At Risk:

Upward ______
Downward ______
Not Apparent ___X___

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No ___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)______________________

HUC 19040601 and 19040605 Wetland Functions and Values

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WETLAND FUNCTIONS AND SERVICES FORM

Project Name: Ambler Mining District Industrial Access Road

Project #: 1124.60693.04 Assessed By: A. Morrill & J. Graham Date: 01/02/2013

Cowardin Class: PFO4/SS4B Wetland Size: ______ Wetland Name: T138-739
(If Applicable)

A. Flood Flow Alteration *(Storage and Desynchronization)*	Likely or not likely to Provide (Y or N)
1. Wetland occurs in the upper portion of its watershed. 2. Wetland is relatively flat area and is capable of retaining higher volumes of water during storm events, than under normal rainfall conditions. 3. Wetland is a closed (depressional) system. 4. If flowthrough, wetland has constricted outlet with signs of fluctuating water levels, algal mats, and/or lodged debris. 5. Wetland has dense woody vegetation. 6. Wetland receives floodwater from an adjacent water course. 7. Floodwaters come as sheet flow rather than channel flow.	1. Y 2. N 3. N 4. N 5. Y 6. N 7. Y 5 – 7 (Y) High Function 1 – 4 (Y) Moderate Function None – Low Function Moderate Function
B. Sediment Removal	Likely or not likely to Provide (Y or N)
1. Sources of excess sediment (from tillage, mining or construction) are present upgradient of the wetland. 2. Slow-moving water and/or a deepwater habitat are present in the wetland. 3. Dense herbaceous vegetation is present. 4. Interspersion of vegetation and water is high in wetland. 5. Ponding of water occurs in the wetland. 6. Sediment deposits are present in wetland (observation or noted in application materials).	1. N 2. N 3. Y 4. N 5. N 6. N 4 – 6 (Y) High Function 1 – 3 (Y) Moderate Function None – Low Function Moderate Function
C. Nutrient and Toxicant Removal *(important with high adjacent land use/industrial areas)*	Likely or not likely to Provide (Y or N)
1. Sources of excess nutrients (fertilizers) and toxicants (pesticides and heavy metals) are present upgradient of the wetland. 2. Wetland is inundated or has indicators that flooding is a seasonal event during the growing season. 3. Wetland provides long duration for water detention. 4. Wetland has at least 30% aerial cover of live dense herbaceous vegetation. 5. Fine grained mineral or organic materials are present for the wetland (in wetland report).	1. N 2. N 3. N 4. Y 5. Y 3 – 5 (Y) High Function 1 – 2 (Y) Moderate Function None – Low Function Moderate Function

D. Erosion Control and Shoreline Stabilization *If associated with watercourse or shoreline* 1. Wetland has dense, energy absorbing vegetation bordering the water course and no evidence of erosion. 2. An herbaceous layer is part of this dense vegetation. 3. Trees and shrubs able to withstand erosive flood events are also part of this dense vegetation.	Likely or not likely to Provide (Y or N) 1. n/a 2. n/a 3. n/a 1 – 3 (Y) High Function None – Low Function N/A
E. Production of Organic Matter and its Exports 1. Wetland has at least 30% aerial cover of dense herbaceous vegetation. 2. Woody plants in wetland are mostly deciduous. 3. High degree of plant community structure, vegetation density, and species richness present. 4. Interspersion of vegetation and water is high in wetland. 5. Wetland is inundated or has indicators that flooding is a seasonal event during the growing season. 6. Wetland has outlet from which organic matter is flushed.*	Likely or not likely to Provide (Y or N) 1. Y 2. Y 3. Y 4. N 5. N 6. N 4 – 6 (Y) High Function 1 – 3 (Y) Moderate Function None – Low Function *If 6 is N, then automatically low function. Low Function
F. General Habitat Suitability 1. Wetland is not fragmented by development. 2. Upland surrounding wetland is undeveloped. 3. Wetland has connectivity with other habitat types. 4. Diversity of plant species is high. 5. Wetland has more than one Cowardin Class (i.e., PFO, PSS, PEM, POW, etc.) 6. Has high degree of Cowardin Class interspersion. 7. Evidence of wildlife use, e.g., tracks, scat, gnawed stumps, etc., is present.	Likely or not likely to Provide (Y or N) 1. Y 2. Y 3. N 4. Y 5. Y 6. N 7. Y 5 – 7 (Y) High Function 1 – 4 (Y) Moderate Function None – Low Function High Function
G. General Fish Habitat *Must be associated with a fish-bearing water* 1. Wetland has perennial or intermittent surface water connection to a fish-bearing water body. 2. Wetland has sufficient size and depth of open water so as not to freeze completely during winter. 3. Observation of fish. 4. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter. 5. Spawning areas are present (aquatic vegetation and/or gravel beds.) 6. Juvenile rest areas.	Likely or not likely to Provide (Y or N) 1. n/a 2. n/a 3. n/a 4. n/a 5. n/a 6. n/a 4 – 6 (Y) High Function 1 – 3 (Y) Moderate Function None – Low Function N/A

H. Native Plant Richness 1. Dominant and co-dominant plants are native. 2. Wetland contains two or more Cowardin Classes. 3. Wetland has three or more strata of vegetation. 4. Wetland has mature trees.	Likely or not likely to Provide (Y or N) 1. Y 2. Y 3. Y 4. Y 3 – 4 (Y) High Function 1 – 2 (Y) Moderate Function None – Low Function High Function
I. Education or Scientific 1. Site has documented scientific or educational use. 2. Wetland is in public ownership. 3. Accessible trails available.	Likely or not likely to Provide (Y or N) 1. N 2. Y 3. N 2 – 3 (Y) High Function 1 – (Y) Moderate Function None – Low Function Moderate Function
J. Uniqueness and Heritage 1. Wetland contains documented occurrence of a state or federally listed threatened or endangered species. 2. Wetland contains documented critical habitat, high quality ecosystems, or priority species respectively designated by the U.S. Fish and Wildlife Service 3. Wetland has biological, geological, or other features that are determined rare. 4. Wetland has been determined significant because it provides functions scarce for the area. 5. Wetland is part of: an estuary, bog, or a mature forest.	Likely or not likely to Provide (Y or N) 1. N 2. N 3. N 4. N 5. Y 3 – 5 (Y) High Function 1 – 2 (Y) Moderate Function None – Low Function Moderate Function

FUNCTIONS AND VALUES CRITERIA FOR WETLAND HABITATS

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WETLAND FUNCTIONS AND SERVICES FORM

*****This is an example. Best professional judgment should be used on each specific site*****

Helpful when evaluating permittee-responsible mitigation to determine which functions are being lost; therefore, these functions should be replaced in the applicant's mitigation proposal

File #:____________________ Assessed by:__________________________

Cowardin Class:____________ Wetland Size:__________ Date:____________________

Function/Service	Occurrence Y	N	Rationale	Comments
Flood Flow Alteration				
Sediment Removal				
Nutrient & Toxicant Removal				
Erosion Control & Shoreline Stabilization				
Production of Organic Matter and its Export				
General Habitat Suitability				
General Fish Habitat				
Native Plant Richness				
Educational or Scientific Value				
Uniqueness and Heritage				

NOTE: The function/services that are to be lost with the project are the functions/services that should be replaced.

SUMMARY OF POTENTIAL FUNCTIONS FOR HGM CLASS WETLANDS

*****This is an example. Best professional judgment should be used on each specific site*****

Common definitions of HGM Classification Types:

Riverine - Riverine wetlands occur in floodplains and riparian corridors in association with stream or river channels. They lie in the active floodplain and have important hydrologic links to the water dynamics of the river or stream. The distinguishing characteristic of Riverine wetlands is that they are frequently flooded by overbank flow from the stream or river. Flood waters are a major factor that structures the ecosystem in these wetlands. Wetlands that lie in floodplains but are **not** frequently flooded are not classified as Riverine.

Depressional - Depressional wetlands occur in topographic depressions. Dominant water sources are precipitation, groundwater discharge, and interflow from adjacent uplands. The direction of flow is normally from the surrounding uplands toward the center of the depression. Elevation contours are closed, thus allowing the accumulation of surface water. Depressional wetlands may have any combination of inlets and outlets or may lack them completely. Dominat hydrodynamics are vertical fluctuations, primarily seasonal. Depressional wetlands may lose water through intermittent or perennial drainage from an outlet and by evapotranspiration and, if they are not receiving groundwater discharge, may slowly contribute to groundwater.

Lacustrine Fringe - Lacustrine fringe wetlands are adjacent to lakes where the water elevation of the lake maintains the water table in the wetland. In some cases, these wetlands consist of a floating mat attached to land. Additional sources of water are precipitation and groundwater discharge, the latter dominating where lacustrine fringe wetlands intergrade with uplands or slope wetlands. Surface water flow is bidirectional, usually controlled by water-level fluctuations such as seiches in the adjoining lake.Lacustrine fringe wetlands are indistinguishable from depressional wetlands where the size of the lake becomes so small relative to fringe wetlands that the lake is incapable of stabilizing water tables. Lacustrine wetlands lose water by flow returning to the lake after flooding, by saturation surface flow, and by evapotranspiration.

Tidal Fringe - Tidal Estuarine wetlands occur along coasts and estuaries and are under the influence of the sea level. They intergrade landward with riverine wetlands where tidal current diminishes and river flow becomes the dominant water source. Additional water sources may be groundwater discharge and precipitation. The interface between the tidal fringe and riverine classes is where bidirectional flows from tides dominate over unidirectional ones controlled by floodplain slope of riverine wetlands. Because tidal fringe wetlands frequently flood and water table elevations are controlled mainly by sea surface elevation, tidal fringe wetlands seldom dry for significant periods. Tidal fringe wetlands lose water by tidal exchange, by saturated overland flow to tidal creek channels, and by evapotranspiration.

Slope - Slope Wetlands normally are found where there is a discharge of groundwater to the land surface. They normally occur on sloping land; elevation gradients may range from steep hillsides to slight slopes. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are usually groundwater return flow and interflow from surrounding uplands as well as precipitation. Hydrodynamics are dominated by downslope unidirectional water flow. Slope wetlands can occur in nearly flat landscapes if groundwater discharge is a dominant source to the wetland surface. Slope wetlands lose water primarily by saturation subsurface and surface flows, and by evapotranspiration. Slope wetlands may develop channels, but the channels serve only to convey water away from the slope wetland.

Flats - Flats wetlands occur in topographically flat areas that are hydrologically isolated from surrounding ground or surface water. The main source of water in these wetlands is precipitation. They receive virtually no groundwater discharge. This characteristic distinguishes them from Depressional and Slope wetlands.

Description of Wetland Categories Based on Functions

*****This is an example. Best professional judgment should be used on each specific site*****

Category I – High functioning wetlands
These wetlands are the "cream of the crop." Generally, these wetlands are less common. These are wetlands that: 1) provide a life support function for threatened or endangered species that has been documented; 2) represent a high quality example of a rare wetland type; 3) are rare within a given region; or, 4) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a human lifetime, if at all. Examples of the latter are mature forested wetlands that may take a century to develop, and certain bogs and fens with their special plant populations that have taken centuries to develop. The position of the wetland in the landscape plays an integral role in overall watershed health.

Category II – High to Moderate functioning wetlands
These wetlands are those that: 1) provide habitat for very sensitive or important wildlife or plants; 2) are either difficult to replace (such as bogs); or 3) provide very high functions, particularly for wildlife habitat. These wetlands may occur more commonly than Category I wetlands, but still need a high level of protection.

Category III – Moderate to low functioning wetlands
These wetlands can provide important functions and values. They can be important for a variety of wildlife species and can provide watershed protection functions depending on where they are located. Generally these wetlands will be smaller and/or less diverse in the landscape than Category II wetlands. These wetlands usually have experienced some form of degradation, but to a lesser degree than Category IV wetlands.

Category IV – Degraded and low functioning wetlands
These wetlands are the smallest, most isolated, have the least diverse vegetation, may contain invasive species, and have been degraded by humankind. These are wetlands that we should be able to replace and, in some cases, be able to improve from a habitat standpoint. These wetlands can provide important functions and values, and should to some degree be protected depending on where they are located in the watershed and the condition of that watershed (urban vs. rural). In some areas, these wetlands may be providing groundwater recharge and water pollution prevention functions and, therefore, may be more important from a local point of view. Thus, regional differences may call for a more narrow definition of this category.

PROPER FUNCTIONING CONDITION CRITERIA FOR RIVERINE HABITATS

General Instructions

1) This checklist constitutes the **Minimum National Standards** required to determine proper functioning condition of lotic riparian-wetland areas.

2) As a minimum, an **ID team** will use this checklist to determine the degree of function of a riparian-wetland area.

3) An ID team **must review existing documents**, particularly those referenced in this document, so that the team has an understanding of the concepts of the riparian-wetland area they are assessing.

4) An ID team **must determine the attributes and processes important** to the riparian wetland area that is being assessed.

5) Mark one box for each element. Elements are numbered for the purpose of cataloging comments. The numbers do not declare importance.

6) For any item marked "**No**," the severity of the condition must be explained in the "**Remarks**" section and must be a subject for discussion with the ID team in determining riparian-wetland functionality. Using the "**Remarks**" section to also explain items marked "**Yes**" is encouraged but not required.

7) Based on the ID team's discussion, "**functional rating**" will be resolved and the checklist's summary section will be completed.

8) Establish photo points where possible to document the area being assessed.

APPENDIX D

Cowardin Maps: Sheets 1 to 252

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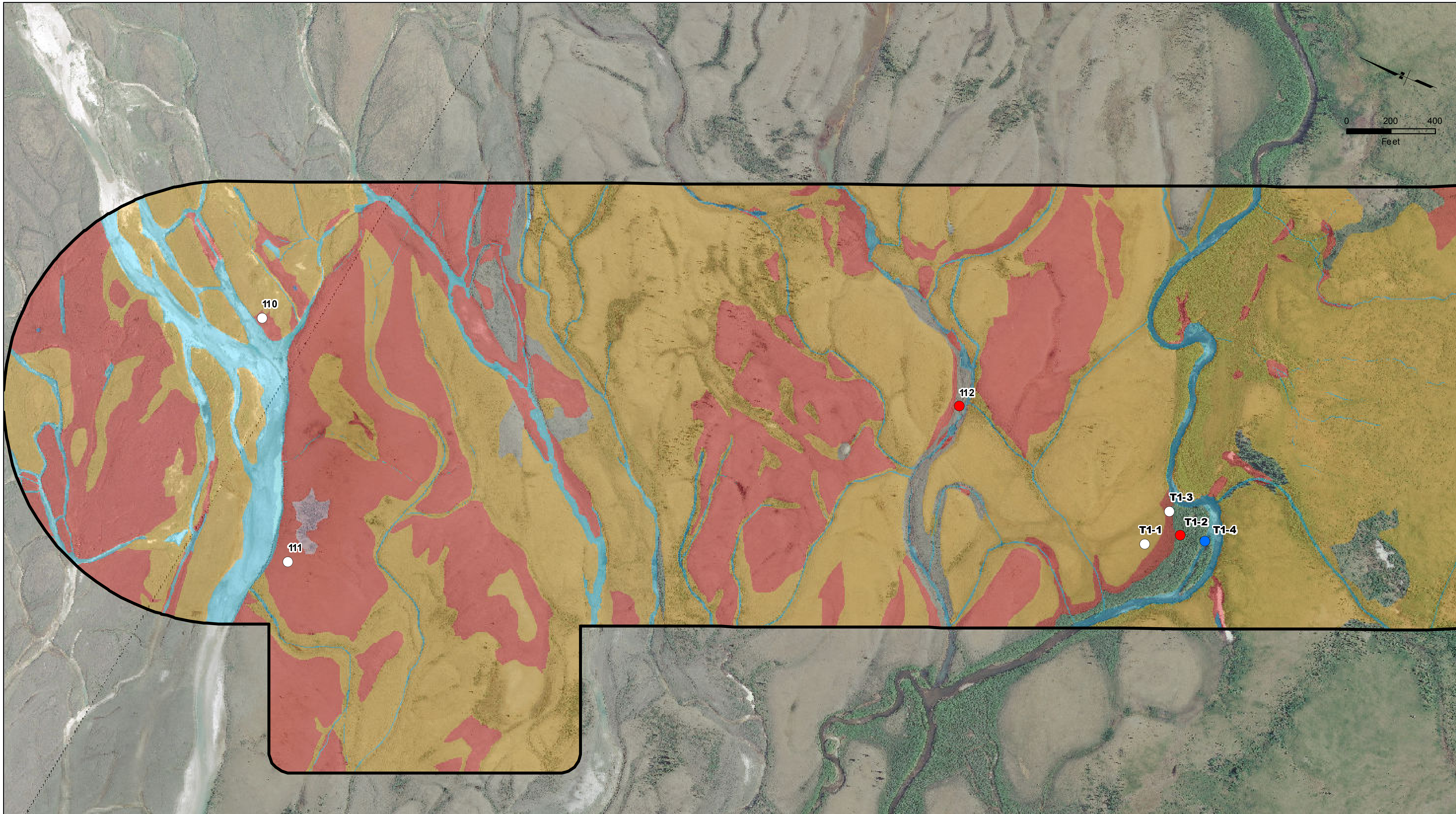

Study Area

Sample Points

- Wetland
- Upland
- Water

Cowardin Value

- PEM
- PFO4
- PSS1
- PUBH
- R3U

DOWL HKM

AIDEA Alaska Industrial Development and Export Authority

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

Cowardin Classification Map

Ambler Mining District
Industrial Access Road

March 17, 2014

Sheet: 1 of 252

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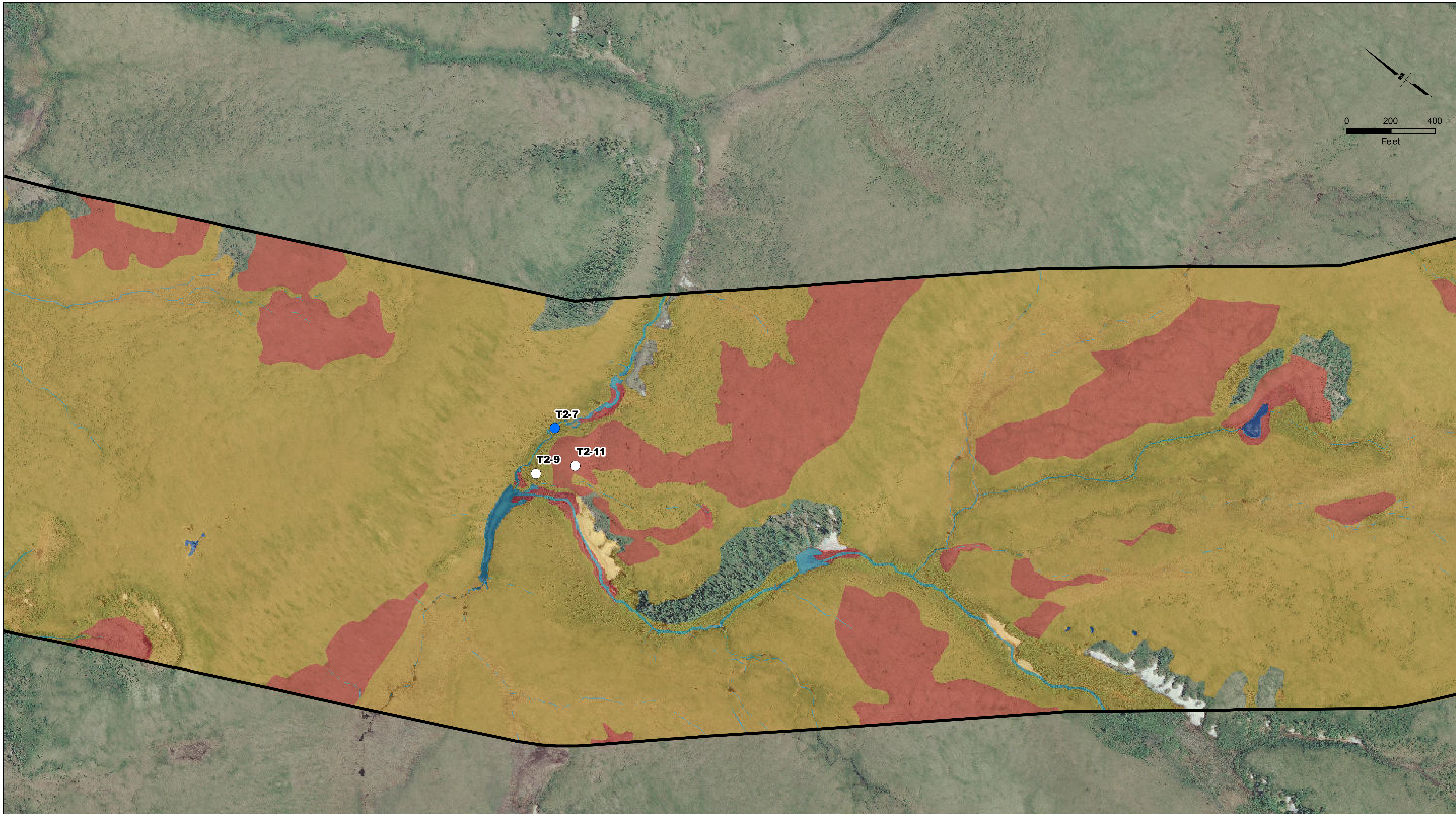
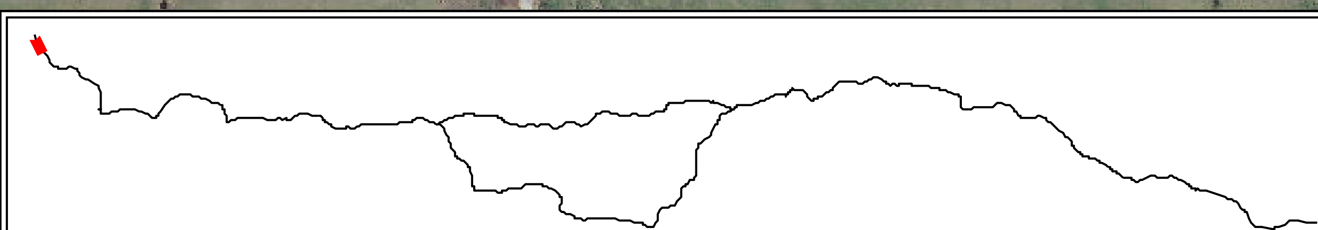


Study Area

Sample Points
- Wetland
- Upland
- Water

Cowardin Value
- PEM
- PSS1
- PUBH
- R3U



DOWL HKM

AIDEA Alaska Industrial Development and Export Authority

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

Cowardin Classification Map

Ambler Mining District
Industrial Access Road

March 17, 2014

Sheet: 2 of 252

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APPENDIX E

<u>Viereck Maps: Sheets 1 to 252</u>

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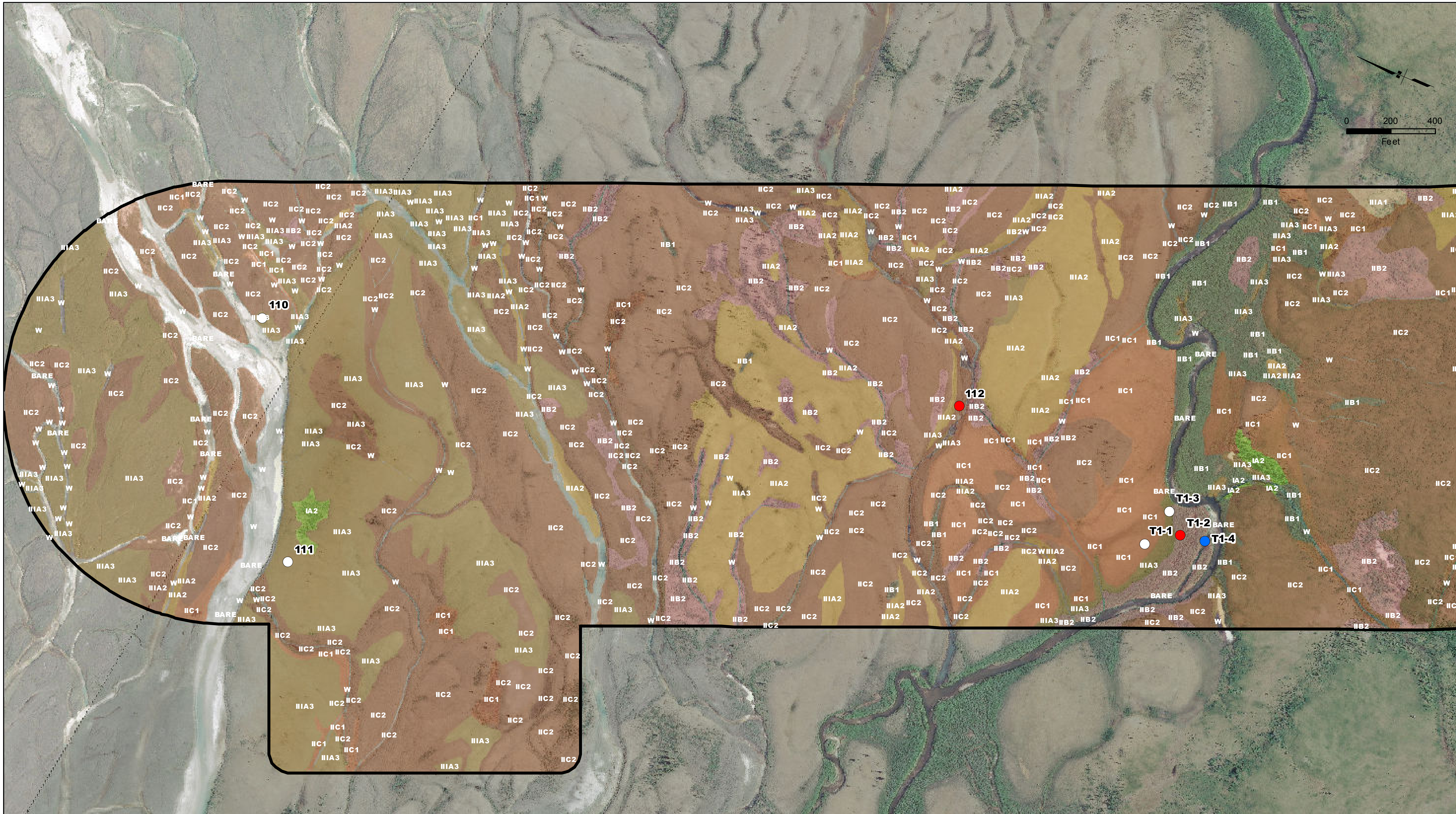

Study Area

Sample Points

- Wetland
- Upland
- Water

Viereck Value

- IA2
- IIB1
- IIB2
- IIC1
- IIC2
- IIIA1
- IIIA2
- IIIA3

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AIDEA Alaska Industrial Development and Export Authority

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

Viereck Map

Ambler Mining District Industrial Access Road

March 17, 2014

Sheet: 1 of 252

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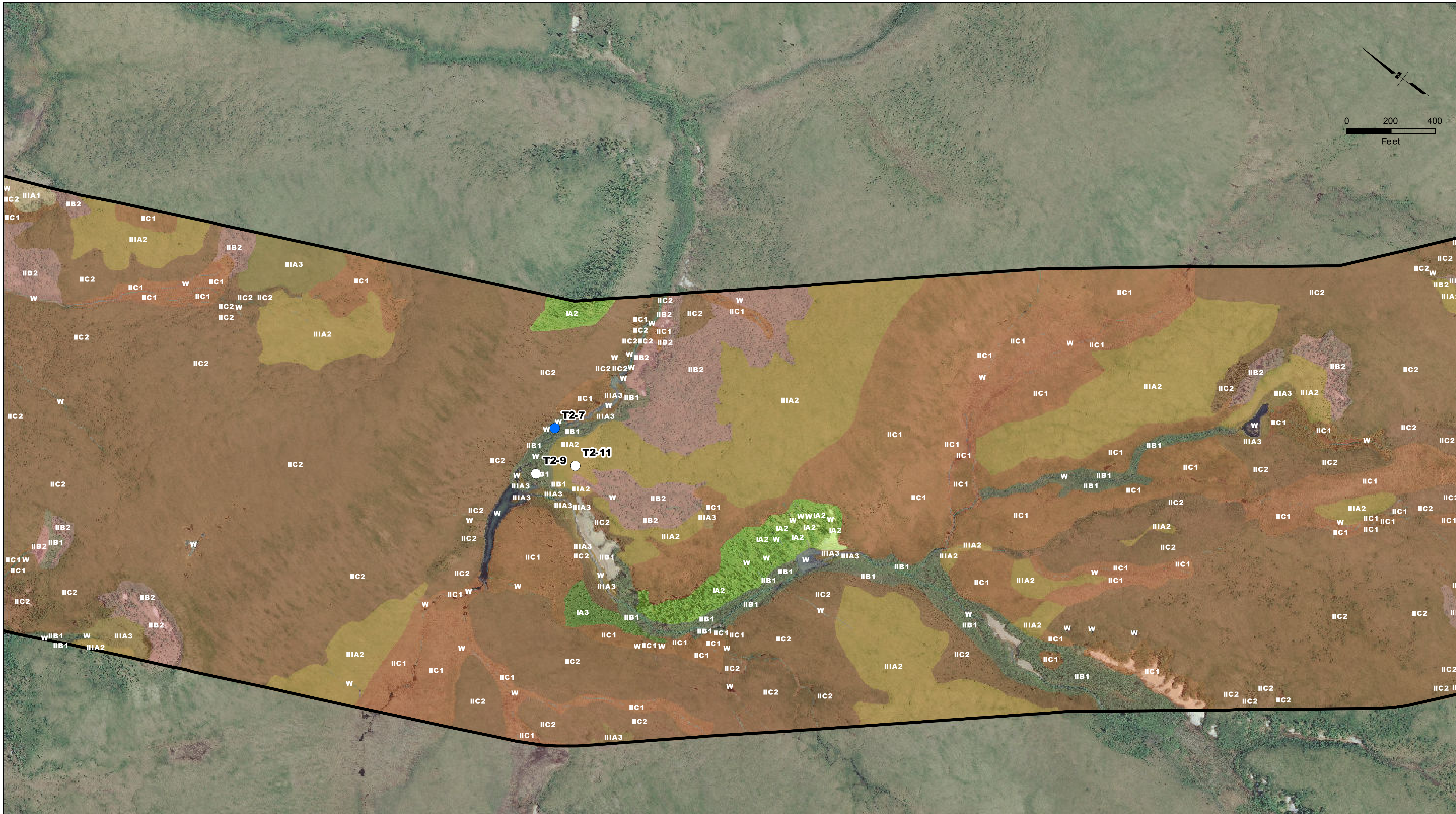


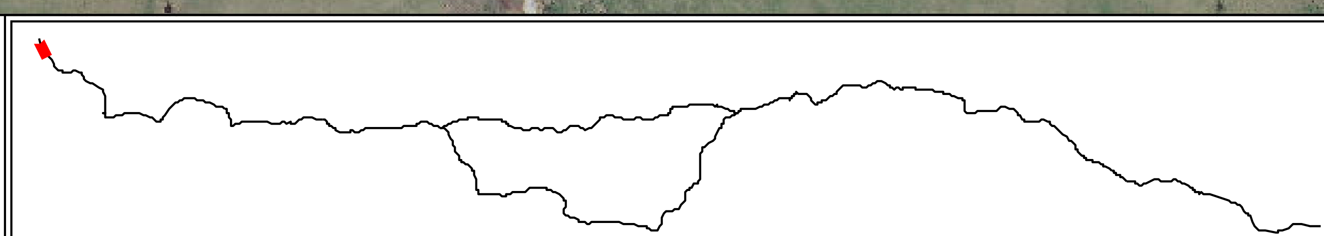
Study Area

Sample Points

- Wetland
- Upland
- Water

Viereck Value

- IA2
- IA3
- IIB1
- IIB2
- IIC1
- IIC2
- IIIA1
- IIIA2
- IIIA3



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AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD

Viereck Map

Ambler Mining District
Industrial Access Road

March 17, 2014

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