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APPENDIX E WETLAND FIELD SURVEY REPORT



**2014 WETLAND FIELD STUDY REPORT
LIVENGOOD (MP 401) TO TRAPPER CREEK
(MP 709.5)**

USAI-UR-SRZZZ-00-000012-000


	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE I OF II

TABLE OF CONTENTS


1.0	INTRODUCTION	1
1.1	PROJECT DESCRIPTION	1
1.2	PURPOSE	1
1.3	STUDY AREA	3
2.0	METHODOLOGY	4
2.1	DEFINITIONS AND WETLAND NAMING CONVENTIONS.....	4
	2.1.1 Cowardin Classification.....	4
	2.1.2 Hydrogeomorphic Classes.....	6
2.2	WETLAND PARAMETERS AND INDICATORS	8
	2.2.1 Hydrophytic Vegetation.....	8
	2.2.2 Wetland Soils	9
	2.2.3 Wetland Hydrology.....	10
2.3	AERIAL INTERPRETATION (PRE-MAPPING)	10
2.4	FIELD TARGET SELECTION	11
2.5	WETLAND FIELD DATA COLLECTION	11
	2.5.1 Crew Composition.....	12
	2.5.2 Wetland Determination Field Protocols	13
2.6	QUALITY ASSURANCE/QUALITY CONTROL	13
2.7	WETLAND MAP REVISIONS	14
2.8	WETLAND FUNCTIONAL ASSESSMENT	14
2.9	JURISDICTIONAL DETERMINATION	15
3.0	RESULTS.....	16
3.1	WETLAND FIELD DATA COLLECTION	16
3.2	WETLAND MAP REVISIONS	16
3.3	NEXT STEPS.....	20
4.0	ACRONYMS AND ABBREVIATIONS	21
5.0	REFERENCES	22
6.0	APPENDICES	24

Appendix A – Summary of 2014 Wetland and Vegetation Mapping and Field Targets Completed

Appendix B – 2014 Wetland Determination Field Survey Protocols

Appendix C – 2014 Wetlands Field Data Summary Table and U.S. Army Corps of Engineers Alaska District Wetland Determination Forms

Appendix D – 2014 Wetland Delineation Maps

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE II OF II

LIST OF TABLES

Table 1. Wetland Types within the Project Mapping Corridor from Livengood (MP 401) to Trapper Creek (MP 709.5), Alaska 5

Table 2. Hydrogeomorphic Classes within the Project Mapping Corridor from Livengood (MP 401) to Trapper Creek (MP 709.5), Alaska 7

Table 3. Field Targets Completed in 201416

Table 4. Wetland Acreage within the Project Mapping Corridor South of Livengood, by Hydrogeomorphic and Cowardin Types18


Table 5. Preliminary Stream Crossings and Flow Regimes, Along the Project Route South of Livengood, by Study Spread19

Table 6. Major Waterbody Crossings Along the Project Route South of Livengood20

LIST OF FIGURES

Figure 1. 2014 Project Study Area 2

Figure 2. Field Data Collection by a Wetland Scientist12

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 1 OF 31

1.0 INTRODUCTION

This Wetland Field Study Report provides an interim review of the wetlands that were mapped and field surveyed for the Alaska Liquefied Natural Gas (LNG) Project (Project) during the 2014 field season. This report includes the area of the proposed Project's Mainline corridor (see description below) from Livengood (MP 401) to approximately 43 miles south of Trapper Creek (MP 709.5) (**Figure 1**). This portion of the Project corridor was not part of the previous Alaska Pipeline Project (APP) effort (APP 2011).

1.1 PROJECT DESCRIPTION

The Alaska Gasline Development Corporation, BP Alaska LNG LLC, ConocoPhillips Alaska LNG Company, ExxonMobil Alaska LNG LLC, and TransCanada Alaska Midstream LP (Applicants) plan to construct an integrated Project (the Alaska LNG Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit (PTU) and Prudhoe Bay Unit (PBU) production fields on the Alaska North Slope (North Slope), for export in foreign commerce. Proposed Project facilities include: a 42-in diameter, 800-mi natural gas pipeline from the North Slope to a Liquefaction Facility near Nikiski. The Liquefaction Facility is comprised of an LNG Plant and marine terminal. The natural gas pipeline would include an offshore section crossing the Cook Inlet. Two pipeline study corridors across the Cook Inlet are being considered, an east pipeline corridor and a west pipeline corridor.

1.2 PURPOSE

The purpose of wetlands and waterbodies mapping is to identify on aerial imagery potential "waters of the United States (U.S.), including wetlands," that are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (40 Code of Federal Regulations [CFR] Part 230) and Section 10 of the Rivers and Harbors Act (33 CFR Part 328.3[b]) that may be impacted by the Project. As part of the Section 404 permitting process, all projects must avoid impacts to wetlands whenever possible, minimize impacts to wetlands to the maximum extent practicable, and compensate for all unavoidable wetland impacts.

Field surveys were conducted in 2014 to verify the accuracy of wetland types and boundaries as determined in pre-field mapping. Field data will also be used to improve the accuracy of future Project wetland mapping efforts. This information is required for the National Environmental Policy Act process as expected to be administered by FERC and for Section 404 and Section 10 permits administered by the USACE. Additionally, this data will constitute baseline information for the FERC's Resource Report No. 2.

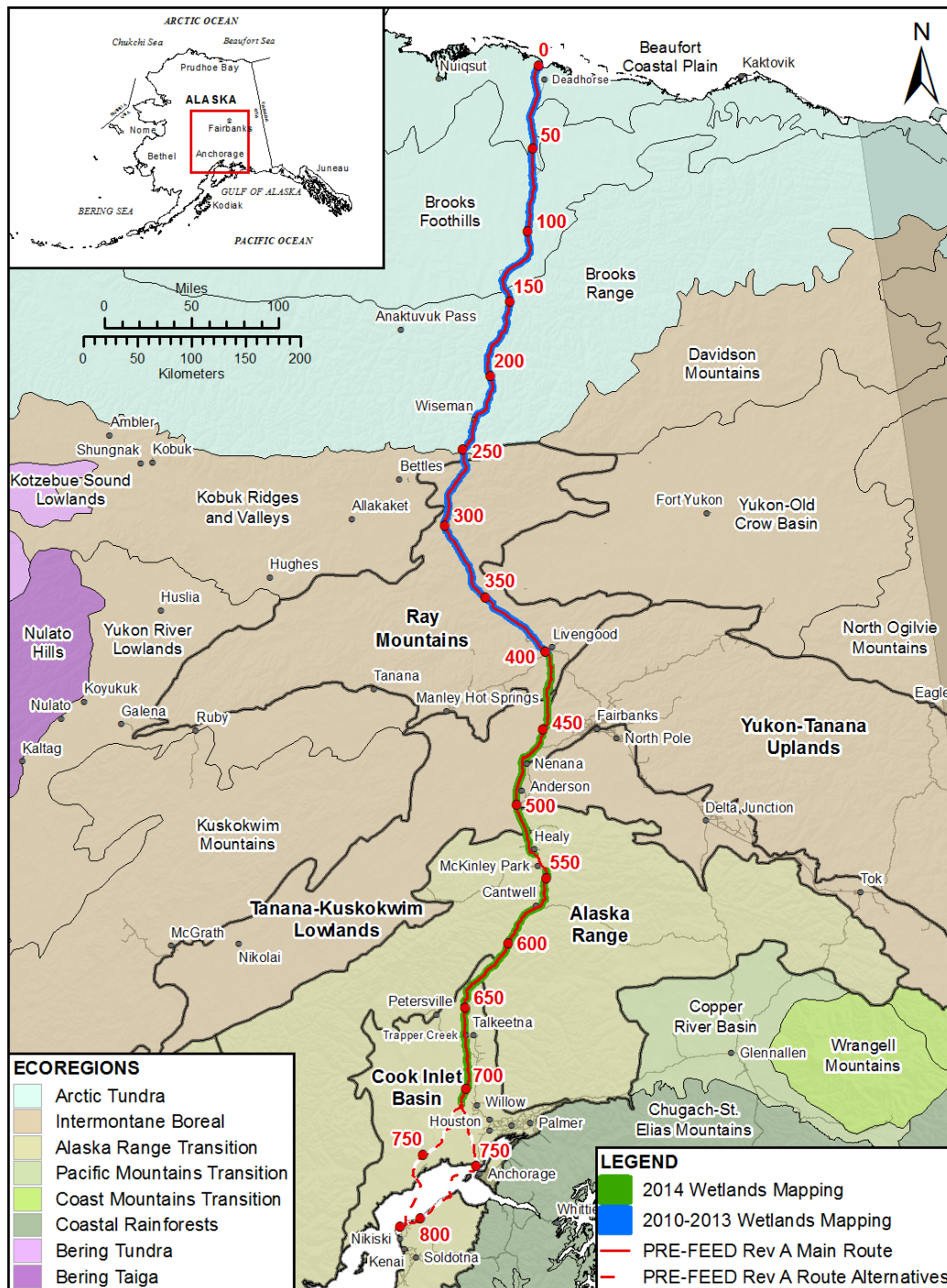



Figure 1. 2014 Project Study Area

	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 3 OF 24

1.3 STUDY AREA

The 2014 field season focused on higher confidence routing areas (90% confidence sections of the March 14, 2014 Focus Study Route) along the Project corridor, approximately from Livengood (MP 401) to 43 miles south of Trapper Creek (MP 709.5). Since the proposed Project route was revised (August 5, 2014) during the 2014 field season, not all sections of the revised 90% confidence areas have been field verified. **Appendix A** lists sections of the proposed route south of Livengood that still need to be mapped and/or field verified. Approximately 49 miles of the revised route will need to be mapped after aerial photography is obtained, and 170 miles will need to be field verified in 2015.


The Project route south of Livengood passes through two ecoregions with five sub-ecoregions, as described by Nowacki et al. (2001):

- Intermontane Boreal Ecoregion
 - Ray Mountains Sub-Ecoregion
 - Yukon-Tanana Uplands Sub-Ecoregion
 - Tanana-Kuskokwim Lowlands Sub-Ecoregion
- Alaska Range Transition Ecoregion
 - Alaska Range Sub-Ecoregion
 - Cook Inlet Basin Sub-Ecoregion

Ecoregions are defined as a unit of land or water with a geographically distinct compilation of species, communities, and environmental conditions. The Alaska LNG corridor, south of Livengood, begins in the Ray Mountains, continues south and passes through the Tanana-Kuskokwim Lowlands, briefly passing through the Yukon-Tanana Uplands, and then through the Alaska Range, before ending in the Cook Inlet Basin Sub-Ecoregion. Ecoregion descriptions are presented in the 2014 Vegetation Study Report (Alaska LNG 2014a). The wetlands survey area was divided into two corridors: a wetland mapping corridor and a field survey corridor. The mapping corridor was 2,000 feet wide (1,000 feet on either side of the proposed centerline). All wetlands and waterbodies were mapped within the mapping corridor using aerial photograph interpretation. The smaller field survey corridor was 300 feet wide (150 feet on each side of the proposed centerline) and centered within the mapping corridor. Field work was concentrated within the field survey corridor, ensuring that the wetland field work occurred near areas most likely to be disturbed by the proposed Project. The locations of any facilities outside of the two corridors were not included in the mapping or field survey.

The field survey area south of Livengood was divided into four geographic spreads for planning purposes for all disciplines:

- Livengood to Healy (LH), Pipeline milepost (MP) 401-525;
- Healy to Trapper Creek (HT), MP 525-667;
- Trapper Creek to Cook Inlet (TI), MP 667-767; and
- Cook Inlet to Nikiski (IN), MP 767-804.

	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 4 OF 24

2.0 METHODOLOGY

Wetland Determination Field Survey Protocols (**Appendix B**) were prepared by experienced wetland scientists prior to the 2014 field season. The protocols, summarized below, follow standard methods used to delineate wetlands for large linear projects in Alaska. The protocols comprise a three-phased iterative approach, including: 1) wetland pre-mapping relying primarily on aerial photo interpretation; 2) collection of ground reference data at pre-determined field targets; and 3) revision of the wetland pre-mapping based on the results of the field efforts. The same approach was followed for the Project mapping corridor north of Livengood, as part of the prior APP effort.


Pre-mapping was completed in 2013 and 2014 for the Mainline corridor from Livengood (MP 401) to approximately 43 miles south of Trapper Creek (MP 709.5) (**Appendix A** lists sections of the route that have not been pre-mapped). As noted above, the study effort did not include any off-corridor access roads or facility sites. Initial pre-mapping results were presented in a 2013 Wetland Mapping Report – South of Livengood (Alaska LNG 2013). This 2014 Wetland Field Study Report summarizes the pre-mapping effort and focuses on results of the field data collection. Since data from the Wetland Field Study and the Vegetation Field Study were collected at the same time, some of the vegetation classification data are presented in the appendices of this report. All of the information and methodology used for the Vegetation Study is provided in the 2014 Vegetation Field Study Report (Alaska LNG 2014a). The goal of the Vegetation Study was to identify vegetation cover types according to the Alaska Vegetation Classification System (Vioreck et al. 1992).

2.1 DEFINITIONS AND WETLAND NAMING CONVENTIONS

The USACE defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” Most wetlands are considered to be waters of the U.S. and are within the jurisdiction of the USACE (33 CFR Part 328.3[b]). Jurisdictional status is based on connectivity to Traditional Navigable Waters (TNW). Wetlands are considered jurisdictional “if the wetland, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as ‘navigable.’” (*Rapanos v. United States* and *Carabell v. United States* [33 U.S. Code §1251 et seq.]) (Stonestreet et al. 2009). Other non-wetland waters of the U.S. under the jurisdiction of the USACE, include deepwater aquatic habitats, unvegetated ponds, river channels, and other special aquatic sites as described by the USACE (See Section. 2.9).

2.1.1 Cowardin Classification


All wetlands and other waters of the U.S. in the wetland mapping corridor were classified using the “Classification of Wetlands and Deepwater Habitats of the United States” (Cowardin et al., 1979), commonly referred to as the Cowardin classification system. Cowardin classifies wetlands and aquatic habitats by system, subsystem, class, subclass, and water regime and is based on hydrologic setting (riverine, lacustrine, estuarine, palustrine), vegetation structure (forested, scrub-shrub, emergent, aquatic bed), and water regime (saturated, seasonally flooded, semi-permanently flooded, etc.).

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 5 OF 24

The Cowardin classifications are used as the standard codes in the National Wetland Inventory (NWI). The NWI Program has mapped many of the wetlands across the U.S., including many in the Project's mapping corridor (at a smaller scale than the Alaska LNG mapping). It was developed largely for mapping based on interpretation of high-altitude aerial photography. **Table 1** lists the most common Cowardin classifications found in the 2014 field survey corridor.

Table 1. Wetland Types within the Project Mapping Corridor from Livengood (MP 401) to Trapper Creek (MP 709.5), Alaska

Cowardin Wetland and Deepwater Habitat Types	Description	Example
Disturbed (D) (non-wetland)	Gravel-filled or previously graded areas, man-made structures	Roads, pads, buildings*
Lacustrine Limnetic (L1)	Deepwater habitats within the lacustrine system	Deepwater lakes*
Lacustrine Littoral (L2)	Vegetated habitats within the lacustrine system, or shoreward bound to 2 meters below annual low water	Lake fringes with unvegetated shallow water, or submerged or floating vegetation
Palustrine Aquatic Bed (PAB)	Habitats dominated by plants growing on or below the water surface	Ponds with submerged or floating vegetation such as pondweeds, water lilies
Palustrine Emergent (PEM)	Habitats dominated by erect, rooted, herbaceous species	Emergent wetlands with grasses, sedges, rushes
Palustrine Moss-Lichen (PML)	Habitats dominated by moss or lichen species	Wetlands with mosses or lichens
Palustrine Scrub-Shrub (PSS)	Habitats dominated by woody vegetation less than 6 meters tall/3-inch diameter at breast height (DBH)	Scrub-shrub wetlands with willow or alder thickets, black spruce, tussock tundra, ericaceous bogs
Palustrine Forested (PFO)	Habitats dominated by woody tree species greater than 6 meters tall/3- inch DBH	Forested wetlands with black spruce, tamarack
Palustrine Unconsolidated Bottom (PUB)	Habitats containing at least 25% cover of particles smaller than stones, and less than 30% cover by vegetation	Ponds with unvegetated shallow water, or submerged or floating vegetation
Riverine Lower Perennial Unconsolidated Shoreline/Unconsolidated Bottom (R2US/UB)	Low-gradient rivers/streams with slow water velocity	Valley bottom streams*
Riverine Upper Perennial Unconsolidated Shoreline/Unconsolidated Bottom (R3US/UB)	High-gradient rivers/streams with fast water velocity	Mountain streams*
Riverine Intermittent Streambed (R4SB)	Channels containing flowing water only part of the year	Intermittent streams*

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 6 OF 24

Upland (U) (non-wetland)	Habitats that do not contain criteria diagnostic of wetlands	Non-wetland communities, ranging from closed spruce forest, mixed woodlands, shrublands to alpine tundra
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* Unvegetated areas

2.1.2 Hydrogeomorphic Classes


Wetlands within the Project mapping corridor were also assigned a hydrogeomorphic (HGM) classification (Smith et al., 1995; and Brinson, 1993) during the mapping process. The HGM classification of wetlands comprises three components: 1) landscape setting; 2) water source (precipitation, surface flow, or groundwater discharge); and 3) hydrodynamics (direction and strength of flow). The three components of the HGM classes are largely responsible for determining a wetland's ecosystem function. The HGM classes in the 2014 field survey corridor are defined below per Smith et al. (1995) and are summarized in **Table 2**.

Riverine – Riverine wetlands occur in floodplains and riparian corridors in association with stream channels. Dominant water sources are often overbank flow from the channel or subsurface hydraulic connections between the stream channel and wetlands; however, sources may be interflow and return flow from adjacent uplands, occasional overland flow from adjacent uplands, tributary inflow, and precipitation. At their headwaters, riverine wetlands often are replaced by slope or depressional wetlands where the channel morphology may disappear. They may intergrade with poorly drained flats or uplands. Perennial flow in the channel is not a requirement.

Depressional – Depressional wetlands occur in topographic depressions. Dominant water sources are precipitation, groundwater discharge, and both interflow and overland flow 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 a combination of inlets and outlets or lack them completely. Dominant hydrodynamics are vertical fluctuations, primarily seasonal. Depressional wetlands may lose water through intermittent or perennial drainage from an outlet, by evapotranspiration, and, if they are not receiving groundwater discharge, may slowly contribute to groundwater. Peat deposits may develop in depressional wetlands.

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. Fens are a common example of slope wetlands.

Flat – There are two types of “flat” wetlands: mineral soil flats and organic soil flats. Mineral soil flats are most common on interfluvies, extensive relic lake bottoms, or large floodplain terraces where the main source of water is precipitation. They receive virtually no groundwater discharge which distinguishes them from depressions and slopes. Dominant hydrodynamics are vertical fluctuations. They lose water by evapotranspiration, saturation overland flow, and seepage to

	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 7 OF 24

underlying groundwater. They are distinguished from flat upland areas by their poor vertical drainage, often due to spodic horizons and hardpans, and low lateral drainage, usually due to low hydraulic gradients. Mineral soil flats that accumulate peat can eventually become organic soil flats.

Organic soil flats differ from mineral soil flats, in part, because their elevation and topography are controlled by vertical accretion of organic matter. They occur commonly on flat interfluvies, but may also be located where depressions have become filled with peat to form a relatively large flat surface. Water source is dominated by precipitation, while water loss is by saturation, overland flow, and seepage to underlying groundwater. Raised bogs share many of these characteristics, but may be considered a separate class because of their convex upward form and distinct edaphic conditions for plants. Organic flats wetlands over permafrost soils are common in Interior Alaska. These flats can and often occur on slopes up to 20%.


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 fringe wetlands lose water by flow returning to the lake after flooding, by saturation surface flow, and by evapotranspiration. Organic matter normally accumulates in areas sufficiently protected from shoreline wave erosion.

Table 2. Hydrogeomorphic Classes within the Project Mapping Corridor from Livengood (MP 401) to Trapper Creek (MP 709.5), Alaska

Hydrogeomorphic Class	Dominant Water Source	Dominant Hydrodynamics	Examples
Riverine	Overbank flow from channel	Unidirectional, horizontal	Riparian scrub-shrub wetlands
Depressional	Groundwater	Vertical	Kettle wetlands
Slope	Groundwater	Unidirectional, horizontal	Avalanche chutes
Flat	Precipitation	Vertical	Peat bogs
Lacustrine Fringe	Overbank flow from lake	Bidirectional, horizontal	Emergent lake edge wetlands

These HGM classes of wetlands have the potential to perform the following eight functions (Magee and Hollands 1998):

- Modification of groundwater discharge: The capacity of a wetland to influence the amount of water moving from the groundwater to surface water.
- Modification of groundwater recharge: The capacity of a wetland to influence the amount of water moving from surface water to groundwater.
- Storm and flood-water storage: The storage of inflowing water from storm or flooding events, resulting in detention and retention of water on the wetland surface.

	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 8 OF 24

- Modification of stream flow: The modification of inflow hydrology by the wetland to produce the outlet stream's hydrology.
- Modification of water quality: Removal of suspended and dissolved solids from surface water and dissolved solids from groundwater and conversion into other forms, plant or animal biomass, or gases. Wetlands with a low slope-angle or location in depressions provide a high level of this function.
- Export of detritus: Export of organic detritus from the wetland to adjacent and downstream aquatic ecosystems.
- Contribution to abundance and diversity of wetland vegetation: The capacity of a wetland to produce an abundance and diversity of hydrophytic plant species individually or as part of a group of wetlands in a local landscape (Tiner 1984).
- Contribution to abundance and diversity of wetland fauna: The capacity of a wetland to support large and / or diverse populations of animal species that spend part or all of their lifecycle in wetlands, individually, or as part of a mosaic of wetlands in a local landscape.

2.2 WETLAND PARAMETERS AND INDICATORS


Wetland determinations were made according to currently accepted methods in Alaska, as described in the "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region" (Regional Supplement) (USACE, 2007a), and the "USACE Wetlands Delineation Manual" (USACE Manual) (USACE, 1987). These methods require a three-parameter approach, of which the three essential characteristics of a wetland (hydrophytic vegetation, hydric soils, and wetland hydrology) must be present to have a positive wetland determination.

Wetland indicators are field verifiable and measurable characteristics of vegetation, soil, and hydrology that generally indicate that the parameter in question is present. The absence of an indicator, however, does not always mean that a parameter is not met, or that a wetland is not present. For these "problematic" situations, the Regional Supplement provides procedures to determine if a parameter is present or not. These generally rely on an understanding of the hydrogeomorphology of a site, and the best professional judgment of the wetland scientist. Each parameter, along with select Alaska-specific indicators, is described below.

2.2.1 Hydrophytic Vegetation

Hydrophytic vegetation, or a community dominated by plants with special adaptations to survive saturated or anaerobic conditions, is required for a positive wetland determination. The U.S. Fish and Wildlife Service prepared the "National List of Vascular Plant Species That Occur in Wetlands" in 1988 (Reed, 1988), which categorizes species based on their estimated probability of occurring in a wetland. USACE took over the task of updating this plant list (Lichvar, and Gillrich 2011, Lichvar et al. 2014). Indicator ratings and their descriptions are as follows:

- OBL (obligate wetland) – almost always found in wetlands, rarely in uplands;
- FACW (facultative wetland) – usually found in wetlands but occasionally found in uplands;
- FAC (facultative) – commonly occurs in either wetlands or uplands;
- FACU (facultative upland) – occasionally found in wetlands, but usually occurs in uplands;

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 9 OF 24

- UPL (obligate upland) – rarely found in wetlands, almost always in uplands.

Plant species with an indicator status of OBL, FACW, or FAC are considered adapted for life in saturated or anaerobic soil conditions. Such species are referred to as hydrophytic vegetation, or hydrophytes.

The presence of hydrophytic vegetation is determined by satisfying either a Dominance Test or a Prevalence Index. The Dominance Test is generally a quick way to characterize the vegetative community, however, communities with a large number of low cover species are more accurately characterized by the Prevalence Index, a weighted average of the wetland indicator status of all plant species in the community. Both methods were used when collecting field data.

If both of these indicators fail, yet the site exhibits both hydric soil and wetland hydrology (see description below), wetland scientists may examine FACU vegetation within the community for morphological adaptations indicating that it is indeed acting as a hydrophyte. Typical morphological adaptations observed in Alaska wetlands include white spruce (*Picea glauca*) with a narrow growth form, widely spaced needles, and less bushy branching; or resin birch (*Betula neoalaskana*) with multiple trunks, an “apple tree” like growth, smaller size, and a rotten core in the tree trunk. If these morphological adaptations were observed, the species may be considered FAC at the site in question, and the Dominance Test recalculated.


2.2.2 Wetland Soils

Hydric soils are also required for a positive wetland determination. The National Resources Conservation Service (NRCS) has defined a hydric soil as “a soil that in its undrained condition is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation” The criteria for hydric soils includes certain soil taxonomic groups that are poorly drained during the growing season, or soils that are frequently ponded or frequently flooded for long or very long durations during the growing season.

Due to anaerobic conditions, hydric soils exhibit certain characteristics that can be observed in the field. These characteristics may include the following:

- High organic content representing accumulation and slow decomposition in anaerobic conditions;
- Reduction of ferric (Fe³⁺) to ferrous iron (Fe²⁺) and consequent leaching from the soil profile, causing a greenish- or bluish-gray color (gley formation);
- Generation of hydrogen sulfide, noted by characteristic odor;
- Spots or blotches of different color interspersed with the matrix, or dominant color (mottling); and
- Dark soil colors (low soil chroma).

Indicators have been established by USACE to assist with identification of hydric soils. These indicators are found in the Regional Supplement and the “Field Indicators of Hydric Soils in the United States” (USDA, NRCS 2010). The absence of listed indicators, however, does not preclude the soil from being hydric. If indicators of hydrophytic vegetation and wetland hydrology are present, but hydric soils are not evident, the procedure outlined in the Regional Supplement for problematic hydric soils was followed.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 10 OF 24

2.2.3 Wetland Hydrology

Wetland hydrology is the third parameter required for a positive wetland determination. The most ephemeral of the three parameters, surface water or saturation, need not be present throughout the entire year to meet the definition of wetland hydrology. According to the USACE Manual (1987), wetland hydrology is present when there is inundation or soil saturation to the surface continuously for at least five percent of the growing season in most years. Indicators of wetland hydrology include observing ponding or soil saturation, as well as evidence of previous inundation, such as dry algae on bare soil, watermarks on soils or leaves, and drainage patterns. Where positive indicators were observed, it was assumed that wetland hydrology occurs for a sufficient period of the growing season.


2.3 AERIAL INTERPRETATION (PRE-MAPPING)

Wetland boundaries for the mapping corridor south of Livengood were delineated on digital orthorectified and geo-referenced true color aerial imagery with 1.6-foot pixel resolution using the following aerial imagery:

- Healy Area Orthophoto (U.S. Census Bureau 2006);
- Digital Orthophoto Quarter Quadrangles - Anderson Area (Natural Resources Conservation Service, NRCS, 2006);
- Northern Central Corridor Ortho Mosaic (Digital Globe 2013a);
- Southern Corridor Ortho Mosaic (Digital Globe 2013b);
- Talkeetna Aerial Orthophoto (Matanuska Susitna Borough, MSB, 2011a);
- Caswell Aerial Orthophoto (MSB 2011b); and
- Willow Aerial Orthophoto (MSB 2011c).

Data from the following sources was also used during the mapping process:

- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) digital datasets and hardcopy maps;
- NRCS Soil Survey digital datasets and hardcopy maps;
- Light Detection and Ranging generated topographic contours (TransCanada 2011, MSB 2011d);
- Pertinent previous studies, such as Terrestrial and Aquatic Habitat Mapping Along the Alaska Natural Gas Pipeline System (USFWS 1980), the Denali Pipeline Project, the instate Alaska Stand Alone Pipeline Project, and the Alaska Pipeline Project;
- U.S. Geological Survey Digital Raster Graphics (e.g., topographic maps);
- Existing Geographic Information System (GIS) layers including waterbodies, contours, and roads; and
- Existing Land Status GIS layers including: State of Alaska, U.S. Bureau of Land Management, and Native allotments.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 11 OF 24

All wetland mapping was created in a GIS platform, using a “heads-up” digitizing effort. This “heads-up” process applies aerial image interpretation to delineate vector polygons of ground features. This is the generally accepted wetland and deepwater habitat mapping technique employed by the U.S. Fish and Wildlife Service personnel as part of the NWI program (Dahl *et al.* 2009). Data sources were overlaid on aerial photography and wetland, non-wetland, and areas of uncertain wetland status were identified by interpreting color, texture, and landscape position, among other elements. Aerial photography clues can include dwarf or stunted trees, topography characteristics (such as swales, toe slopes and depressions), and obvious signs of inundation.

All wetlands were mapped at a scale of 1:2,400 (1 inch to 200 feet) or finer. Lakes, ponds and rivers were mapped at a scale of 1:1,200 (1 inch to 100 feet). Larger rivers and streams were delineated as polygons. Smaller streams, those with bankfull widths of approximately 10 feet or less, were mapped as lines.

Approximately 49 miles of the Project route have not been pre-mapped due to a lack of adequate aerial imagery. There is also a 12 mile gap in the 90% confidence route that has not been pre-mapped (**Appendix A**).

2.4 FIELD TARGET SELECTION

Field targets were selected from the pre-mapping based on changes in the wetlands types, aerial vegetation signatures, NWI classification, and NRCS soil classification. The primary focus of the pre-selected field targets was to characterize specific wetland types which represent all similar wetland types in the region and to identify wetland/upland boundaries by selecting paired plots. Field targets were used to confirm areas where wetland subject matter experts had high confidence in their aerial interpretation, and were used to confirm or correct wetland boundary locations. Field targets were also placed in low-confidence areas to provide field data where the photo signatures or landscape features were not clearly indicative of wetland or upland. Field targets spanned the full range of Cowardin and HGM classes within the Project mapping corridor.

Field targets were evaluated during the field season provided there was land access. If a field target could not be accessed, a new field target was located on a nearby accessible parcel in an area with similar aerial photography vegetation signatures and site conditions as the original field target.

2.5 WETLAND FIELD DATA COLLECTION

The 2014 wetland field study was conducted from early June through early September, and focused on field targets from Livengood (MP 401) to 43 miles south of Trapper Creek (MP 709.5).


	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 12 OF 24



Photo taken by V. Watkins


Figure 2. Field Data Collection by a Wetland Scientist

2.5.1 Crew Composition

Two three-person crews collected data in 2014. Each crew consisted of a field crew chief, an assistant wetland scientist / Global Positioning System (GPS) Technician, and a wilderness safety specialist. Each position had defined roles and responsibilities in the field and required a specific level of technical expertise.

Field crew chiefs were required to have proven field experience and a strong familiarity with wetland science. They were in charge of the field crews and ultimately responsible for data collection quantity and quality; daily reporting; crew health and safety; and data submittal on a daily or near-daily basis. Field crew chiefs also planned the workday for the crew, coordinated with Project management, and addressed any technical issues.

Wetland scientists / GPS technicians were required to be experienced in field work, familiar with wetland science principles, and to have attended a wetland delineation training course. They assisted in the wetland field survey (**Figure 2**) with appropriate supervision by the field crew chief. The wetland scientist / GPS technician was also responsible for electronic data collection at each site using a Trimble backpack-mounted GPS instrument. They worked closely with field crew

	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 13 OF 24

chiefs to verify that the data was accurate and complete, and were also responsible for the maintenance and care of the GPS equipment, managing the crew's electronic data, and ensuring data files were uploaded to the Project's SharePoint site on a daily or near-daily basis.

Wilderness safety specialists were professionally trained in firearms proficiency, Alaska wilderness survival, and First Aid / cardiopulmonary resuscitation. They were responsible for protecting the field crew from aggressive wildlife encounters, and assisting the field crew chief in the communication of and compliance with all Project health and safety policies.

2.5.2 Wetland Determination Field Protocols

Wetland Determination Field Survey Protocols are provided in **Appendix B**. As described in the protocols, data was collected as either a Determination Point (DP), where a hard copy Wetland Determination Form was completed, or an Observation Point (OP), in which notes and photographs were used to describe wetland status and the community. All wetlands and waterbodies were classified using Cowardin codes.

The field crew chief examined vegetation and topography to determine appropriate sampling location(s) at each field target. Although field targets were used to guide the location of field crews, field crew chiefs were allowed discretion in the number, type (DP or OP), and final location of data points. This flexible approach allowed scientists to collect data in locations that best described the target community, allowed them to collect additional data as field conditions warranted, and enhanced efficiency by allowing scientists to collect observational data if a similar community was thoroughly described nearby. Wetland scientists used their best professional judgment and collected appropriate field data to adequately revise the wetland pre-mapping.

Field crew chiefs maintained field logbooks and hardcopy field maps with aerial photography, field targets, and pre-mapped wetland boundaries and classifications. The wetland scientist / GPS technician entered some of the data into electronic data forms specific to DPs and OPs. Daily field quality assurance/quality control (QA/QC) procedures are described in Section 2.6. Hardcopy and electronic data forms, field notes, maps, GPS data, and site photos were uploaded daily to the Project SharePoint website.


2.6 QUALITY ASSURANCE/QUALITY CONTROL

The wetland and vegetation technical lead conducted quality audits during the first week of each deployment. These audits ensured data quality and consistency between teams, and provided an opportunity for any problems to be corrected immediately.

Each crew member was responsible for collecting and recording clear and accurate data. The field crew chief reviewed all hardcopy and electronic data forms and completed a QA/QC checklist before leaving each site.

The field crew manager ensured that all data files were uploaded to the Project website. These transmitted files were then downloaded and reviewed by office-based data management staff. The wetland technical lead checked each hardcopy data sheet and electronic data form for quality and consistency, as it was received. If problems arose, the field crew was notified promptly to ensure that any data quality issues were corrected immediately.

Wetland mapping was also reviewed by experienced wetland scientists both after the initial pre-mapping, and after map revisions were complete.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 14 OF 24

2.7 WETLAND MAP REVISIONS

The wetland pre-mapping was revised to incorporate the results of the 2014 field studies, including revision of the wetland classifications (e.g., HGM and Cowardin). Map revisions followed procedures outlined in the Wetland Determination Field Survey Protocols (**Appendix B**), and included the 2014 GPS data, Wetland Determination Forms, Vegetation Classification Forms for upland sites, site photographs, logbooks, and field maps as additional data sources. Map revisions were only made with post-processed GPS data and field forms that passed the QA/QC process (Section 2.6).


Generally, the wetland pre-mapping revision process involved:

- Exporting spatial data for all field targets and photo points from the Alaska LNG database;
- Compiling electronic copies of all notes, sketches, and photographs associated with above points; and
- Using this data in a GIS platform to update files through heads-up digitizing, or modifying the initial map on screen as described in Section 3.2 of the Wetland Determination Field Survey Protocols.

Note that, when updating the map for both wetland and upland polygons, changes were not necessarily applied solely to the polygon containing field data. Rather, field data were used to “recalibrate” that portion of the map (generally within one half mile of the data collection site), represented by a particular spectral signature (combination of color, tone, shadow, etc.), and recoded in that area as deemed appropriate. As the aerial imagery used for pre-mapping had seasonal variations (including imagery taken prior to green-up), revisions were most often needed to correct pre-mapping interpretations of vegetation height, percent canopy coverage, and plant species composition.

2.8 WETLAND FUNCTIONAL ASSESSMENT

Wetlands are known to provide a variety of ecological functions depending on the location and type of wetland. At sites determined to be wetland, a Wetland Functional Assessment Data Sheet was collected. Information from this data sheet will be incorporated into the functional models described in *A Rapid Procedure for Assessing Wetland Functional Capacity* (Magee and Hollands 1998). Hydrogeomorphic (HGM) classes of wetlands and the eight wetland functions identified by Magee and Hollands are described in Section 2.1.2 and in the Wetland Determination Field Survey Protocols (**Appendix B**). The functional assessment models provide a Functional Capacity Index for each wetland function. The Functional Capacity Index indicates the potential degree to which the wetland performs the function and is only comparable to other wetlands within the same HGM class and region. The results from the models will be extrapolated to the applicable wetlands within the mapping corridor. This information will potentially serve as the basis to determine appropriate compensatory mitigation for the unavoidable impacts of the Project. Wetland functional assessment data will be reported in 2016, after all field data is collected.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 15 OF 24

2.9 JURISDICTIONAL DETERMINATION

The USACE regulates wetlands and other waters of the U.S. that are under their jurisdiction. Jurisdictional status is based on connectivity to Traditional Navigable Waters (TNW) (Rapanos v. United States and Carabell v. United States [33 U.S. Code §1251 et seq.]).

The Project, similar to other large pipeline and energy projects permitted by the USACE, will assume that all delineated wetlands fall under USACE jurisdiction; because the FERC requires that the Project adhere to certain construction requirements in all wetlands, regardless of jurisdiction, it will be assumed that all wetlands fall within USACE jurisdiction for purposes of planning, permitting, mitigation, and construction methods.

3.0 RESULTS

3.1 WETLAND FIELD DATA COLLECTION

A total of 212 field targets comprising wetlands, non-wetlands, and uncertain areas were sampled by field crews during the 2014 field season (**Table 3**). Wetland crews collected Wetland Determination Data Forms at 192 field targets, Vegetation Classification Data Forms at 10 field targets and OPs at 10 field targets. The 2014 wetland determination data forms and the Wetland and Vegetation Field Data Summary Table are provided in **Appendix C**.

Table 3. Field Targets Completed in 2014

Spread	Milepost	Total Number of Field Targets Completed	Number of Field Targets Completed Within Current 90% Confidence Field Survey Corridor
Livengood to Healy	401 - 525	46	28
Healy to Trapper Creek	525 - 667	102	84
Trapper Creek to Cook Inlet	667 - 767	64	34
Cook Inlet to Nikiski	767 - 804	0	0
Total:		212*	146

*66 of the field targets completed fall outside of the current proposed route (90% confidence route) (**Appendix A**).


Since the proposed Project route was revised on August 5, 2014, after pre-mapping and field surveys began, 66 field targets were surveyed in areas that are no longer within the 90% confidence portions of the route. A total of 146 field targets have been completed within the current 90% confidence field survey corridor. Also, some sections that have been rerouted have either (1) only been pre-mapped and not field verified or (2) not been pre-mapped or field verified due to a lack of quality aerial imagery (**Appendix A**).

3.2 WETLAND MAP REVISIONS

The wetland delineation pre-mapping was revised according to the criteria summarized in Section 2.7 of this report. The 2014 final wetland delineation maps are included as **Appendix D**. A summary of wetland acreage per spread within the Project mapping corridor south of Livengood is presented in **Table 4** in which wetlands are organized by HGM (Brinson, 1993) and Cowardin (Cowardin et al.1979) classifications. Of the approximate 71,026 acres in the mapping corridor, wetlands and other waters of the U.S comprise 23,183 acres or 33 percent of the total.

Within the Livengood to Healy spread approximately 42% of the area is wetland. About 78% of the wetlands in this spread are palustrine scrub-shrub and palustrine forested wetlands, the majority of which are dominated by black spruce (*Picea glauca*) plant communities on permafrost soils. About 21% of the wetlands within this reach are higher quality wetlands, such as depressional palustrine emergent, palustrine, aquatic bed, palustrine unconsolidated bottom, and riverine wetlands. These wetlands are mostly semipermanently or permanently flooded wetlands providing aquatic habitats for a variety of species.

Within the Healy to Trapper Creek spread about 22% of the area is wetland. This spread contains far fewer acres of the lower quality permafrost wetlands (about 14% of all wetlands within the

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 17 OF 24

spread). About 55% of the wetlands within this spread are depressional higher quality wetlands, and about 25% of the wetlands in this spread are within riverine systems.

About one third (36%) of the Trapper Creek to Cook Inlet spread covered by this report is wetland. About 94% of these wetlands are classified as depressional, and 5% are riverine wetlands. About 26% of these depressional and riverine wetlands consist primarily of semipermanently or permanently flooded wetlands, such as palustrine unconsolidated bottom, palustrine aquatic bed, palustrine emergent, and riverine systems.


	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 18 OF 24

Table 4. Wetland Acreage within the Project Mapping Corridor South of Livengood, by Hydrogeomorphic and Cowardin Types

HGM and Cowardin Classification	Livengood to Healy (acres)	Healy to Trapper Creek (acres)	Trapper Creek to Cook Inlet (MP 709.5) (acres)	Grand Total (acres)
Flat				
PEM	17.07	2.22	0	19.29
PEM/SS	79.39	82.80	0	162.19
PFO	472.58	8.78	0.43	481.79
PFO/EM	0	4.59	0	4.59
PFO/SS	2838.10	4.18	0	2842.28
PSS	5210.34	773.24	0	5983.58
PSS/EM	1031.67	904.55	0	1936.22
PSS/FO	116.30	0	0	116.30
Depressional				
L1UB	0	111.32	0	111.32
L2UB	0	7.93	0	7.93
PAB	14.93	114.28	183.31	312.52
PAB/EM	0	39.07	11.35	50.42
PEM	160.68	1025.66	242.85	1429.19
PEM/SS	20.73	713.54	549.73	1284
PFO	1.90	286.49	266.17	554.56
PFO/EM	0	0.64	0	0.64
PFO/SS	1.13	60.09	254.22	315.44
PML	0	0.68	0	0.68
PSS	40.10	1286.26	1003.72	2330.08
PSS/EM	403.04	328.84	174.19	906.07
PSS/FO	0	0.36	736.03	736.39
PUB	24.60	123.71	80.39	228.70
PUB/AB	0	3.45	8.17	11.62
PUB/EM	0	1.87	0	1.87
Slope				
PEM	0	23.99	0	23.99
PEM/SS	0	13.87	0	13.87
PFO/SS	0	62.15	0	62.15
PSS	2.98	12.56	0	15.54
PSS/EM	0	33.86	0	33.86
PUB	0	0.45	0	0.45
Lacustrine Fringe				
PAB	0	0.77	24.61	25.38
Riverine				
PAB	32.63	0.88	1.43	34.94
PEM	30.84	41.23	7.72	79.79
PEM/SS	72.84	15.80	56.94	145.58
PFO	296.41	49.37	0	345.78
PFO/SS	633.79	0	0	633.79
PSS	362.16	215.21	73.34	650.71
PSS/EM	456.42	105.85	21.00	583.27
PSS/FO	0	24.79	0	24.79
PSS/US	0	0.21	12.35	12.56
PUB	5.91	25.59	3.30	34.8
PUB/SS	0	1.44	0	1.44
R2UB	134.54	68.97	11.24	214.75
R2US	0.47	22.33	0	22.80


Study Spread	Stream Classification								
	Lower Perennial (R2) Crossing			Upper Perennial (R3) Crossing			Intermittent (R4) Crossing		
	Major (>100 ft)	Intermediate (10-100 ft)	Minor (<10 ft)	Major (>100 ft)	Intermediate (10-100 ft)	Minor (<10 ft)	Major (>100 ft)	Intermediate (10-100 ft)	Minor (<10 ft)
Livengood to Healy	3	5	1	0	3	0	0	5	24
Healy to Trapper Creek	1	1	0	4	11	12	1	3	33
Trapper Creek to Cook Inlet	0	0	0	0	7	4	0	3	11
Cook Inlet to Nikiski	0	0	0	0	0	0	0	0	0
Total:	4	6	1	4	21	16	1	11	68
Grand Total:	132								

Table 6. Major Waterbody Crossings Along the Project Route South of Livengood

Major Crossings			
Study Spread	Stream Classification	Stream Name	MP
Livengood to Healy	R2	Chatanika River	438.8
		Tanana River	470.2
		Nenana River #1	478.9
		Chulitna River	644.5
Healy to Trapper Creek	R3	Yanert Fork	544.9
		Nenana River #4	563.1
		Jack River	569.0
		Troublesome Creek	643.3
	R4	Dry Creek	528.0


3.3 NEXT STEPS

Some sections of the proposed 90% confidence Project route were revised after the 2014 field studies were underway. Two rerouted segments near Trapper Creek were pre-mapped and field verified in September. The four additional rerouted segments, any alternative segments, and off-corridor areas will need to be pre-mapped, and then field verified in 2015. Sections of the route lacking adequate aerial photography will also need to be pre-mapped and field verified. **Appendix A** lists sections of the proposed route south of Livengood that still need to be mapped and/or field verified. Additional aerial photography will be provided in a subsequent draft of this Resource Report.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 21 OF 24


4.0 ACRONYMS AND ABBREVIATIONS

APP	Alaska Pipeline Project
CFR	Code of Federal Regulations
DP	Determination Point
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic
LNG	Liquefied Natural Gas
MP	Milepost
NRCS	National Resources Conservation Service
NWI	National Wetland Inventory
OP	Observation Point
PJD	Preliminary Jurisdictional Determination
Project	Alaska LNG
QA/QC	Quality Assurance/Quality Control
ROW	Right-of-Way
TNW	Traditional Navigable Water
U.S.	United States
USACE	U.S. Army Corps of Engineers


	2014 WETLAND STUDY REPORT – LIVENGOOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 22 OF 24

5.0 REFERENCES


- Alaska LNG. 2013. Wetlands Mapping Report-South of Livengood (USAKE-UR-SRZZZ-00-0018).
- Alaska LNG. 2014a. Vegetation Field Study Report-Livengood to Trapper Creek (USAI-UR-SRZZZ-00-000019-000).
- Alaska LNG 2014b. Stream Hydrology Survey Field Study Report (USAI-UR-SRZZZ-00-000004-000).
- Alaska Pipeline Project (APP). 2011. Wetlands Field Study Report (USAG-UR-SRWDF-000008).
- Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. Technical Report WRP-DE-4. U.S. Army Corps of Engineers, Waterways Experiment Station. Vicksburg, MS.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, Fish and Wildlife Service, U.S. Department of the Interior. FWS1035-79-81.
- Dahl, T.E., J. Dick, J. Swords and B.O. Wilen. 2009. Data Collection Requirements and Procedures for Mapping Wetland, Deepwater and Related Habitats of the United States. Division of Habitat and Resource Conservation, National Standards and Support Team. Madison, WI. 85 p.
- Digital Globe. 2013a. Northern Central Corridor Ortho Mosaic. eTerra 2013.
- Digital Globe. 2013b. Southern Corridor Ortho Mosaic. eTerra 2013.
- Lichvar, R. W. and J. J. Gillrich. Final Protocol for Assigning Wetland Indicator Status Ratings during National Wetland Plant List Update. 2011. ERDC/CRREL TN-11-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.
- Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2014 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42.
- Magee, D.W and G.G Hollands. 1998. A Rapid Procedure for Assessing Wetland Functional Capacity Based on HGM Classification. Normandeau Associates, Bedford, NH.
- Matanuska-Susitna Borough (MSB). 2011a. Talkeetna Aerial Orthophoto.
- MSB. 2011b. Caswell Aerial Orthophoto.
- MSB. 2011c. Willow Aerial Orthophoto.
- MSB. 2011d. Mat-Su Borough LiDAR.
- Natural Resource Conservation Service (NRCS) 2006. Digital Orthophoto Quarter Quadrangles – Anderson Area.
- Nowacki, G., P. Spencer, T. Brock, M. Fleming, and T. Jorgenson. 2001. Ecoregions of Alaska and Neighboring Territories. U.S. Geological Survey Miscellaneous Investigations Series 1 Map.
- Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands: 1988 National

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 23 OF 24

- Summary. Biological Report 88(24). Washington, DC: U.S. Fish and Wildlife Service.
- Smith, R. D., A. Amman, C. Bartoldus, and M. M. Brinson. 1995. An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices. Technical Report WRP-DE-9. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.
- Stonestreet, R. M. and Dinsmore & Shohl LLP. 2009. New Guidance for “Jurisdictional Waters” under Clean Water Act. Online: http://www.martindale.com/environmental-law/article_Dinsmore-Shohl-LLP_602482.htm
- TransCanada 2011. Alaska Pipeline Project Light Detection and Ranging. ESRI ArcGIS File Geodatabase, PHB Technologies. Quebec, Canada.
- USACE. 1987. Corps of Engineers Wetlands Delineation Manual. Department of the Army, Waterways Experiment Station. Vicksburg, MS.
- USACE. 2007a. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0). ed. J.S. Wakeley, R.W. Lichvar, and C. Noble. ERDC/EL TR-07-24. U.S. Army Engineer Research and Development Center. Vicksburg, MS.
- USACE. 2007b. U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook and Approved Jurisdictional Determination Form (May 30, 2007).
- United States Department of Agriculture. 2010. Field Indicators of Hydric Soils in the United States. Available from: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_053171.pdf.
- U.S. Department of the Census, Census Bureau. 2006. Healy Area Orthophoto.
- U.S. Environmental Protection Agency and USACE. 2008. Clean Water Act Jurisdiction following the U.S. Supreme Court’s Decision in Rapanos v. United States & Carabell v. United States.
- United States Fish and Wildlife Service. 1980. Terrestrial and Aquatic Habitat Mapping Along the Alaska Natural Gas Pipeline System. Carl J. Markon. USFWS Special Studies. Anchorage, AK. p. 67.
- Viereck, L.A.; Dyrness, C.T.; Batten, A.R.; Wenzlick, K.J. 1992. The Alaska vegetation classification. General Technical Report PNW-GTR-286. U.S. Department of Agriculture, U.S. Forest Service, Pacific Northwest Research Station. Portland, OR.

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1
		PAGE 24 OF 24

6.0 APPENDICES

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1

APPENDIX A – SUMMARY OF 2014 WETLAND AND VEGETATION MAPPING AND FIELD TARGETS COMPLETED

Summary of Wetland and Vegetation Mapping

Livengood (MP 401) to Approximately 43 Miles South of Trapper Creek (MP 709.5)

➤ Unmapped Areas Due To Lack Of Aerial Photography

- MP 405.5 – MP 432
- MP 480 – MP 500.5 (we have imagery of this section, but it's very poor quality)
- MP 592.4 – MP 592.8
- MP 586 – MP 587.1

➤ Field Verification Of Rerouted Areas Needed

- MP 407 – MP 433
- MP 440 – MP 454
- MP 468 – MP 516
- MP 585 – MP 605

➤ 90% Confidence Area Gaps

- MP 533 – MP 545

➤ 2014 Field Season Field Data Point Locations

- Wetland Points

Points Located Within The Most Current 90% Confidence Route		Points Located Outside The Current 90% Confidence Route	
Feature ID	Field Target #	Feature ID	Field Target #
W61LH001	1	W61LH006	6
W61LH002	2	W61LH007	7
W61LH003	3	W61LH010	7
W61LH004	4	W61LH008	8
W61LH005	5	W61LH009	9
W61LH023	23	W61LH011	11
W61LH024	24	W61LH012	12
W61LH025	25	W61LH013	13
W61LH026	26	W61LH014	14
W61LH027	27	W61LH015	15
W61LH028	35	W61LH016	16
W61LH029	36	W61LH017	17
W61LH031	37	W61LH018	18
W61LH032	38	W61LH019	19
W61LH033	39	W61LH020	20
W61LH034	40	W61LH021	21
W61LH035	41	W61LH047	20
W61LH036	42	W61LH022	22
W61LH037	43	W61LH030	34
W61LH038	44	W61HT038	61
W61LH039	45	W61HT032	76
W61LH040	47	W61HT033	77
W61LH041	46	W61HT035	78
W61LH042	48	W61HT034	79
W61LH043	49	W61HT007	80

W61LH044	50	W61HT008	81
W61LH045	51	W61HT009	82
W61LH046	52	W61HT013	83
W61HT001	53	W61HT014	84
W61HT011	54	W61HT015	85
W61HT010	55	W60HT039	100
W61HT012	56	W61HT016	115
W61HT004	58	W61HT017	114
W61HT003	57	W61HT018	113
W61HT005	59	W61HT019	117
W61HT002	60	W60HT054	130
W61HT037	62	W60HT055	132
W61HT036	63	W60HT025	148
W61HT025	64	W60TI051	150
W61HT026	65	W60TI040	151
W61HT024	66	W60TI039	152
W61HT023	67	W60TI046	156
W61HT027	68	W60TI045	155
W61HT028	69	W60TI044	154
W61HT030	70	W60TI042	160
W61HT029	71	W60TI043	159
W61HT006	72	W60TI041	161
W61HT022	73	W60TI047	162
W61HT021	74	W60TI048	162
W61HT031	75	W60TI037	163
W60HT002	86	W60TI036	164
W60HT001	87	W60TI035	165
W60HT003	88	W60TI032	166
W60HT033	89	W60TI034	168
W60HT034	90	W60TI031	167
W60HT015	91	W60TI030	169
W60HT028	92	W60TI027	170
W60HT029	93	W60TI028	171
W60HT030	94	W60TI029	172
W60HT031	95	W60TI023	173
W60HT032	97	W60TI024	174
W60HT035	98	W60TI025	175
W60HT037	99	W60TI020	176
W60HT038	100	W60TI019	177
W60HT040	101	W60TI022	178
W60HT041	102	W60TI017	179
W60HT042	103	W60TI018	180
W60HT024	104	W60TI015	181
W60HT026	106	W60TI016	182
W60HT027	107		
W60HT044	108		
W60HT045	109		
W60HT046	110		
W60HT048	112		
W61HT020	116		
W60HT050	119		

W60HT049	118		
W60HT019	122		
W60HT018	121		
W60HT051	123		
W60HT020	125		
W60HT021	126		
W60HT023	128		
W60HT004	133		
W60HT007	134		
W60HT006	135		
W60HT005	136		
W60HT053	138		
W60HT056	139		
W60HT008	142		
W60HT009	141		
W60HT010	143		
W60HT012	145		
W60HT013	146		
W60HT014	147		
W60HT057	202		
W60HT047	149		
W60HT059	203		
W60TI038	153		
W60TI049	157		
W60TI050	158		
W60TI052	205		
W60TI053	206		
W60TI054	207		
W60TI055	208		
W60TI056	209		
W60TI058	210		
W60TI059	212		
W60TI061	214		
W60TI062	215		
W60TI063	216		
W60TI064	217		
W60TI065	218		
W60TI068	220		
W60TI067	221		
W60TI014	183		
W60TI013	184		
W60TI012	185		
W60TI010	186		
W60TI008	187		
W60TI006	188		
W60TI004	190		
W60TI003	191		
W60TI001	193		
W60TI069	223		
W60TI070	224		

- Vegetation Points

Points Located Within The Most Current 90% Confidence Route		Points Located Outside The Current 90% Confidence Route	
Feature ID	Field Target #	Feature ID	Field Target #
W60HT016	91	W60TI033	166
W60HT036	98	W60TI026	173
W60HT043	103	W60TI021	176
W60HT017	120		
W60HT052	124		
W60HT022	127		
W60HT011	144		
W60HT058	202		
W60TI072	210		
W60TI057	211		
W60TI060	213		
W60TI066	219		
W60TI011	186		
W60TI009	187		
W60TI007	189		
W60TI005	190		
W60TI002	192		
W60TI071	225		


- Wetland Observation Points

Points Located Within The Most Current 90% Confidence Route		Points Located Outside The Current 90% Confidence Route	
Feature ID	Field Target #	Feature ID	Field Target #
W61LH002_OP	2	W61LH006_OP	6
W61LH005_OP	5	W61LH009_OP	9
W61LH025_OP	25	W61LH011_OP	11
W61LH028_OP	35	W61LH011_OP1	10
W61LH031_OP	37	W61LH012_OP	12
W61LH033_OP	39	W61LH016_OP	16
W61LH034_OP	40	W61LH030_OP	34
W61LH035_OP	41	W61LH030_OP1	34
W61LH037_OP	43	W61HT014_OP	84
W61LH038_OP	44	W61HT015_OP	85
W61LH039_OP	45	W61HT017_OP	114
W61LH041_OP	46	W61HT016_OP	115
W61LH041_OP1	46	W61HT019_OP	117
W61LH042_OP	48	W60HT055_OP1	131
W61LH043_OP	49	W60HT055_OP	131
W61LH046_OP	52	W60TI028_OP	171
W61HT001_OP	53	W60TI023_OP	173
W61HT011_OP	54	W60TI025_OP	175
W61HT010_OP	55	W60TI020_OP	176
W61HT012_OP	56	W60TI015_OP	181
W61HT003_OP	57		

W61HT004_OP	58		
W61HT005_OP	59		
W61HT002_OP	60		
W61HT038_OP	61		
W61HT036_OP	63		
W61HT025_OP	64		
W61HT024_OP	66		
W61HT023_OP	67		
W61HT027_OP	68		
W61HT006_OP	72		
W61HT022_OP1	73		
W61HT022_OP	73		
W61HT031_OP	75		
W60HT015_OP	91		
W60HT028_OP	92		
W60HT030_OP	94		
W60HT031_OP	96		
W60HT026_OP	105		
W60HT045_OP	109		
W60HT046_OP	111		
W60HT023_OP	129		
W60HT053_OP	137		
W60HT053_OP1	140		
W60HT059_OP	203		
W60HT059_OP1	204		
W60TI052_OP	205		
W60TI055_OP	208		
W60TI063_OP	216		
W60TI068_OP	220		
W60TI013_OP	184		
W60TI012_OP	185		
W60TI010_OP	186		
W60TI008_OP	187		
W60TI001_OP	193		

Alternative Routes - South of MP 709.5

- Mapping was completed on two alternate routes from MP 709.5 south to Nikiski. The new 90% confidence route from MP 709.5 southwest to Tyonek has also been mapped, but only where aerial imagery is available. This section of the mapping still needs a QA/QC check.
 - Mapping completed from MP 709.5 to 731, and from MP 757 to 767 (Cook Inlet).
 - Mapping not completed from MP 731 to MP 757 (aerial imagery is needed).
- Field verification is needed for all alternate routes south of MP 709.5.
- There is no 90% confidence route for any segments on the Kenai Peninsula

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1

APPENDIX B – 2014 WETLAND DETERMINATION FIELD SURVEY PROTOCOLS

Alaska LNG

2014 Wetland Determination

Field Survey Protocols

USAKE-UR-SPFLD-00-0008

Rev	Rev date	Description	Prepared By	Checked By	Endorsed By	Approved By
A	3.20.14	Issued for Review and Comment	VW			
0	4.4.14	Issued for Information				
1	4.16.14	Issued for Information				
2	5.20.14	Issued for Information				

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE i OF iv

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ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE iii OF iv

TABLE OF CONTENTS

1.0	PROJECT DESCRIPTION	1
2.0	INTRODUCTION.....	3
2.1	OBJECTIVES	3
2.2	PROJECT AREA.....	3
3.0	METHODS.....	5
3.1	OVERVIEW	5
3.2	WETLAND PRE-MAPPING	5
3.3	FIELD TARGET SELECTION.....	6
3.4	WETLAND FIELD DATA COLLECTION	7
3.5	MAP REVISIONS	7
3.6	WETLAND FUNCTIONAL ASSESSMENT	8
3.7	JURISDICTIONAL DETERMINATION	9
3.8	DATA RECORDING AND PROCESSING	9
3.9	QUALITY ASSURANCE/QUALITY CONTROL	10
3.10	REPORTING.....	10
4.0	FIELD STUDIES EXECUTION.....	11
5.0	REFERENCES	12
6.0	APPENDICES	14

APPENDIX A WETLAND DETERMINATION DATA FORM

APPENDIX B WETLAND SURVEY GEAR LIST

APPENDIX C QUALITY ASSURANCE/QUALITY CONTROL CHECKLIST

APPENDIX D FIELD STUDIES EXECUTION

FIGURES

FIGURE 1 PROPOSED ALASKA LNG ROUTE

Note – All pipeline routing and/or facility siting information described in this document should be considered preliminary and subject to change.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE iv OF iv

ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
FCI	Functional Capacity Index
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GPS	Global Positioning System
GTP	Gas Treatment Plant
HGM	hydrogeomorphic
LNG	liquefied natural gas
MP	milepost
MSB	Matanuska Susitna Borough
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PBU	Prudhoe Bay Unit
PTU	Point Thomson Unit
ROW	right-of-way
RPW	Relatively Permanent Water
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 1 OF 14

1.0 PROJECT DESCRIPTION

BP, ConocoPhillips, ExxonMobil, and TransCanada are currently developing a potential project, known as the Alaska LNG Project, to treat, transport, and deliver natural gas from the Alaska's North Slope to a new liquefied natural gas (LNG) plant and marine terminal on Cook Inlet (the "Project"). The proposed Project includes the following major components in Alaska: an LNG Plant, a Gas Pipeline, a Gas Treatment Plant (GTP), a Prudhoe Bay Unit (PBU) Gas Transmission Line, and a Point Thomson Unit (PTU) Gas Transmission Line. In October 2013, the Project selected a site in the Nikiski area on the Kenai Peninsula as the preferred location for a proposed natural gas liquefaction plant and marine terminal. Pipeline routing definition from the Prudhoe Bay Unit to the plant location is ongoing.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 2 OF 14



Figure 1. Proposed Alaska LNG Route

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 3 OF 14

2.0 INTRODUCTION

Alaska LNG will conduct wetland determination surveys to verify the pre-field mapping wetland types and boundaries of all waters of the United States (U.S.), including wetlands, within the defined corridor and in specific areas along the Project route. The 2014 field survey will be conducted on a limited basis focusing portions of the route between Livengood and Trapper Creek, Alaska.

All waters of the U.S. are regulated by the U.S. Army Corp of Engineers (USACE) under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. All projects, as part of the Section 404 permitting process, must avoid impacts to wetlands wherever possible, minimize impacts to wetlands to the maximum extent practicable, and compensate for all unavoidable wetland impacts.

Results of the wetland surveys will facilitate the eventual evaluation of project-related direct, indirect, and cumulative impacts under the Federal Energy Regulatory Commission (FERC) Resource Report 2 (Water Use and Quality), the National Environmental Policy Act, and Section 404 and Section 10 permits administered by the USACE.

This document presents the wetland determination field survey protocols that will be used during the 2014 field season. It discusses the protocols used in both the field and office for delineating the boundaries of areas that are regulated by USACE and may be impacted by the proposed project.

2.1 OBJECTIVES

The main objectives for the Alaska LNG 2014 wetland field season are:

- Complete wetland surveys in the vicinity of the pre-selected field targets;
- Collect data at field-selected observation points and at additional wetland determination points where necessary to adequately update the field maps; and
- Update the pre-field wetland mapping based on results of the field data.

2.2 PROJECT AREA

The wetlands survey area for the project is divided into two corridors: A wetland mapping corridor and a field survey corridor. The mapping corridor has been preliminarily established as a 2,000 foot corridor (1,000 feet on either side of the proposed alignment centerline). This mapping corridor width may be modified, with the approval of USACE, to exclude terrain features such as steep mountain slopes or lands on the far side of rivers, which are not under consideration for use. All wetlands and waterbodies will be mapped within the mapping corridor using aerial photograph interpretation. The smaller field survey corridor is 300-feet-wide (150-feet on each side of the proposed alignment centerline) and centered within the mapping corridor. Field work will be concentrated within the field survey corridor, ensuring that the wetland field work occurs near areas most likely to be disturbed by the proposed project.

The Alaska LNG field survey area south of Livengood is divided into four geographic spreads for planning purposes:

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 4 OF 14

- Livengood to Healy, milepost (MP) 399-520;
- Healy to Trapper Creek, MP 520-660;
- Trapper Creek to Cook Inlet, MP 660-743; and
- Cook Inlet to Nikiski, MP 743-806.

The 2014 field season will focus on areas along this Project corridor, approximately between Livengood and Trapper Creek.

The Alaska LNG project route south of Livengood will pass through two ecoregions, Boreal-Intermontane Boreal and Alaska Range Transition, with five sub-ecoregions, as described by Nowacki et al. (2001). Ecoregions are defined as a unit of land or water with a geographically distinct compilation of species, communities, and environmental conditions. The Alaska LNG corridor, south of Livengood, begins in the Ray Mountains, continues south and passes through the Tanana-Kuskokwim Lowlands, briefly passing through the Yukon-Tanana Uplands, and then through the Alaska Range, before ending in the Cook Inlet Basin sub-ecoregion.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 5 OF 14

3.0 METHODS

3.1 OVERVIEW

The USACE defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” These wetlands are considered to be waters of the U.S. and are within the jurisdiction of the USACE (33 Code of Federal Regulations (CFR) Part 328.3[b]).

Other non-wetland waters of the U.S. under the jurisdiction of the USACE include deepwater aquatic habitats, unvegetated ponds, river channels, and other special aquatic sites as described by the USACE (Federal Register 1982). Unvegetated ponds, lakes, and river channels in the survey area are classified as other waters of the U.S., but not wetlands.

Uplands are non-wetland areas that are neither deepwater aquatic habitats, nor other special aquatic sites.

All wetlands and other waters of the U.S. in the preliminary Alaska LNG corridor will be delineated and classified using standard National Wetland Inventory (NWI) codes as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). Cowardin classifies wetlands and aquatic habitats by system, subsystem, class, subclass, and water regime and is based on hydrologic setting (riverine, lacustrine, estuarine, palustrine), vegetation structure (forested, scrub-shrub, emergent, aquatic bed), and water regime (saturated, temporarily flooded, seasonally flooded, semi-permanently flooded, etc.).

One deviation from standard NWI protocols for this project will be the use of two non-wetland categories. One category will include all vegetated uplands. The other will be labeled “Disturbed/Fill” and include uplands that have been impacted by human development, including all roads, gravel pads, buildings, and farmland.

Standard methods are used to delineate wetlands for large linear projects in Alaska. The protocols comprise a three-phased iterative approach, including: 1) wetland pre-mapping relying primarily on aerial photo interpretation; 2) collection of ground reference data at pre-determined field targets; and 3) revision of wetland pre-mapping based on results of field efforts.

3.2 WETLAND PRE-MAPPING

The wetland pre-mapping has been completed for the preliminary Alaska LNG route. Wetland boundaries were delineated on digital ortho-rectified and geo-referenced true color aerial photography with 1.6-foot pixel resolution using the following aerial imagery:

- Healy Area Orthophoto (U.S. Census Bureau 2006);
- Digital Orthophoto Quarter Quadrangles - Anderson Area (Natural Resources Conservation Service, NRCS, 2006);
- Northern Central Corridor Ortho Mosaic (Digital Globe 2013a);
- Southern Corridor Ortho Mosaic (Digital Globe 2013b);

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 6 OF 14

- Talkeetna Aerial Orthophoto (Matanuska Susitna Borough, MSB, 2011a);
- Caswell Aerial Orthophoto (MSB 2011b);
- Willow Aerial Orthophoto (MSB 2011c);
- Point MacKenzie Aerial Orthophoto (MSB 2011d); and
- Nikiski Area Aerial Orthophoto (Kenai Peninsula Borough 2006).

Data from the following sources was also used during the mapping process:

- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) digital datasets and hardcopy maps;
- NRCS Soil Survey digital datasets and hardcopy maps;
- Light Detection and Ranging (LIDAR) generated topographic contours (TransCanada 2011, MSB 2011e);
- Kenai Watershed Forum – Cook Inlet Wetlands for the Kenai Peninsula and the Matanuska Susitna Boroughs (Gracz 2011);
- Pertinent previous studies, such as Terrestrial and Aquatic Habitat Mapping Along the Alaska Natural Gas Pipeline System (USFWS 1980), the Denali Pipeline Project, the instate Alaska Stand Alone Pipeline Project, and the Alaska Pipeline Project;
- U.S. Geological Survey Digital Raster Graphics (e.g., topographic maps);
- Existing Geographic Information System (GIS) layers including waterbodies, contours, and roads; and
- Existing Land Status GIS layers including: State of Alaska, U.S. Bureau of Land Management, and Native allotments.

All wetland mapping was created in a GIS geodatabase, using a “heads-up” digitizing effort. This “heads-up” process applies aerial image interpretation to delineate vector polygons of ground features. This is the generally accepted wetland and deepwater habitat mapping technique employed by the U.S. Fish and Wildlife Service personnel as part of the NWI program (Dahl *et al.* 2009). Data sources were overlaid on aerial photography and wetland, non-wetland, and areas of uncertain wetland status were identified by interpreting color, texture, and landscape position, among other elements. Aerial photography clues can include dwarf or stunted trees, topography characteristics (such as swales, toe slopes and depressions), and obvious signs of inundation.

All wetlands were mapped at a scale of 1:2,400 (1 inch to 200 feet) or finer. Lakes, ponds and rivers were mapped at a scale of 1:1,200 (1 inch to 100 feet). Larger rivers and streams were delineated as polygons. Smaller streams, those with bankfull widths of approximately 10 feet or less, were mapped as vector lines.

3.3 FIELD TARGET SELECTION

Field targets were selected based on changes in the wetlands types, aerial vegetation signatures, NWI classification, and NRCS soil classification. The primary focus of the pre-

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 7 OF 14

selected field targets will be to characterize specific wetland types which represent all similar wetland types in the region and to identify wetland/upland boundaries by selecting paired plots. Field targets will be used to confirm areas where wetland Subject Matter Experts have high confidence in their aerial interpretation, and will be used to confirm or correct wetland boundary locations. Field targets were also placed in low-confidence areas to provide field data where the photo signatures or landscape features were not clearly indicative of wetland or upland. The USACE may want to review and approve the 2014 field target locations that are selected to ensure that an appropriate range of representative wetlands are sampled.

Field targets may be re-evaluated based on the status of land access permissions. When necessary, new field targets will be located on nearby accessible parcels in areas with similar aerial photography vegetation signatures and site conditions as the original field targets.

3.4 WETLAND FIELD DATA COLLECTION

Wetland determinations will be made using the USACE *Wetlands Delineation Manual* (1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region* (Regional Supplement) (2007a).

In order for an area to be identified as a wetland, the following three parameters must be present:

- Hydrophytic vegetation: The prevalent vegetation must be adapted to areas of saturated or inundated soils.
- Hydric soils: The soil must be classified as hydric or possess characteristics that are associated with reducing soil conditions.
- Wetland hydrology: The area must be inundated or saturated at some time during the growing season.

Field targets will be accessed via existing highways and secondary roads where available. A helicopter will be required to access remote sites. A Global Positioning System (GPS) device will be used to locate sites and to collect coordinates. At each field target, a USACE *Wetland Determination Data Form – Alaska Region* (**Appendix A**) will be used to determine if the site is a wetland, other water of the U.S., or upland. All wetlands and waterbodies will be delineated and classified using NWI codes. The GPS device will also be used to collect limited field data on an electronic form that will be developed for the Project.

Field crews will also collect qualitative wetland data at observation points and establish additional field targets and complete *Wetland Determination Data Forms* where necessary, and will not be limited by the pre-selected field targets. The field crews will identify changes in wetland types or wetland/upland boundaries not easily identified on the aerial photography. Wetland scientists will use their best professional judgment and collect appropriate field data to adequately revise the wetland pre-mapping. A detailed wetland field survey gear list is provided in **Appendix B**.

3.5 MAP REVISIONS

As wetlands field data becomes available, the field data will be downloaded in the office and plotted on the base maps of the corridor. The location of each plot will be attributed with the

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 8 OF 14

information collected in the field. This allows the creation of a reference dataset linking an aerial photography signature to a wetland status and vegetation type. This reference dataset will be used to finalize the mapping of the 2,000-foot corridor.

3.6 WETLAND FUNCTIONAL ASSESSMENT

Wetlands are known to provide a variety of ecological functions depending on the location and type of wetland. At sites determined to be wetland, a *Wetland Functional Assessment Data Sheet* (**Appendix A**) will be collected. Information from this data sheet will be incorporated into the functional models described in *A Rapid Procedure for Assessing Wetland Functional Capacity* (Magee and Hollands 1998). Magee and Hollands have identified five hydrogeomorphic (HGM) classes of wetland that occur in Alaska.

- Depressional wetlands: Depressional wetlands occur in a topographic depression. Predominant water sources are direct precipitation, surface water runoff, and groundwater (Brinson 1976).
- Slope wetlands: Slope wetlands generally occur on a hillside and water flow is predominantly unidirectional parallel to the slope. The water source is primarily groundwater and occasionally precipitation (Brinson 1976).
- Lacustrine fringe wetlands: A lacustrine fringe wetland borders a lake and lacks any topographic features. The water source is surface water and flow is bidirectional.
- Flat wetlands: There are two types of flats wetlands: organic and mineral flats. Flat wetlands in Alaska are primarily organic flats. Organic flats “can occur on relatively gentle to moderate slopes up to 20% in steepness. In relatively undisturbed conditions and without significant human alteration, the dominant hydrodynamics are vertical, even on relatively gentle to moderate slopes (i.e. slopes < 20%). Specifically, the main hydrologic input to wetlands within the organic soil flat class in interior Alaska is precipitation” (ADEC/USACE 1999).
- Riverine wetlands: Riverine wetlands are adjacent to rivers and are dominated by overbank flooding. Water flow is bidirectional locally with an overall regional flow down the river valley.

Magee and Hollands use these HGM classes to compare the functions of wetlands within a particular HGM class. Each HGM class represents a separate functional model, which is used to define the Functional Capacity Index (FCI) of eight functions. The eight functions identified by Magee and Hollands are listed below.

- Modification of groundwater discharge: The capacity of a wetland to influence the amount of water moving from the groundwater to surface water.
- Modification of groundwater recharge: The capacity of a wetland to influence the amount of water moving from surface water to groundwater.
- Storm and flood-water storage: The storage of inflowing water from storm or flooding events, resulting in detention and retention of water on the wetland surface.
- Modification of stream flow: The modification of inflow hydrology by the wetland to produce the outlet stream’s hydrology.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USACE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 9 OF 14

- Modification of water quality: Removal of suspended and dissolved solids from surface water and dissolved solids from groundwater and conversion into other forms, plant or animal biomass, or gases. Wetlands with a low slope-angle or location in depressions provide a high level of this function.
- Export of detritus: Export of organic detritus from the wetland to adjacent and downstream aquatic ecosystems.
- Contribution to abundance and diversity of wetland vegetation: The capacity of a wetland to produce an abundance and diversity of hydrophytic plant species individually or as part of a group of wetlands in a local landscape (Tiner 1984).
- Contribution to abundance and diversity of wetland fauna: The capacity of a wetland to support large and / or diverse populations of animal species that spend part or all of their lifecycle in wetlands, individually, or as part of a mosaic of wetlands in a local landscape.

The Magee and Hollands functional assessment method requires site-specific information to be entered into a model that will produce a FCI for each wetland function. The FCI indicates the potential degree to which the wetland performs the function and is only comparable to other wetlands within the same HGM class and region. The FCI scale is from 0.0 to 1.0. Most of the model inputs will be collected in the field, with the remaining variables taken from available GIS datasets (such as wetland size and land ownership). The results from the functional assessment models will be extrapolated to the applicable wetlands within the mapping corridor. This information will potentially serve as the basis to determine appropriate compensatory mitigation for the unavoidable impacts of the project. The *Wetland Functional Assessment Data Sheet* will be reviewed and adjusted as necessary to collect appropriate data for the different ecoregions.

3.7 JURISDICTIONAL DETERMINATION

USACE regulates wetlands and other waters of the U.S. that are under their jurisdiction. Jurisdictional status is based on connectivity to Traditional Navigable Waters (*Rapanos v. United States* and *Carabell v. United States* [33 U.S. Code §1251 et seq.]). Field visits by USACE, the Federal Energy Regulatory Commission, the Environmental Protection Agency, and the Owner's Representative could also be conducted (with minimal notice) to observe field survey teams while they are conducting wetland delineations, and to review protocols and any data collected.

The Project, similar to other large pipeline and energy projects permitted by the USACE, will assume that all wetlands found fall under USACE jurisdiction. Because the FERC requires that the Project adhere to certain construction requirements in all wetlands, regardless of jurisdiction, the Project will assume that all wetlands found will be within the USACE jurisdiction for permitting, mitigation, and construction method purposes.

3.8 DATA RECORDING AND PROCESSING

Data will be recorded on hardcopy field forms (**Appendix A**), and some of the data will be entered into an electronic data form. Electronic data files will be uploaded to a Project website

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 10 OF 14

through an internet connection or by a satellite link, and will include GPS locations, electronic data form, site photos, site sketches, and field notes.

3.9 QUALITY ASSURANCE/QUALITY CONTROL

The Wetlands Technical Lead will conduct quality audits during the first week of each deployment. These audits will ensure data quality and consistency between teams, and will provide an opportunity for any problems to be corrected immediately.

Each crew member is responsible for collecting clear and accurate data according to the sampling protocol. The Field Crew Chief will review all hardcopy and electronic data forms and complete a quality assurance/quality control (QA/QC) checklist (**Appendix C**) before leaving each site.

The Field Crew Manager will ensure that all data files, hardcopy and electronic, are uploaded to the Project website. These transmitted files will then be downloaded and reviewed by office-based data management staff. The Wetland Technical Lead will check each hardcopy data sheet and electronic data form for quality and consistency, as it is received. If problems arise, the field crew will be notified promptly to ensure that any data quality issues are corrected immediately.

3.10 REPORTING

The results of the 2014 field work will be compiled into a field survey report at the end of the season. The report will include a GIS dataset comprised of field-verified wetland mapping, field sample locations, and data collected at each site. It will also outline the field survey methods and identify all wetland types found throughout the corridor describing common plant species, hydrology indicators, and hydric soil indicators.

After the 2015 wetland field season, a report on the Wetland Functional Assessment for all wetlands surveyed will be provided. The Wetland Functional Assessment will be submitted to USACE for review and concurrence. Once USACE concurs, the wetland boundaries delineated will be used to calculate project impacts for Section 404 permitting. The Wetland Functional Assessment will help USACE characterize the impacted wetlands to determine appropriate compensatory mitigation for the unavoidable project impacts to wetlands and other waters of the U.S.

Results of this survey will be provided in the FERC Resource Report 2.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 11 OF 14

4.0 FIELD STUDIES EXECUTION

Field study execution details are currently being developed. **Appendix D** will include field execution details consisting of: field crew composition, schedule and march charts, field target maps, and general project-wide permits and approvals. Field safety will also be discussed and a specific Job Safety Analysis (JSA) developed for wetland surveys will be included.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 12 OF 14

5.0 REFERENCES

- American Geologic Institute. 1972. Glossary of Geology. Margaret Gary, Robert McAfee, Jr., and Carol Woods eds.
- Brinson, R.G. 1993. A Hydrogeomorphic Classification for Wetlands. Tech. Rpt. WRP-DE-4. Biology Dept. East Carolina University. Greenville, NC 27858.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, Fish and Wildlife Service, U.S. Department of the Interior, FWS 1035-79-81.
- Dahl, T.E., J. Dick, J. Swords and B.O. Wilen. 2009. Data Collection Requirements and Procedures for Mapping Wetland, Deepwater and Related Habitats of the United States. Division of Habitat and Resource Conservation, National Standards and Support Team. Madison, WI. 85 p.
- Digital Globe. 2013a. Northern Central Corridor Ortho Mosaic. eTerra 2013.
- Digital Globe. 2013b. Southern Corridor Ortho Mosaic. eTerra 2013.
- Gracz, M. 2011. Cook Inlet Wetlands. Prepared by for the Matanuska-Susitna Borough. Kenai Watershed Forum. Online: <http://cookinletwetlands.info/downloads/matsudownloads.htm>
- Magee, D.W and G.G Hollands. 1998. A Rapid Procedure for Assessing Wetland Functional Capacity Based on HGM Classification. Normandeau Associates, Bedford, NH.
- Kollmogren Instrument Division, 1990. Munsell Soil Color Chart Baltimore, Maryland.
- Matanuska-Susitna Borough (MSB). 2011a. Talkeetna Aerial Orthophoto.
- MSB. 2011b. Caswell Aerial Orthophoto.
- MSB. 2011c. Willow Aerial Orthophoto.
- MSB. 2011d. Point MacKenzie Aerial Orthophoto.
- MSB. 2011e. Mat-Su Borough LiDAR.
- Natural Resource Conservation Service (NRCS) 2006. Digital Orthophoto Quarter Quadrangles – Anderson Area.
- Nowacki, G., P. Spencer, T. Brock, M. Fleming, and T. Jorgenson. 2001. Ecoregions of Alaska and Neighboring Territories. U.S. Geological Survey Miscellaneous Investigations Series 1 Map.
- State of Alaska Department of Environmental Conservation/U. S. Army Corps of Engineers Waterways Experiment Station Technical Report Number: WRP-DE-____ 1999. Operational Draft Guidebook for Reference Based Assessment of the Functions of Precipitation-Driven Wetlands on Discontinuous Permafrost in Interior Alaska. Anchorage, AK. Interior Alaska Operational Draft Guidebook.
- Tiner, R.W. 1984. The concept of hydrophyte for wetland identification. *Bioscience* 41:236-247.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 13 OF 14

TransCanada 2011. Alaska Pipeline Project Light Detection and Ranging. ESRI ArcGIS File Geodatabase, PHB Technologies. Quebec, Canada.

U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Department of the Army, Waterways Experiment Station. Vicksburg, MS.

USACE. 2007a. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0). ed. J.S. Wakeley, R.W. Lichvar, and C. Noble.

ERDC/EL TR-07-24. U.S. Army Engineer Research and Development Center. Vicksburg, MS.

USACE. 2007b. U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook and Approved Jurisdictional Determination Form (May 30, 2007).

United States Fish and Wildlife Service. 1980. Terrestrial and Aquatic Habitat Mapping Along the Alaska Natural Gas Pipeline System. Carl J. Markon. USFWS Special Studies. Anchorage, AK. p. 67.

U.S. Department of the Census, Census Bureau. 2006. Healy Area Orthophoto.

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	PAGE 14 OF 14

6.0 APPENDICES

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

APPENDIX A – WETLAND DETERMINATION DATA FORM

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) % Dominant Species that are OBL, FACW, or FAC: _____ (A/B)
1.				
2.				
3.				
4.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species: _____ X 1 = _____ FACW species: _____ X 2 = _____ FAC species: _____ X 3 = _____ FACU species: _____ X 4 = _____ UPL species: _____ X 5 = _____ Column Totals: _____ (A) _____ (B) PI = B/A = _____
<u>Sapling/Shrub Stratum</u> (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: _____ Dominance Test is > 50% _____ Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1.				
2.				
3.				
4.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): _____ Notes: (If observed, list morphological adaptations below)
5.				
6.				
7.				
8.				
9.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				
10.				

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches, Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

APPENDIX B – WETLAND SURVEY GEAR LIST

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

Wetland and Vegetation Gear	Communication
1 – Sharp shooter shovel (fiberglass, not wood handle)	1 - VHF Radio
1 – U-Dig-it (Hand shovel)	1 - charger for vhf radio
1 – Compass	1 - Iridium Satellite Phone
1 – Hand lens	1 charger for satellite phone
1 – Leatherman/sample knife (folding) 4” serrated	Safety/Survival Pack (Need for 2teams)
1 – Digital camera	2 – Sleeping Bags
1 - calculator	1 – Tent
1 – extra batteries for digital camera	1- Wilderness First Aid Kit
1 – pH meter (pen kind) with storage solution	1 - Flare gun kit
1 – Pocket rod (measuring tape)	1 - Emergency procedures Manual
1- Opaque small spray bottle filled with alpha-alpha dipyrityl	1 - Iodine Tablets /Filter
2 packages – gallon Ziploc bags	1 - 50’ Nylon Rope/Parachute cord
1 package- pint Ziploc bags	1 – small Flashlight/headlamp (for soil pit)
1- Squirt Water bottle (for moistening soil to color)	2 - Space Blankets
200+ – USACE Wetland Determination Form – Alaska Region (on Rite-in-the-Rain) with functional assessment	1 – Bear Spray
1 set – Field Maps on Rite-in-the-Rain	1 – Tarp (10’ x 12’)
4+ – Rite-in-the-Rain Field notebooks (spiral with lines)	1 – Gloves – Work/Latex/Insulated rubber
12+ – Mechanical Pencils w/ extra lead	matches
12+ – Sharpies (red and black)	1 – Roll of duct tape
1- Laptop Computer (for downloading data every night)	Flagging tape (1 bright color per team)
2 – Clipboards	BPA-free water jug
Extra Rite-in-the-Rain paper	Personal Gear
1 – 12 inch file (for shovel sharpening) with handle	1 - Xtratuffs
1 – scissors	1 – Felt insoles for Xtratuffs
1 – tape	1 - Blaze Orange Surveyor Field Vest
2 – post it notes	1 - Mosquito Head Net
2 – toilet paper	1 – Rain Jacket/Pants
1- Roll of duct tape	2 - Bug Spray
1 – (see through) small dry bag for soil kit	2 – Sunblock
1 – (see through) medium dry bag for field reference materials	1 – Sun Glasses
1 – dry erase board (for pictures)	1 - Water Bottle
1 – plant press	1 - Backpack
Books	1 - Hat
1 – Munsell Soil Color charts	Cell phone and charger
1 – Flora of Alaska and Neighboring Territories – Eric Hulten	1 – umbrella
1 – Trees and Shrubs – Viereck	Boot dryers
1 – Western Boreal Forest and Aspen Parkland – MacKinnon and Pojar	
1 – Wetland Sedges of Alaska – Tande and Lipkin	
1 – Willows of Interior Alaska – Collett	
1 – National List of Plant Species that Occur in Wetlands – Alaska Region - Reed 1988 (print)	
1 – Field Guide to Alaskan Wildflowers – Verna Pratt	
1 – Wildflowers along the Alaskan Highway – Verna Pratt	
1 – Rapid Procedure for Assessing Wetland Functional Capacity: Based on HGM Classification – Hollands and Magee (print)	
1 – 1987 Wetland Delineation Manual (print)	
1 – 2007 Regional Supplement to the Corps of Engineers Wetland Delineation Manual – Alaska Region (print)	
1 – Classification of Wetlands and Deepwater Habitats – Cowardin (print)	
1 – Hydric soils in Alaska (print)	

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

APPENDIX C – QA/QC CHECKLIST

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: _____ Field Target: _____ Date: _____

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☐ Site description, site parameters and summary of findings are complete?
- ☐ A detailed site sketch is included?

2. Vegetation

- ☐ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☐ Cover calculations are complete and correct?
- ☐ All dominant species have been determined and recorded per strata?
- ☐ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☐ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

- ☐ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
☐ Maps are initialed and dated?

8. Photos

- ☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Wetland Scientist (print)

X

Signature / Date

X


Field Crew Chief (print)

X

Signature / Date

ALASKA LNG	WETLAND DETERMINATION FIELD SURVEY PROTOCOLS	USAKE-UR-SPFLD-00-0008 APRIL 2014 REVISION: 2
	CONCEPT INFORMATION - CONFIDENTIAL	

APPENDIX D – FIELD STUDIES EXECUTION

	2014 WETLAND STUDY REPORT – LIVENGOD (MP 401) TO TRAPPER CREEK (MP 709.5)	USAI-UR-SRZZZ-00-000012-000 JANUARY 2015 REVISION: 1

**APPENDIX C – 2014 WETLANDS FIELD DATA SUMMARY TABLE AND U.S. ARMY
CORPS OF ENGINEERS ALASKA DISTRICT WETLAND DETERMINATION FORMS**

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W60HT001	WDF	6/9/2014	87	62.9995	-149.5567	PSS1B	SLOPE	II B 2
W60HT002	WDF	6/9/2014	86	63.0112	-149.5465	PEM1/SS1B	FLAT	III A 2, II C 2
W60HT003	WDF	6/9/2014	88	62.9939	-149.5775	UPLAND	N/A	III A 1, II C 2
W60HT004	WDF	6/10/2014	133	62.4506	-150.271	PSS1/EM1B	DEPRESSIONAL	II C 2, III A 2
W60HT005	WDF	6/10/2014	136	62.4455	-150.2689	PSS1B	DEPRESSIONAL	II B 2
W60HT006	WDF	6/10/2014	135	62.4468	-150.2694	PEM1F	DEPRESSIONAL	III A 3
W60HT007	WDF	6/10/2014	134	62.4489	-150.2715	UPLAND	N/A	II B 1
W60HT008	WDF	6/12/2014	142	62.4209	-150.2638	UPLAND	N/A	I C 2
W60HT009	WDF	6/12/2014	141	62.4207	-150.2655	PEM1F	DEPRESSIONAL	III A 3
W60HT010	WDF	6/12/2014	143	62.4182	-150.2633	UPLAND	N/A	III A 3
W60HT011	Veg	6/13/2014	144	62.3957	-150.2659	UPLAND	N/A	I C 2
W60HT012	WDF	6/13/2014	145	62.3793	-150.2694	PSS1B	RIVERINE	II B 2
W60HT013	WDF	6/14/2014	146	62.3652	-150.2603	PEM1B	DEPRESSIONAL	III A 1
W60HT014	WDF	6/11/2014	147	62.3618	-150.2578	PEM1B/ PUBF	DEPRESSIONAL	III A 2
W60HT015	WDF	6/24/2014	91	62.9348	-149.6872	PSS1B	FLAT	II B 2, II C 2
W60HT015_OP	OP	6/24/2014	91	62.9347	-149.6872	R4SB	*	N/A
W60HT016	Veg	6/24/2014	91	62.9345	-149.6871	UPLAND	N/A	I C 2, II C 2
W60HT017	Veg	6/24/2014	120	62.5347	-150.2366	UPLAND	N/A	I C 2, II B 2
W60HT018	WDF	6/24/2014	121	62.5342	-150.2363	UPLAND	N/A	I C 2, II B 2
W60HT019	WDF	6/24/2014	122	62.5343	-150.2351	PEM1F	DEPRESSIONAL	III A 3
W60HT020	WDF	6/25/2014	125	62.5283	-150.2378	UPLAND	N/A	II B 2, III A 2
W60HT021	WDF	6/25/2014	126	62.5278	-150.2386	UPLAND	N/A	I C 1, II C 2
W60HT022	Veg	6/25/2014	127	62.5229	-150.2405	UPLAND	N/A	I C 2, II B 2
W60HT023	WDF	6/25/2014	128	62.5152	-150.252	UPLAND	N/A	I C 2, II C 2
W60HT023_OP	OP	7/6/2014	129	62.5012	-150.267	UPLAND	N/A	NONE
W60HT024	WDF	6/26/2014	104	62.7728	-150.0452	PSS4/1B	DEPRESSIONAL	II A 2, II B 2, II C 2
W60HT025	WDF	7/9/2014	148	62.3449	-150.2641	PEM1C	DEPRESSIONAL	III A 3, II C 2
W60HT026	WDF	6/26/2014	106	62.7657	-150.0687	UPLAND	N/A	I B 3, II B 1
W60HT026_OP	OP	6/26/2014	105	62.7693	-150.0582	R4SB	*	II B 1, I B 2
W60HT027	WDF	6/26/2014	107	62.7657	-150.0693	PEM1/SS1F	DEPRESSIONAL	III A 3, II C 2
W60HT028	WDF	6/27/2014	92	62.9293	-149.6967	UPLAND	N/A	I C 2
W60HT028_OP	OP	6/27/2014	92	62.9288	-149.6957	R3UB	*	N/A
W60HT029	WDF	6/27/2014	93	62.8983	-149.7387	UPLAND	N/A	I C 2, II C 1

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W60HT030	WDF	6/27/2014	94	62.8787	-149.8255	PSSI/EM1B	DEPRESSIONAL	II C 2, III A 3
W60HT030_OP	OP	6/27/2014	94	62.8772	-149.8248	UPLAND	N/A	II C 2, II B 2
W60HT031	WDF	6/28/2014	95	62.868	-149.8518	UPLAND	N/A	I B 2, II C 2
W60HT031_OP	OP	6/28/2014	96	62.8679	-149.8521	UPLAND	N/A	I C 2
W60HT032	WDF	6/28/2014	97	62.8679	-149.8532	UPLAND	N/A	I C 2, II C 2
W60HT033	WDF	7/1/2014	89	62.9732	-149.6314	PSS1/EM1B	DEPRESSIONAL	II C 2, III A 3
W60HT034	WDF	7/1/2014	90	62.9565	-149.6504	PSS1/EM1B	FLAT	II C 2, III A 3
W60HT035	WDF	7/1/2014	98	62.8632	-149.8723	PEM1/SS1B	DEPRESSIONAL	III A 3, II C 2
W60HT036	Veg	7/1/2014	98	62.863	-149.872	UPLAND	N/A	I C 2, II C 2
W60HT037	WDF	7/2/2014	99	62.863	-149.8741	PSS1/EM1B	DEPRESSIONAL	II B 1, III A 3
W60HT038	WDF	7/2/2014	100	62.8408	-149.8894	PEM1/SS1B	DEPRESSIONAL	III A 3, II C 2
W60HT039	WDF	7/2/2014	100	62.8402	-149.8888	UPLAND	N/A	I C 3, II B 2
W60HT040	WDF	7/2/2014	101	62.8326	-149.8979	PEM1/SS1F	DEPRESSIONAL	III A 3, II C 2
W60HT041	WDF	7/2/2014	102	62.8213	-149.9196	PEM1/SS1F	FLAT	III A 3, II C 2
W60HT042	WDF	7/3/2014	103	62.8047	-149.9663	PSS1B	DEPRESSIONAL	II C 2, III A 3
W60HT043	Veg	7/3/2014	103	62.8051	-149.9669	UPLAND	N/A	I C 2, II B 1
W60HT044	WDF	7/3/2014	108	62.7582	-150.0935	PEM1/SS1B	DEPRESSIONAL	III A 3, II C 2
W60HT045	WDF	7/3/2014	109	62.7377	-150.1466	PEM1/SS1B	DEPRESSIONAL	III A 2, I C 2, II C 2
W60HT045_OP	OP	7/3/2014	109	62.7377	-150.1465	R4SB	*	III A 2, II C 2, I C 2
W60HT046	WDF	7/3/2014	110	62.7373	-150.1472	PSS1/EM1B	SLOPE	II C 2, III A 2
W60HT046_OP	OP	7/5/2014	111	62.6987	-150.2309	UPLAND	N/A	I C 3, II B 1
W60HT047	WDF	7/9/2014	149	62.3445	-150.2713	PFO4/SS1B	FLAT	I A 2, II C 2
W60HT048	WDF	7/5/2014	112	62.6263	-150.2281	UPLAND	N/A	I B 1
W60HT049	WDF	7/5/2014	118	62.546	-150.2506	PFO4/SS1B	FLAT	I A 3, II B 2
W60HT050	WDF	7/5/2014	119	62.5465	-150.2496	PFO1/4/SS1B	FLAT	I C 2, II B 2
W60HT051	WDF	7/5/2014	123	62.533	-150.2371	PEM1C	DEPRESSIONAL	III A 3
W60HT052	Veg	7/5/2014	124	62.5329	-150.2364	UPLAND	N/A	I C 2, II B 2
W60HT053	WDF	7/8/2014	138	62.4313	-150.2687	PSS1/EM1B	DEPRESSIONAL	II C 2, III A 3
W60HT053_OP	OP	7/8/2014	137	62.4316	-150.2688	PEM1F	*	III A 3
W60HT053_OP1	OP	7/6/2014	140	62.4264	-150.2672	PEM1/SS1F	*	III A 3, II C 2
W60HT054	WDF	7/6/2014	130	62.4886	-150.2726	PEM1/SS1F	DEPRESSIONAL	III A 3, I C 2
W60HT055	WDF	7/6/2014	132	62.477	-150.2716	PEM1F	DEPRESSIONAL	III A 3
W60HT055_OP	OP	7/6/2014	131	62.4865	-150.2716	PEM1F	*	III A 3

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W60HT055_OP1	OP	7/6/2014	131	62.4893	-150.2728	R4SB	*	N/A
W60HT056	WDF	7/6/2014	139	62.4266	-150.2675	PSS1/EM1B	DEPRESSIONAL	II C 2, III A 3
W60HT057	WDF	9/3/2014	202	62.354	-150.2745	PEM1/SS1B	DEPRESSIONAL	III A 3, II C 2
W60HT058	Veg	9/3/2014	202	62.3547	-150.2735	UPLAND	N/A	I C 2, II C 2
W60HT059	WDF	9/3/2014	203	62.3299	-150.2765	UPLAND	N/A	I C 2, II C 2
W60HT059_OP	OP	9/3/2014	203	62.33	-150.2721	PEM1E	*	III A 2, II C 2
W60HT059_OP1	OP	9/3/2014	204	62.3274	-150.2728	PEM1H	*	III A 3
W60TI001	WDF	6/1/2014	193	61.808	-150.3114	PSS1B	DEPRESSIONAL	II C 1
W60TI001_OP	OP	6/1/2014	193	61.8082	-150.3117	UPLAND	N/A	I A 3, II C 2
W60TI002	Veg	6/1/2014	192	61.8083	-150.3106	UPLAND	N/A	I A 3, II C 2
W60TI003	WDF	6/1/2014	191	61.8313	-150.2817	PEM1B	DEPRESSIONAL	III A 3
W60TI004	WDF	6/2/2014	190	61.8341	-150.2804	PEM1/SS1B	DEPRESSIONAL	III A 2, II C 2
W60TI005	Veg	6/2/2014	190	61.8341	-150.2809	UPLAND	N/A	I C 1
W60TI006	WDF	6/2/2014	188	61.9255	-150.2017	PEM1/SS1B	DEPRESSIONAL	III A 2, II C 2
W60TI007	Veg	6/2/2014	189	61.9238	-150.2045	UPLAND	N/A	II B 2, II C 2, III A 2
W60TI008	WDF	6/3/2014	187	61.9459	-150.1957	PSS1B	FLAT	II C 1
W60TI008_OP	OP	6/3/2014	187	61.9466	-150.1952	UPLAND	N/A	II B 2, II C 2
W60TI009	Veg	6/3/2014	187	61.9467	-150.1952	UPLAND	N/A	II B 2, II C 2
W60TI010	WDF	6/3/2014	186	61.949	-150.1938	PSS1/EM1C	DEPRESSIONAL	II C 2, III A 2
W60TI010_OP	OP	6/3/2014	186	61.9485	-150.1941	PSS1B	*	II B 2, II C 2
W60TI011	Veg	6/3/2014	186	61.9482	-150.1943	UPLAND	N/A	II B 2, II C 2
W60TI012	WDF	6/3/2014	185	61.9553	-150.1912	UPLAND	N/A	II C 2
W60TI012_OP	OP	6/3/2014	185	61.9556	-150.1889	PSS4/1B	*	II A 3, II C 2
W60TI013	WDF	6/3/2014	184	61.9871	-150.1974	PEM1/SS1B	FLAT	II B 2, III A 2
W60TI013_OP	OP	6/3/2014	184	61.9862	-150.1976	PSS1/3B	*	II C 2
W60TI014	WDF	6/4/2014	183	61.988	-150.1973	UPLAND	N/A	II B 2, II C 2
W60TI015	WDF	6/4/2014	181	62.032	-150.1967	PEM1/SS1B	DEPRESSIONAL	III A 2, II C 2
W60TI015_OP	OP	6/4/2014	181	62.0322	-150.1965	PSS4/1B	*	II A 2, II C 2
W60TI016	WDF	6/4/2014	182	62.0317	-150.1972	PEM1B	DEPRESSIONAL	III A 2
W60TI017	WDF	6/4/2014	179	62.0357	-150.1927	PSS4/1B	DEPRESSIONAL	II A 3, II C 2
W60TI018	WDF	6/4/2014	180	62.0352	-150.193	PEM1/SS1F	DEPRESSIONAL	III A 3, II C 2
W60TI019	WDF	6/5/2014	177	62.048	-150.1785	PSS4/1B	DEPRESSIONAL	II A 3, II C 2
W60TI020	WDF	6/5/2014	176	62.0481	-150.1783	PUB/ABH	DEPRESSIONAL	III D 1

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W60TI020_OP	OP	6/5/2014	176	62.0479	-150.1776	PEM1F	*	III A 3
W60TI021	Veg	6/5/2014	176	62.0483	-150.1748	UPLAND	N/A	I C 2, II C 2
W60TI022	WDF	6/5/2014	178	62.0477	-150.179	PEM1/ SS1B	DEPRESSIONAL	III A 2, II C 2
W60TI023	WDF	6/5/2014	173	62.0581	-150.1671	PSS1/EM1C	RIVERINE	II C 2, III A 3
W60TI023_OP	OP	6/5/2014	173	62.0581	-150.1668	N/A	N/A	N/A
W60TI024	WDF	6/5/2014	174	62.0571	-150.1686	PSS1/EM1B	DEPRESSIONAL	II C 2, III A 2
W60TI025	WDF	6/5/2014	175	62.0569	-150.1686	UPLAND	N/A	I A 2, II B 2
W60TI025_OP	OP	6/5/2014	175	62.0569	-150.1694	PF04/SS4B	*	I A 2, II A 2
W60TI026	Veg	6/5/2014	173	62.0576	-150.1679	UPLAND	N/A	I C 2, II C 2
W60TI027	WDF	6/6/2014	170	62.0645	-150.1595	PSS4/1B	DEPRESSIONAL	II A 2, II C 2
W60TI028	WDF	6/6/2014	171	62.0644	-150.16	PF04/SS4B	FLAT	I A 2, II A 2
W60TI028_OP	OP	6/6/2014	171	62.0641	-150.1605	UPLAND	N/A	I C 2, II C 2
W60TI029	WDF	6/5/2014	172	62.0641	-150.1608	UPLAND	N/A	I C 2, II B 2
W60TI030	WDF	6/5/2014	169	62.0646	-150.1597	PSS4/1B	DEPRESSIONAL	II A 2, II C 2
W60TI031	WDF	6/8/2014	167	62.1223	-150.164	PSS4/1B	DEPRESSIONAL	II A 2, II C 2
W60TI032	WDF	6/8/2014	166	62.123	-150.1637	PF04B	DEPRESSIONAL	I A 2
W60TI033	Veg	6/8/2014	166	62.1233	-150.1646	UPLAND	N/A	I C 2
W60TI034	WDF	6/8/2014	168	62.1223	-150.1636	PSS4/EM1B	DEPRESSIONAL	II A 3, III A 2
W60TI035	WDF	6/8/2014	165	62.1357	-150.1653	PSS1/4/EM1B	DEPRESSIONAL	II C 2, III A 3
W60TI036	WDF	6/8/2014	164	62.1358	-150.1652	PSS4/1B	DEPRESSIONAL	II A 2, II C 2
W60TI037	WDF	6/9/2014	163	62.1362	-150.1652	PF04B	DEPRESSIONAL	I A 2
W60TI038	WDF	6/11/2014	153	62.2427	-150.2513	PSS1C	RIVERINE	II C 1
W60TI039	WDF	6/11/2014	152	62.2858	-150.2474	PSS1C	RIVERINE	II C 2
W60TI040	WDF	6/11/2014	151	62.2882	-150.2495	PEM1B	DEPRESSIONAL	III A 2
W60TI041	WDF	6/30/2014	161	62.1681	-150.195	PSS4/EM1B	DEPRESSIONAL	II A 2, III A 2
W60TI042	WDF	6/13/2014	160	62.1884	-150.216	PSS1/4/EM1F	DEPRESSIONAL	II C 2, III A 2
W60TI043	WDF	6/13/2014	159	62.1888	-150.2134	PF04/1B	RIVERINE	I C 2
W60TI044	WDF	6/14/2014	154	62.2313	-150.2404	UPLAND	N/A	I C 1
W60TI045	WDF	6/14/2014	155	62.2314	-150.2399	PSS4/1B	DEPRESSIONAL	II A 2, II B 2
W60TI046	WDF	6/14/2014	156	62.2314	-150.2393	PSS1F	DEPRESSIONAL	II C 2
W60TI047	WDF	6/30/2014	162	62.1678	-150.1942	PEM1F	FLAT	III A 3
W60TI048	WDF	6/30/2014	162	62.1676	-150.1923	PFO1/4B	FLAT	I C 1, II C 1
W60TI049	WDF	7/8/2014	157	62.221	-150.2349	PSS4/1B	FLAT	II A 3, II C 2

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W60TI050	WDF	7/8/2014	158	62.2208	-150.2359	PEM1/SS4E	FLAT	III A 3, II A 3
W60TI051	WDF	7/9/2014	150	62.29	-150.2512	PEM1B	DEPRESSIONAL	III A 2
W60TI052	WDF	9/4/2014	205	62.2084	-150.2376	PEM1E	DEPRESSIONAL	III A 3
W60TI052_OP	OP	9/4/2014	205	62.2084	-150.2359	PEM1/SS1B	*	III A 2, II B 2
W60TI053	WDF	9/4/2014	206	62.1985	-150.235	UPLAND	N/A	I C 2, II C 2
W60TI054	WDF	9/4/2014	207	62.1792	-150.2229	PF01/SS1B	FLAT	I B 2, II B 2, III B 2
W60TI055	WDF	9/5/2014	208	62.1549	-150.2082	PEM1/SS1B	DEPRESSIONAL	III A 2, II B 2
W60TI055_OP	OP	9/5/2014	208	62.1548	-150.2084	R2UBH	*	N/A
W60TI056	WDF	9/5/2014	209	62.1352	-150.2288	PSS1/EM1C	DEPRESSIONAL	II C 2, III A 3
W60TI057	Veg	9/5/2014	211	62.1046	-150.2247	PF01/SS1E	*	I B 2, II B 2
W60TI058	WDF	9/6/2014	210	62.1065	-150.2254	PEM1/SS1F	DEPRESSIONAL	III A 3, II C 2
W60TI059	WDF	9/6/2014	212	62.1034	-150.2253	PFO4/SS1B	FLAT	I A 2, II C 2
W60TI060	Veg	9/6/2014	213	62.086	-150.2128	PF04/SS1B	*	I A 2, II B 1
W60TI061	WDF	9/7/2014	214	62.0609	-150.2039	PSS1/4C	DEPRESSIONAL	II B 2, II C 2
W60TI062	WDF	9/7/2014	215	62.0501	-150.2095	PEM1/SS1E	FLAT	III A 3, II C 2
W60TI063	WDF	9/7/2014	216	62.0492	-150.2115	UPLAND	N/A	I C 2, II C 2
W60TI063_OP	OP	9/7/2014	216	62.0492	-150.2116	R4SB	*	N/A
W60TI064	WDF	9/7/2014	217	62.0428	-150.2133	PEM1/SS1E	DEPRESSIONAL	III A 3, II C 2
W60TI065	WDF	9/7/2014	218	62.0423	-150.2136	UPLAND	N/A	I A 1, II B 2
W60TI066	Veg	9/7/2014	219	62.0355	-150.2151	UPLAND	N/A	I C 2, II B 2, III A 2
W60TI067	WDF	9/8/2014	221	62.0318	-150.2051	PSS4/EM1B	DEPRESSIONAL	II A 3, III A 2
W60TI068	WDF	9/8/2014	220	62.0317	-150.2083	UPLAND	N/A	I C 2, II B 2
W60TI068_OP	OP	9/8/2014	220	62.0319	-150.2089	PSS4/EM1B	*	I B 2, III A 3
W60TI069	WDF	9/8/2014	223	61.768	-150.3201	UPLAND	N/A	I C 2, II B 2
W60TI070	WDF	9/8/2014	224	61.7612	-150.3139	PSS3/1B	DEPRESSIONAL	I C 2, III A 2
W60TI071	Veg	9/8/2014	225	61.7602	-150.3142	UPLAND	N/A	I C 3, II B 2
W60TI072	Veg	9/6/2014	210	62.1062	-150.2247	UPLAND	N/A	I C 3, II C 2
W61HT001	WDF	6/27/2014	53	63.8855	-149.0751	PSSI/4B	FLAT	II C 1, II A 3
W61HT001_OP	OP	6/27/2014	53	63.8845	-149.0798	UPLAND	N/A	I C 2
W61HT002	WDF	6/28/2014	60	63.6074	-148.7725	PSS4/1B	SLOPE	I A 2, II C 1
W61HT002_OP	OP	6/28/2014	60	63.6075	-148.7714	PEM1/SS1/4C	*	III A 1, II C 1, II B 2
W61HT003	WDF	6/28/2014	57	63.672	-148.7644	PSS1/4B	FLAT	II C 1, II A 2
W61HT003_OP	OP	6/28/2014	57	63.6714	-148.7642	PSS1C	*	II C 1

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W61HT004	WDF	6/28/2014	58	63.6724	-148.7633	UPLAND	N/A	II C 1, I A 2
W61HT004_OP	OP	6/28/2014	58	63.6721	-148.7632	PSS1/4B	*	II C 1, II A 2
W61HT005	WDF	6/29/2014	59	63.6414	-148.7389	PEM1B		III A 2
W61HT005_OP	OP	6/29/2014	59	63.6413	-148.7387	PEM1E	*	III A 3
W61HT006	WDF	6/29/2014	72	63.3494	-149.075	PSS1C	RIVERINE	II B 1
W61HT006_OP	OP	6/29/2014	72	63.3495	-149.0753	PEM1E	*	III A 3
W61HT007	WDF	6/29/2014	80	63.1576	-149.4106	PEM1E	FLAT	III A 3
W61HT008	WDF	6/29/2014	81	63.1574	-149.4109	PEM1F	FLAT	III A 3
W61HT009	WDF	6/29/2014	82	63.1573	-149.4113	PUB/ABH	DEPRESSIONAL	III D 1
W61HT010	WDF	6/30/2014	55	63.8192	-148.9913	PSS1/EM1B	FLAT	II C 1, III A 2
W61HT010_OP	OP	6/30/2014	55	63.8191	-148.991	PSS1/EM1B	*	II C 1, III A 2
W61HT011	WDF	6/30/2014	54	63.8198	-148.9922	PSS1/EM1B	FLAT	II C 1, III A 2
W61HT011_OP	OP	6/30/2014	54	63.8197	-148.9924	PSS1C	*	II C 1, III A 3
W61HT012	WDF	6/30/2014	56	63.8099	-148.967	PSS1/EM1B	FLAT	II C 1, III A 2
W61HT012_OP	OP	6/30/2014	56	63.8103	-148.9679	PSS1A	*	II B 1
W61HT013	WDF	7/1/2014	83	63.1423	-149.4213	UPLAND	N/A	I A 2, II B 2, II C 1
W61HT014	WDF	7/1/2014	84	63.1328	-149.4491	UPLAND	N/A	I C 2, II B 2, II C 1
W61HT014_OP	OP	7/1/2014	84	63.1323	-149.4503	UPLAND	N/A	I A 2, II C 1
W61HT015	WDF	7/1/2014	85	63.1143	-149.4715	UPLAND	N/A	III A 1
W61HT015_OP	OP	7/1/2014	85	63.1145	-149.4714	PSS1C	*	II B 1
W61HT016	WDF	7/2/2014	115	62.5653	-150.2594	UPLAND	N/A	III A 3
W61HT016_OP	OP	7/2/2014	115	62.5654	-150.2592	UPLAND	N/A	II B 1
W61HT017	WDF	7/2/2014	114	62.5659	-150.2634	UPLAND	N/A	I B 1, III A 1
W61HT017_OP	OP	7/2/2014	114	62.5661	-150.2626	PEM1C	*	III A 3
W61HT018	WDF	7/2/2014	113	62.5648	-150.265	PEM1B	DEPRESSIONAL	III A 3
W61HT019	WDF	7/3/2014	117	62.5571	-150.2628	UPLAND	N/A	I C 3, II B 2, III A 1
W61HT019_OP	OP	7/3/2014	117	62.5571	-150.2623	PEM1B	*	III A 2
W61HT020	WDF	7/3/2014	116	62.5577	-150.2654	PEM1/SS1B	FLAT	III A 3, II C 2
W61HT021	WDF	7/5/2014	74	63.3134	-149.1822	PEM1/SS1F	FLAT	III A 3, II C 2
W61HT022	WDF	7/5/2014	73	63.315	-149.1814	UPLAND	N/A	II B 2, II C 1
W61HT022_OP	OP	7/5/2014	73	63.3152	-149.1819	UPLAND	N/A	II C 1
W61HT022_OP1	OP	7/5/2014	73	63.3149	-149.181	UPLAND	N/A	II B 2, II C 1
W61HT023	WDF	7/5/2014	67	63.4159	-148.8457	PSS1/EM1B	FLAT	II C 1, III A 2

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W61HT023_OP	OP	7/5/2014	67	63.4161	-148.8459	PSS1C	*	II C 1
W61HT024	WDF	7/5/2014	66	63.4377	-148.8269	PSSIB	FLAT	II C 1
W61HT024_OP	OP	7/5/2014	66	63.4377	-148.8278	UPLAND	N/A	I A 2, II C 1
W61HT025	WDF	7/6/2014	64	63.4416	-148.8026	PSSIB	SLOPE	II C 1
W61HT025_OP	OP	7/6/2014	64	63.4418	-148.8027	UPLAND	N/A	I A 2, II A 2, II C 1
W61HT026	WDF	7/6/2014	65	63.4416	-148.8039	UPLAND	N/A	I A 2, II C 2, III A 1
W61HT027	WDF	7/6/2014	68	63.4025	-148.8579	PEM1/SS1B	SLOPE	III A 2, II C 2
W61HT027_OP	OP	7/6/2014	68	63.4023	-148.858	UPLAND	N/A	II C 2
W61HT028	WDF	7/6/2014	69	63.3799	-148.9101	PSS1/EM1B	FLAT	II C 1, III A 2
W61HT029	WDF	7/6/2014	71	63.374	-148.9484	PSS1/EM1B	RIVERINE	II C 1, III A 2
W61HT030	WDF	7/6/2014	70	63.3742	-148.9471	PSS1C	RIVERINE	II B 1, II C 2
W61HT031	WDF	7/7/2014	75	63.2556	-149.2624	PEM1/SS1F	FLAT	III A 3, II C 2
W61HT031_OP	OP	7/7/2014	75	63.2551	-149.2626	PSS1B	*	II C 1
W61HT032	WDF	7/7/2014	76	63.254	-149.2642	PSS1/EM1B	FLAT	II C 1, III A 3
W61HT033	WDF	7/7/2014	77	63.2536	-149.2647	PSS1B	FLAT	II B 1, III A 2
W61HT034	WDF	7/8/2014	79	63.2366	-149.2748	PFO1/4/SS1B	RIVERINE	I C 3, III A 2
W61HT035	WDF	7/8/2014	78	63.2441	-149.2724	UPLAND	N/A	II C 2, III A 2
W61HT036	WDF	7/8/2014	63	63.4654	-148.8062	PSS1/EM1B	FLAT	II A 2, II C 1, III A 2
W61HT036_OP	OP	7/8/2014	63	63.4654	-148.8062	PSS1B	*	II C 1
W61HT037	WDF	7/8/2014	62	63.5206	-148.8005	UPLAND	N/A	I A 2, II C 1, III A 1
W61HT038	WDF	7/8/2014	61	63.5235	-148.8019	UPLAND	N/A	I A 2, II C 2
W61HT038_OP	OP	7/8/2014	61	63.5235	-148.8021	PEM1F	*	III A 3
W61LH001	WDF	6/7/2014	1	65.4459	-148.6187	PSS4/1/F04B	FLAT	II B 1, I A 2
W61LH002	WDF	6/7/2014	2	65.4451	-148.6184	PSS1/4C	RIVERINE	II C 1
W61LH002_OP	OP	6/7/2014	2	65.445	-148.6185	R4SB	*	N/A
W61LH003	WDF	6/7/2014	3	65.4441	-148.6186	UPLAND	FLAT	II A 2, II B 2, II C 2
W61LH004	WDF	6/7/2014	4	65.4303	-148.6122	PSS4B	FLAT	II A 2
W61LH005	WDF	6/8/2014	5	65.4195	-148.6085	UPLAND	FLAT	I A 2
W61LH005_OP	OP	6/8/2014	5	65.4201	-148.6075	PSS1C	*	II C 1
W61LH006	WDF	6/8/2014	6	65.4045	-148.6171	PSS1B	FLAT	II B 2, II C 2
W61LH006_OP	OP	6/8/2014	6	65.4045	-148.6177	PSS1/4B	*	II B 2, II C 2
W61LH007	WDF	6/8/2014	7	65.3952	-148.6277	PSS4/1B	FLAT	II A 2, II C 2
W61LH008	WDF	6/8/2014	8	65.3196	-148.6614	PSS 13B	FLAT	II C 1, II C 2

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W61LH009	WDF	6/9/2014	9	65.3075	-148.6655	UPLAND	N/A	I A 2, II C 1
W61LH009_OP	OP	6/9/2014	9	65.307	-148.6652	PSS1B	*	II C 1
W61LH010	WDF	6/8/2014	7	65.3948	-148.6281	PSS1/EM1B	FLAT	II C 1, III A 2
W61LH011	WDF	6/9/2014	11	65.2631	-148.6819	UPLAND	N/A	II C 1
W61LH011_OP	OP	6/9/2014	11	65.2629	-148.6822	PSS1B	*	II B 2, II C 2
W61LH011_OP1	OP	6/9/2014	10	65.2642	-148.6791	UPLAND	N/A	II B 1
W61LH012	WDF	6/9/2014	12	65.2143	-148.6904	PSS1B	FLAT	II C 1
W61LH012_OP	OP	6/9/2014	12	65.2141	-148.6906	PSS1/EM1B	*	II C 1, III B 2
W61LH013	WDF	6/10/2014	13	65.1957	-148.7037	PSS4/1B	FLAT	I A 2, II A 2, II C 1
W61LH014	WDF	6/10/2014	14	65.1945	-148.7052	PSS4/1B	FLAT	II A 2, II C 2
W61LH015	WDF	6/10/2014	15	65.1256	-148.7437	PSS1B	DEPRESSIONAL	II B 1
W61LH016	WDF	6/11/2014	16	65.1146	-148.7285	PSS1/4	FLAT	II C 2, II A 2
W61LH016_OP	OP	6/11/2014	16	65.1145	-148.7291	PSS1/4B	*	II B 1, II C 1, III A 3
W61LH017	WDF	6/10/2014	17	65.1076	-148.7204	PSS1/EM1B	FLAT	II C 1, III A 2
W61LH018	WDF	6/10/2014	18	65.1074	-148.7203	PSS1/EM1B	FLAT	II C 1, III A 2
W61LH019	WDF	6/11/2014	19	65.0862	-148.7217	PEM 1 SS1B	FLAT	III A 2, II C 1
W61LH020	WDF	6/11/2014	20	65.0851	-148.7205	PSS1/EMIB	FLAT	II C 1, III A 2
W61LH021	WDF	6/11/2014	21	65.0843	-148.7199	UPLAND	N/A	I B 2, III B 1
W61LH022	WDF	6/12/2014	22	65.0732	-148.7052	UPLAND	N/A	I C 2, II A 2
W61LH023	WDF	6/12/2014	23	65.0354	-148.6759	PF04/SS1B	FLAT	I A 2, II C 2
W61LH024	WDF	6/12/2014	24	65.0339	-148.6752	UPLAND	N/A	I C 1
W61LH025	WDF	6/14/2014	25	64.9949	-148.6753	UPLAND	N/A	II C 2, III A 2
W61LH025_OP	OP	6/14/2014	25	64.9948	-148.6748	PSS1/EM1B	*	II C 2, III A 2
W61LH026	WDF	6/12/2014	26	64.9946	-148.6742	UPLAND	N/A	II C 2
W61LH027	WDF	6/14/2014	27	64.9943	-148.6724	UPLAND	N/A	II A 2, I A 2
W61LH028	WDF	6/14/2014	35	64.782	-148.8209	UPLAND	N/A	I A 2, II C 1
W61LH028_OP	OP	6/14/2014	35	64.7822	-148.8211	UPLAND	N/A	II B 1
W61LH029	WDF	6/14/2014	36	64.7824	-148.8228	PM1B	FLAT	III A 2
W61LH030	WDF	6/15/2014	34	64.7887	-148.8101	PSS4/IB	FLAT	I A 2, II C 2
W61LH030_OP	OP	6/15/2014	34	64.7882	-148.8117	PSS4B	*	II A 1
W61LH030_OP1	OP	6/15/2014	34	64.7873	-148.8118	PSS4/1B	*	II A 2, II C 2
W61LH031	WDF	6/15/2014	37	64.7643	-148.8276	PF04/SSIB	FLAT	I A 2, II C 1
W61LH031_OP	OP	6/15/2014	37	64.7642	-148.8271	PSS4/1C	*	II A 2, II C 2

2014 Wetland and Vegetation Field Data Summary Table

Feature ID	Data Type ¹	Date	Field Target #	Latitude	Longitude	Cowardin Code	HGM Classification	Vegetation Classification
W61LH032	WDF	6/15/2014	38	64.7635	-148.8271	UPLAND	N/A	I C 2, II B , II C 2
W61LH033	WDF	6/16/2014	39	64.7391	-148.8337	PFO4/SS1B	FLAT	I A 2, II C 1
W61LH033_OP	OP	6/16/2014	39	64.739	-148.8336	UPLAND	N/A	I B 2, II C 1
W61LH034	WDF	6/16/2014	40	64.7363	-148.8406	PSS4B	FLAT	I A 2, II C 1
W61LH034_OP	OP	6/16/2014	40	64.7365	-148.8371	UPLAND	N/A	I C 2, II C 2
W61LH035	WDF	6/16/2014	41	64.7218	-148.8574	PSS1/4B	FLAT	II C 2, II A 2
W61LH035_OP	OP	6/16/2014	41	64.7221	-148.8575	PF04/SS1B	*	I A 2, II B 1
W61LH036	WDF	6/16/2014	42	64.7215	-148.8583	PF04/SS4B	FLAT	I A 2, II A 2
W61LH037	WDF	6/16/2014	43	64.7209	-148.856	PF04/SS1B	FLAT	I A 2, II C 1
W61LH037_OP	OP	6/16/2014	43	64.7203	-148.8572	UPLAND	N/A	I B 1, II C 2
W61LH038	WDF	6/17/2014	44	64.709	-148.8758	UPLAND	N/A	I A 2, II C 1
W61LH038_OP	OP	6/17/2014	44	64.7093	-148.8756	PSS1B	*	II B 1
W61LH039	WDF	6/17/2014	45	64.7081	-148.8741	PSS1B	FLAT	II B 1
W61LH039_OP	OP	6/17/2014	45	64.7086	-148.8735	PFO4/SS1B	*	I A 2, II B 2, III A 2
W61LH040	WDF	6/17/2014	47	64.6867	-148.9252	PF01/SS1B	FLAT	I B 2, II C 2
W61LH041	WDF	6/17/2014	46	64.6863	-148.9226	UPLAND	N/A	II B 1, II C 2
W61LH041_OP	OP	6/17/2014	46	64.6864	-148.9224	PSS1/EM1B	*	III A 2, II C 2
W61LH041_OP1	OP	6/17/2014	46	64.6853	-148.9225	PEM1C	*	III A 3
W61LH042	WDF	6/18/2014	48	64.0043	-149.1292	PSS1/EM1B	FLAT	II C 1, III A 2
W61LH042_OP	OP	6/18/2014	48	64.005	-149.1299	PSS1/4B	*	II C 1, II A 2
W61LH043	WDF	6/19/2014	49	63.9926	-149.1228	PSS1/4B	FLAT	II B 2, II C 1
W61LH043_OP	OP	6/19/2014	49	63.9924	-149.1228	PSS1/4/EM1B	*	II C 1, III A 2
W61LH044	WDF	6/19/2014	50	63.9467	-149.1097	PFO4/SS1B	FLAT	I A 2, II B 2, II C 1
W61LH045	WDF	6/19/2014	51	63.9439	-149.1071	PSS1/4B	FLAT	II C 1, II A 2
W61LH046	WDF	6/27/2014	52	63.9307	-149.0932	PSS1/EM1B	FLAT	II C 1, III A 2
W61LH046_OP	OP	6/27/2014	52	63.9308	-149.0919	PSS1/4B	*	II C 1, II A 2
W61LH047	WDF	6/11/2014	20	65.086	-148.72	PEM1 SS1C	FLAT	III A 3, II C 1

¹WDF = Wetland Data Form; Veg = Vegetation Data Form; OP = Observation Point, No Data Form

*HGM Classification was not collected on Vegetation Forms or at Observation Points

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X</u> <u>corridor</u>
Field Target: <u>087</u>		Map #: <u>59</u> Map Date: <u>5/27/14</u>	
Date: <u>06-09-2014</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT001</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>603</u>	
Latitude: <u>62° 59' 58.11"</u>		Longitude: <u>149° 33' 24.63"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>001</u>	Picture No.: <u>PHT001 - N, S, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hillslope</u>
Slope (%): <u>3-5°</u>	Local relief (concave, convex, none):
Pre-mapped Alaska LNG/NWI classification: <u>PSS1F</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (if no explain in Notes)	
Are "Normal Circumstances" present: Yes _____ No <u>X</u> (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <u>X</u> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology <u>X</u> Naturally Problematic? No _____ (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PSS1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <u>IB2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Beaver dam complex

See sketch on
page 001 in
logbook 2

LC0

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> ssp.	15		FAC
2. <i>Saxex richardsonii</i>	65	Y	FACW
3. <i>Saxex pulchra</i>	15		FACW
4. <i>Spiraea stevenii</i>	5		FACU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>100</u>			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 83 X 2 = 166

FAC species: 88 X 3 = 264

FACU species: 11 X 4 = 44

UPL species: 0 X 5 = 0

Column Totals: 182 (A) 484 (B)

PI = B/A = 2.60

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Chamerion angustifolium</i>	1		FACU
2. <i>Mertensia paniculata</i>	1		FACU
3. <i>Anemone richardsonii</i>	T		FAC
4. <i>Viola palustris</i>	3		FACW
5. <i>Geranium erianthum</i>	4		FACU
6. <i>Calamagrostis Canadensis</i>	60	Y	FAC
7. <i>Smilacina stellata</i>	1		FAC
8. <i>Veratrum viride</i>	10		FAC
9. <i>Sanguisorba canadensis</i>	T		FACW
10. <i>Equisetum Arvense</i>	2		FAC
Total Cover: <u>85</u>			
50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>			
unidentified herb <u>3</u>			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☒ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

30 % Cover of Wetland Bryophytes

50 Total Cover of Bryophytes

20 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

arctis Lupinus

117

Page 3 of 4

WETLAND DETERMINATION DATA FORM

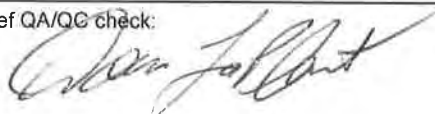
VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>15</u> Short shrub (0.5-2m) <u>85</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>85</u> Moss-Lichen <u>50</u> Floating <u>0</u> Submerged <u>0</u>			
Number of Wetland Types (M): <u>3</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____			
Presence of Islands (M): Absent (none) _____ One or Few <u>X</u> Several to Many _____ N/A _____			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>			
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____			

SOIL VARIABLES
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy <u>X</u> Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet <u>X</u>
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs <u>X</u> Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow <u>X</u> Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>6.6</u>
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <u>X</u>
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring <u>X</u>

LANDSCAPE VARIABLES (M)
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) <u>X</u>

Crew Chief QA/QC check:



GPS Technician QA/QC check:



Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT001

Field Target: 087

Date: 06-09-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated? -

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

zoe meade

Signature / Date

X Dan Laplant

Field Crew Chief (print)

X

Dan Laplant 6/9/14

Signature / Date

HT052

FT 87

veg confirmed
Hydrophytic from first
site visit.

WETLAND DETERMINATION DATA FORM

W60AT001

FT 87

SOIL		Date 6/30/14		Feature ID		Soil Pit Required (Y/N)	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix	Redox Features					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Notes
0-4							Fibric organics
4-20	5Y 5/1	95	5Y 3/4	5	C	PL	Loamy sand - mod. / fine
High Sand Content. Recently forming Hydric Soil							
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						INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____		Alaska Gleyed (A13) _____		Alaska Color Change (TA4) ⁴ _____			
Histic Epipedon (A2) _____		Alaska Redox (A14) _____		Alaska Alpine Swales (TA5) _____			
Black Histic (A3) _____		Alaska Gleyed Pores (A15) _____		Alaska Redox with 2.5Y Hue _____			
Hydrogen Sulfide (A4) _____				Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____			
Thick Dark Surface (A12) _____				Other (Explain in Notes) X 461 low organic carbon pg 93			
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 Notes.							
Restrictive Layer (if present): Type: none Depth (inches): N/A							
Hydric Soil Present (Y/N): Y - Primary Hydric, position, Hyd. Veg Present							
Notes: Soil did not meet Indicator for A. Redox due to low % of Redox conc. & LACK of AVAILABLE iron soil has low organic iron content & Hydric Prob. soil 461							
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)				SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) X	Surface Soil Cracks (B6) _____		Water-stained Leaves (B9) _____		Stunted or Stressed Plants (D1) _____		
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____		Drainage Patterns (B10) X		Geomorphic Position (D2) X		
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____		Oxidized Rhizospheres along Living Roots (C3) _____		Shallow Aquitard (D3) _____		
Water Marks (B1) _____	Marl Deposits (B15) _____		Presence of Reduced Iron (C4) _____		Microtopographic Relief (D4) _____		
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____		Salt Deposits (C5) _____		FAC-Neutral Test (D5) _____		
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____		Notes:				
Algal Mat or Crust (B4) _____	Other (Explain in Notes):						
Iron Deposits (B5) _____							
Surface Water Present (Y/N): Y	Depth (in): >1'		Wetland Hydrology Present (Y/N): Y				
Water Table Present (Y/N): Y	Depth (in): 0						
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 0						
Notes: better soil.							

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 086	Map #: 58 Map Date: 5/27/14
Date: 06-09-2014	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT002
Investigators: Dan LaPlant, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 602	
Latitude: 63° 00' 40.08'		Longitude: 149° 32' 47.86"	Datum: WGS84
Logbook No.: 002	Logbook Page No.: 2	Picture No.: PW60HT002 - N, S, Pit, Plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 15	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SSIB	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SSIB
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): IIIA2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See site sketch in field notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Andromeda polifolia</i>	35	Y	FACW
2. <i>Betula nana</i>	30	Y	FAC
3. <i>Empetrum nigrum</i>	10		FAC
4. <i>Spiraea stevenii</i>	—	—	—
5. <i>Salix ovalifolia</i>	10		FAC
6. <i>Vaccinium uliginosum</i>	20		FAC
7. <i>Vaccinium vitis-idaea</i>	T		
8.			
9.			
Total Cover: <u>105</u> 50% of total cover: <u>52.5</u> 20% of total cover: <u>21</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 35 X 2 = 70
 FAC species: 70 X 3 = 210
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 105 (A) 280 (B)
 PI = B/A = 2.67

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex bigelowii</i>	45	Y	FAC
2. <i>Rubus chamaemorus</i>	T		FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>45</u> 50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
85 % Cover of Wetland Bryophytes
85 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-09-14</u> Feature ID <u>W60 HT002</u>					Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 - 13	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Fibric	organics
13 - 20	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Histic	Hemic
20 - 22	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Sand/gravel	

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) <u> </u>
Histic Epipedon (A2) <u> </u>	Alaska Redox (A14) <u> </u>
Black Histic (A3) <u> </u>	Alaska Gleyed Pores (A15) <u> </u>
Hydrogen Sulfide (A4) <u> </u>	Alaska Redox with 2.5Y Hue <u> </u>
Thick Dark Surface (A12) <u> </u>	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>
	Other (Explain in Notes) <u> </u>

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

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

Hydric Soil Present (Y/N): Y

Notes: water table 2" from surface

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u> </u>	Surface Soil Cracks (B6) <u> </u>	Water-stained Leaves (B9) <u> </u>	Stunted or Stressed Plants (D1) <u> </u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u> </u>	Drainage Patterns (B10) <u> </u>	Geomorphic Position (D2) <u> </u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) <u> </u>	Oxidized Rhizospheres along Living Roots (C3) <u> </u>	Shallow Aquitard (D3) <u> </u>
Water Marks (B1) <u> </u>	Marl Deposits (B15) <u> </u>	Presence of Reduced Iron (C4) <u> </u>	Microtopographic Relief (D4) <u> </u>
Sediment Deposits (B2) <u> </u>	Hydrogen Sulfide Odor (C1) <u> </u>	Salt Deposits (C5) <u> </u>	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) <u> </u>	Dry-Season Water Table (C2) <u> </u>	Notes: <u> </u>	
Algal Mat or Crust (B4) <u> </u>	Other (Explain in Notes): <u> </u>		
Iron Deposits (B5) <u> </u>			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes: <u> </u>		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>105</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>45</u> Moss-Lichen <u>85</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>3</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>	
Vegetation Density/Dominance (P): Sparse (0-20%) <u>X</u> Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A <u>X</u>		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet <u>X</u> No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent <u>X</u> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <u>X</u>	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed <u>X</u> Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W004T0~~08~~⁰² Field Target: 086 Date: 06-09-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X zoe Meade

Wetland Scientist (print)

X

z. Meade

Signature / Date

X Don Lobant

Field Crew Chief (print)

X

Don Lobant 6/9/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <u> </u> Access Road (explain) <u> </u> Other (explain) <u>X</u>		Field Target: <u>088</u>	Map #: <u>60</u> Map Date: <u>7/27/14</u>
Date: <u>06-09-14</u>	Project Name & No.: Alaska LNG 26221306		Feature Id: <u>W60HT003</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>603</u>	
Latitude: <u>62° 59' 38.18"</u>	Longitude: <u>149° 39' 39.18'</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>002</u>	Logbook Page No.: <u>3</u>	Picture No.: <u>P-W60HT-W, E, Pit. plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hillslope w/</u>
Slope (%): <u>15</u>	Local relief (concave, convex, none): <u>hummocks</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1B</u>	Soil Map Unit Name: <u> </u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No <u> </u> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No <u> </u> (If no, explain in Notes.)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present? Yes <u> </u> No <u>X</u>	Wetland Type: <u>upland</u>
Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Alaska Vegetation Classification (Viereck): <u>IIIA1, IIC2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

see logbook

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spiraea stevenii</i>	2		FACU
2. <i>Betula nana</i>	25	Y	FAC
3. <i>Empetrum nigrum</i>	10	Y	FAC
4. <i>Vaccinium vitis-idaea</i>	T		FAC
5. <i>Rhododendron tomentosum</i>	1		FACW
6. <i>Vaccinium uliginosum</i>	10	Y	FAC
7.			
8.			
9.			
Total Cover: <u>47</u> 50% of total cover: <u>23.5</u> 20% of total cover: <u>9.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 1 X 2 = 2
 FAC species: 130 X 3 = 390
 FACU species: 7 X 4 = 28
 UPL species: 0 X 5 = 0
 Column Totals: 138 (A) 420 (B)
 PI = B/A = 3.04

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	85	Y	FAC
2. <i>Gymnocarpium dryopteris</i>	5		FACU
3. <i>Cornus canadensis</i>	T		FACU
4. <i>Anemone narcissiflora</i>	T		FACU
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>96</u> 50% of total cover: <u>45</u> 20% of total cover: <u>17</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
20 % Cover of Wetland Bryophytes
20 Total Cover of Bryophytes
0 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

3 (JA)

SOIL		Date <u>06-14-09</u> Feature ID <u>W60HT002</u>						Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)									
Depth (inches)	Matrix		Redox Features				Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²			
0-2							Fibric	organic	
2-6							Silt loam		
6-22	10 YR 4/1	100					Silt loam + gravel mix		
	7.5 YR 2.5/1	100							

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): N

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): _____	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): _____	
Notes: _____		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____

LANDSCAPE VARIABLES (M)
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____

Crew Chief QA/QC check:

Don J. Platt

GPS Technician QA/QC check:

nm

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60 HT063

Field Target: 88

Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?

☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X Yarmouth

Signature / Date

X Don Lachant

Field Crew Chief (print)

X Don Lachant

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X</u>
Field Target: <u>133</u>		Map #: <u>93</u> Map Date: <u>5/27/14</u>	
Date: <u>06-10-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT004</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>124</u>	
Latitude: <u>62° 27' 02.02"</u>		Longitude: <u>150° 16' 15.34"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>002</u>	Logbook Page No.: <u>005</u>	Picture No.: <u>PW60HT004_E, S.P.H. plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>slight hummocks</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1/EM1C</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes.)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No	Is the Sampled Area within a Wetland? Yes <u>X</u> No
Hydric Soil Present? Yes <u>X</u> No	Wetland Type: <u>PSS1/EM1B</u>
Wetland Hydrology Present? Yes <u>X</u> No	Alaska Vegetation Classification (Vioreck): <u>II C2, III A2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in logbook 002 page 005

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	20	Y	FACW
2. <i>Betula nana</i>	15		FAC
3. <i>Vaccinium oxycoccus</i>	5		OBL
4. <i>Chamaedaphne calyculata</i>	2		FACW
5. <i>Rhododendron tomentosum</i>	4		FACW
6. <i>Empetrum nigrum</i>	30	Y	FAC
7.			
8.			
9.			
Total Cover: <u>76</u>			
50% of total cover: <u>38</u> 20% of total cover: <u>15.2</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 48 X 1 = 48

FACW species: 35 X 2 = 70

FAC species: 52 X 3 = 156

FACU species: 0 X 4 = 0

UPL species: 0 X 5 = 0

Column Totals: 133 (A) 274 (B)

PI = B/A = 2.03

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum arvense</i>	7		FAC
2. <i>Oxyspora rotundifolia</i>	1		OBL
3. <i>Rubus Cham aemorow</i>	7		FACW
4. <i>Pedicularis labradorica</i>	2		FACW
5. <i>Carex microglochin</i>	40	Y	OBL
6. <i>Carex limosa</i>	3		OBL
7.			
8.			
9.			
10.			
Total Cover: <u>00</u>			
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

65 % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-10-14</u> Feature ID <u>W60H1004</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-22</u>							<u>Histic</u>	<u>organics</u>
							<u>Fibric</u>	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2" between hummocks</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>3</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>Surface</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>21</u> Dwarf shrub (<0.5m) <u>35</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>60</u> Moss-Lichen <u>85</u> Floating <u>0</u> Submerged <u>0</u>			
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <input checked="" type="checkbox"/>	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <input checked="" type="checkbox"/> High Density (60-80%) _____ Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____			
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <input checked="" type="checkbox"/>			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>			
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____			

SOIL VARIABLES
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>4.6</u>
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____

LANDSCAPE VARIABLES (M)
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <input checked="" type="checkbox"/> Unknown _____
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) <input checked="" type="checkbox"/>

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT004

Field Target: 133

Date: 06-10-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

X Dan Lapina

Field Crew Chief (print)

X

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 136	Map #: 94 Map Date: 5/27/14
Date: 06-10-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W604T005
Investigators: Dan La Plant, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 124	
Latitude: 62°20'43.854" <i>62°20'43.854"</i>	Longitude: <i>150°16'8.709"</i>	Datum: WGS84	
Logbook No.: 002	Logbook Page No.: 006	Picture No.: P_N.E. pit, plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 0-3	Local relief (concave, convex, none): <i>concave</i>
Pre-mapped Alaska LNG/NWI classification: <i>upland</i>	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: <i>PSS1B</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <i>II B2</i>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in logbook 002 page 006

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix alaxensis</i>	80	Y	FAC
2. <i>Alnus</i> ssp.	3		FAC
3. <i>Viburnum edule</i>	3		FACU
4. <i>Rubus parviflorus</i>	3		FACU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>91</u> 50% of total cover: <u>45.5</u> 20% of total cover: <u>18.2</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 5 X 2 = 10
 FAC species: 178 X 3 = 534
 FACU species: 17 X 4 = 68
 UPL species: 0 X 5 = 0
 Column Totals: 200 (A) 612 (B)
 PI = B/A = 3.1

VEGETATION (use scientific names of plants)			
Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis Canadensis</i>	90	Y	FAC
2. <i>Chamerion angustifolium</i>	1		FACU
3. <i>Viola epipsa palustris</i>	5		FACW
4. <i>Equisetum arvense</i>	5		FAC
5. <i>Mertensia paniculata</i>	2		FACU
6. <i>Echinopanax</i> Horridum	8		FACU
7. <i>Oplapanax</i>			
8.			
9.			
10.			
Total Cover: <u>111</u> 50% of total cover: <u>55.5</u> 20% of total cover: <u>22.2</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground
0 % Cover of Wetland Bryophytes
0 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>16-10-14</u>		Feature ID <u>W60HT 005</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0-2							Fibric organic
2-9	10YR 4/1						Silt loam
9-22	10YR 5/8	50	6.5Y 4/1 5G/	50	C	M	Silt clay
			5.5Y 4/1				

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) <u>X</u>	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>X</u>
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>NO</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Yes</u>	Depth (in): <u>13"</u>	
Saturation Present (Y/N): <u>Yes</u> (includes capillary fringe)	Depth (in): <u>9</u>	
Notes: _____		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>80</u> Short shrub (0.5-2m) <u>5</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>90</u> Short herb (<1m) <u>10</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>			
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____			
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>			
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estuarine Fringe _____			

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent <u>X</u> Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT005

Field Target: 136

Date: 06-10-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade*

Signature / Date

X *Dan Laplant*

Field Crew Chief (print)

X *Dan Laplant* 6/10/14

Signature / Date

soil check

WETLAND DETERMINATION DATA FORM

Soils check

FT ~~1000~~

136

SOIL		Date <u>7/2/14</u>		Feature ID <u>W60 AT 005</u>		Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5							Fibric	organic
5-10		60					Fibric	organic
	10 YR 2/2	40					Silt loam	
10-16	5 Y 4/1	80	2.5 YR 3/6	20	C	PL	silt loam	
16-20	10 YR 5/2	50	10 YR 4/6	50	C	PL		

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) <u>X</u>	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) <u>X</u>	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) <u>X</u>	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): _____	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>14</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>10</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/> <u>Corridor</u>		Field Target: <u>135</u>	Map #: <u>94</u> Map Date: <u>5/27</u>
Date: <u>06-10-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT006</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>124</u>	
Latitude: <u>62°26'48.485"</u>	Longitude: <u>150°16'9.867"</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>002</u>	Logbook Page No.: <u>007</u>	Picture No.: <u>P-5, SW, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>depression</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>upland</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: <u>PEM1F</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>III A3</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in logbook 002 page 007

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Saxex alaxensis</i>	25	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>25</u> 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 75 X 1 = 75
 FACW species: 0 X 2 = 0
 FAC species: 35 X 3 = 105
 FACU species: 4 X 4 = 16
 UPL species: 0 X 5 = 0
 Column Totals: 114 (A) 196 (B)
 PI = B/A = 1.72

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum fluviatile</i>	75	Y	OBL
2. <i>Calamagrostis Canadensis</i>	10		FAC
3. <i>Gymnocarpium dryopteris</i>	3		FACU
4. <i>Streptopus amplexifolius</i>	1		FACU
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>89</u> 50% of total cover: <u>44.5</u> 20% of total cover: <u>17.8</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

☐ % Bare Ground
☐ % Cover of Wetland Bryophytes
☐ Total Cover of Bryophytes
☐ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-10-14</u> Feature ID <u>W60HI006</u>				Soil Pit Required (Y/N) <u>N</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) <u>X</u>

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: target in center of wetland pond - no pit possible

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>10-12"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>X</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: target in center of wetland pond - inundation observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>25</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>75</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>10</u> Short herb (<1m) <u>0</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>75</u>		
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>1</u> Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) <input checked="" type="checkbox"/> Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) <input checked="" type="checkbox"/> Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems <input checked="" type="checkbox"/> 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking <input checked="" type="checkbox"/> Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet <input checked="" type="checkbox"/> No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent <input checked="" type="checkbox"/> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs <input checked="" type="checkbox"/> Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow <input checked="" type="checkbox"/> Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.6</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <input checked="" type="checkbox"/> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT006

Field Target: 135

Date: 06-10-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete? *no soil at*
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)? *2 veg photos (no soil pit dug)*
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

W
X *Zoe Meade*

Wetland Scientist (print)

X *Zoe Meade*

Signature / Date

X *Don LaPoint*

Field Crew Chief (print)

X *Don LaPoint* 6/10/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION <i>off Highway, Map QC</i>			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <u>134</u>	Map #: <u>94</u> Map Date: <u>5/27</u>
Date: <u>06-10-14</u>	Project Name & No.: Alaska LNG 26221306		Feature Id: <u>W60HT007</u>
Investigators: <u>Don LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>124</u>	
Latitude: <u>62° 26' 55.82"</u>		Longitude: <u>-150° 16' 17.45"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>002</u>	Logbook Page No.: <u>008</u>	Picture No.: <u>P_S, N, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>terrace</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>upland</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>upland</u>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>II B 1</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch logbook 002 page 008

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>25</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>0</u> X 2 = <u>0</u> FAC species: <u>93</u> X 3 = <u>279</u> FACU species: <u>165</u> X 4 = <u>660</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>258</u> (A) <u>939</u> (B) PI = B/A = <u>3.64</u>
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Alnus ssp.</u>	<u>90</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Oplopanax horridus</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>120</u> 50% of total cover: <u>60</u> 20% of total cover: <u>24</u>				

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>No</u> Dominance Test is > 50% <u>No</u> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Streptopus amplexifolius</u>	<u>5</u>		<u>FACU</u>	
2. <u>Gymnocarpium dryopteris</u>	<u>50</u>	<u>Y</u>	<u>FACU</u>	
3. <u>Dryopteris expansa</u>	<u>80</u>	<u>Y</u>	<u>FACU</u>	
4. <u>Equisetum sylvaticum</u>	<u>3</u>		<u>FAC</u>	
5.				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>No</u> Notes: (If observed, list morphological adaptations below):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>138</u> 50% of total cover: <u>69</u> 20% of total cover: <u>27.6</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-10-14</u> Feature ID <u>W60HT007</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2							Fibric	organics
2-9	10YR 3/2	100					Silt loam	
9-22	10YR 4/4	100					Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): N

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>N/A</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>15</u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u>14</u>	

Notes: saturation at 14"
Water table at 15"

WETLAND DETERMINATION DATA FORM

Upland

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		
SOIL VARIABLES		
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____		
HYDROLOGIC VARIABLES		
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____		
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____		
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____		
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____		
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____		
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____		
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____		
Surficial Glacial Deposits Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____		
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____		
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____		
LANDSCAPE VARIABLES (M)		
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____		
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____		
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____		
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____		

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT007

Field Target: 134

Date: 06-10-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Joe Meade

Wetland Scientist (print)

X

Joe Meade

Signature / Date

X

Jim Laplant

Field Crew Chief (print)

X

Jim Laplant 6/10/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X</u>
Field Target: <u>142</u>		Map #: <u>98</u> Map Date: <u>5/27/14</u>	
Date: <u>06-12-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60 HT008</u>
Investigators: <u>Dan La Plant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>122.2</u>	
Latitude: <u>62° 25' 15.03"</u>	Longitude: <u>150° 15' 50.03"</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>002</u>	Logbook Page No.: <u>013</u>	Picture No.: <u>P- NW, NE, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>valley bottom</u>
Slope (%): <u>0-4</u>	Local relief (concave, convex, none): <u>none</u>
Pre-mapped Alaska LNG/NWI classification: <u>Upland</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes No <u>X</u>	Is the Sampled Area within a Wetland? Yes No <u>X</u>
Hydric Soil Present? Yes No <u>X</u>	Wetland Type: <u>upland</u>
Wetland Hydrology Present? Yes No <u>X</u>	Alaska Vegetation Classification (Vioreck): <u>IC2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in Logbook 002 page 013.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>		30	Y	FACU
2. <i>Picea glauca</i>		35	Y	FACU
3.				
4.				
Total Cover: <u>65</u> 50% of total cover: <u>32.5</u> 20% of total cover: <u>13</u>				
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum edule</i>		40	Y	FACU
2. <i>Oplopanax horridus</i>		25	Y	FACU
3. <i>Alnus ssp.</i>		15		FAC
4. <i>Sambucus racemosa</i>		5		FACU
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>85</u> 50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>				

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 6 (B)
 % Dominant Species that are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 x 1 = 0
 FACW species: 0 x 2 = 0
 FAC species: 173 x 3 = 519
 FACU species: 147 x 4 = 588
 UPL species: 0 x 5 = 0
 Column Totals: 320 (A) 1107 (B)
 PI = B/A = 3.46

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis Canadensis</i>		80	Y	FAC
2. <i>Athyrium cyclosorum</i>		75	Y	FAC
3. <i>Gymnocarpium dryopteris</i>		10		FACU
4. <i>Streptopus amplexifolius</i>		2		FACU
5. <i>Equisetum sylvaticum</i>		3		FAC
6. <i>Cornus canadensis</i>		T		FAC
7.				
8.				
9.				
10.				
Total Cover: <u>170</u> 50% of total cover: <u>85</u> 20% of total cover: <u>34</u>				

Hydrophytic Vegetation Indicators:
☐ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

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

☐ % Bare Ground
☐ % Cover of Wetland Bryophytes
☐ Total Cover of Bryophytes
☐ % Cover of Water

Hydrophytic Vegetation Present (Y/N): N
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-12-14</u> Feature ID <u>W60HT008</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	<u> </u>	<u>—</u>	<u> </u>	<u>—</u>	<u> </u>	<u> </u>	<u>organic</u>	
4-5.5	<u> </u>	<u>—</u>	<u> </u>	<u>—</u>	<u> </u>	<u> </u>		<u>Ash</u>
5.5-8.5	<u>2.5YR 3/1</u>	<u>100</u>	<u> </u>	<u>—</u>	<u> </u>	<u> </u>	<u>Silt loam</u>	
8.5-22	<u>5YR 5/6</u>	<u>100</u>	<u> </u>	<u>—</u>	<u> </u>	<u> </u>	<u>Silt loam</u>	

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u> </u>	Alaska Gleyed (A13) <u> </u>
Histic Epipedon (A2) <u> </u>	Alaska Redox (A14) <u> </u>
Black Histic (A3) <u> </u>	Alaska Gleyed Pores (A15) <u> </u>
Hydrogen Sulfide (A4) <u> </u>	Alaska Color Change (TA4) ⁴ <u> </u>
Thick Dark Surface (A12) <u> </u>	Alaska Alpine Swales (TA5) <u> </u>
	Alaska Redox with 2.5Y Hue <u> </u>
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>
	Other (Explain in Notes) <u> </u>

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

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

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u> </u>	Surface Soil Cracks (B6) <u> </u>	Water-stained Leaves (B9) <u> </u>	Stunted or Stressed Plants (D1) <u> </u>
High Water Table (A2) <u> </u>	Inundation Visible on Aerial Imagery (B7) <u> </u>	Drainage Patterns (B10) <u> </u>	Geomorphic Position (D2) <u> </u>
Saturation (A3) <u> </u>	Sparsely Vegetated Concave Surface (B8) <u> </u>	Oxidized Rhizospheres along Living Roots (C3) <u> </u>	Shallow Aquitard (D3) <u> </u>
Water Marks (B1) <u> </u>	Marl Deposits (B15) <u> </u>	Presence of Reduced Iron (C4) <u> </u>	Microtopographic Relief (D4) <u> </u>
Sediment Deposits (B2) <u> </u>	Hydrogen Sulfide Odor (C1) <u> </u>	Salt Deposits (C5) <u> </u>	FAC-Neutral Test (D5) <u> </u>
Drift Deposits (B3) <u> </u>	Dry-Season Water Table (C2) <u> </u>	Notes: <u> </u>	
Algal Mat or Crust (B4) <u> </u>	Other (Explain in Notes): <u> </u>		
Iron Deposits (B5) <u> </u>			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u> </u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u> </u>	
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>	Depth (in): <u> </u>	
Notes: <u> </u>		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (>1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____			
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____			
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____			
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____			
SOIL VARIABLES			
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____			
HYDROLOGIC VARIABLES			
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____			
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____			
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____			
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____			
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____			
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____			
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____			
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____			
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____			
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____			
LANDSCAPE VARIABLES (M)			
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____			
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____			
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____			
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____			

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT008

Field Target: 142

Date: 06-12-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☐ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☐ Cover calculations are complete and correct?
- ☐ All dominant species have been determined and recorded per strata?
- ☐ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☐ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X *Zoe Meade* 6/12/14
Signature / Date

X Dan Laplant
Field Crew Chief (print)

X *D. Laplant* 6/12/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 2000' corridor			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 141	Map #: 98 Map Date: 5/27/14
Date: 06-12-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT009
Investigators: Dan Laplant, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 122.2	
Latitude: 62° 25' 14.37"		Longitude: 150° 15' 56.09"	Datum: WGS84
Logbook No.: 002	Logbook Page No.: 014	Picture No.: P.W, NW, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): Valley bottom
Slope (%): 0-2	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PSS 1/EM 1 B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PEM 1 F
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): III A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in Logbook 002 page 015.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>105</u> X 1 = <u>105</u> FACW species: <u>0</u> X 2 = <u>0</u> FAC species: <u>10</u> X 3 = <u>30</u> FACU species: <u>0</u> X 4 = <u>0</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>115</u> (A) <u>135</u> (B) PI = B/A = <u>1.17</u>
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Comarum palustre</u>	<u>15</u>		<u>OBL</u>	
2. <u>Equisetum fluviatile</u>	<u>65</u>	<u>Y</u>	<u>OBL</u>	
3. <u>unidentified herb</u>	<u>5</u>		<u>---</u>	
4. <u>Carex aquatilis</u>	<u>25</u>	<u>Y</u>	<u>OBL</u>	
5. <u>Calamagrostis canadensis</u>	<u>10</u>		<u>FAC</u>	<u>0</u> % Bare Ground <u>25</u> % Cover of Wetland Bryophytes <u>25</u> Total Cover of Bryophytes <u>75</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>120</u> 50% of total cover: <u>60</u> 20% of total cover: <u>24</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-12</u> Feature ID <u>W60HT009</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 - 3	—	—	—	—	—	—	—	organics
3 - 14	2.5 YR 3/1	100	—	—	—	—	Silt loam	
14 - 22+	7.5 YR 7/1	75	2.5 YR 6/8	25	C	PL, M	Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ <u>X</u>
Histic Epipedon (A2) _____	Alaska Redox (A14) <u>X</u>	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12) _____		Other (Explain in Notes)

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:
 2.5 YR 6/8 Mottles are in the pore spaces and in the matrix.
 5 YR 5/8 mottled, 7.5 YR 7/1 matrix } Very large/color of matrix changed when exposed to oxygen w/in first 5 minutes of exposure

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) <u>X</u>	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) <u>X</u>	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) <u>X</u>			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>?</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>9</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>4"</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent <u>X</u> Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>8</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>10</u> Short herb (<1m) <u>0</u> Moss-Lichen <u>25</u> Floating <u>0</u> Submerged <u>90</u>		
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>1</u> Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) <u>X</u> Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent <u>X</u> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.36</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT009

Field Target: 141

Date: 06-012-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

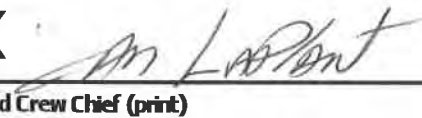
- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X 
Signature / Date

X 
Field Crew Chief (print)

X  6/12/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>143</u>	Map #: <u>98</u> Map Date: <u>5/27</u>
Date: <u>06-12-2014</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT010</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>122</u>	
Latitude: <u>62° 25' 05.39"</u>		Longitude: <u>150° 15' 48.46"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>002</u>	Logbook Page No.: <u>016</u>	Picture No.: <u>P-SE, NW, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Valley bottom</u>
Slope (%): <u>0-1</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>upland</u>	Soil Map Unit Name: _____
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>upland</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>III A31</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in Logbook 002 page 016.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>25</u> (A/B)
1. <i>Betula neolaskana</i>	10	Y	FACU	
2.				
3.				
4.				
Total Cover: <u>10</u> 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>0</u> X 2 = <u>0</u> FAC species: <u>114</u> X 3 = <u>342</u> FACU species: <u>61</u> X 4 = <u>244</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>175</u> (A) <u>586</u> (B) PI = B/A = <u>3.35</u>
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Sambucus racemosa</i>	2		FACU	
2. <i>Oplopanax horridus</i>	10	Y	FACU	
3. <i>Rubus idaeus</i>	3	Y	FACU	
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Dominance Test is > 50% <input type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Calamagrostis canadensis</i>	90	Y	FAC	
2. <i>Chamaerion angustifolium</i>	5		FACU	
3. <i>Trientalis europaea</i>	T		FACU	
4. <i>Gymnocarpium dryopteris</i>	25		FACU	
5. <i>Equisetum sylvaticum</i>	20		FAC	
6. <i>Veratrum viride</i>	2		FAC	
7. <i>Streptopus amplexifolius</i>	1		FACU	
8. <i>Dryopteris expansa</i>	5		FACU	
9.				
Total Cover: <u>148</u> 50% of total cover: <u>74</u> 20% of total cover: <u>29.6</u>				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>0</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
10.				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-12</u> Feature ID <u>W60HT010</u>		Soil Pit Required (Y/N) <u>Y</u>			
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0 - 2							Organics
2 - 4							Ash, volcanic
4 - 8	2.5YR 2.5/1	100					Silt loam
8 - 22	10YR 5/8	100					Silt loam

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Redox with 2.5Y Hue _____
Thick Dark Surface (A12) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer
	Other (Explain in Notes)

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): _____	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): _____	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____			
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____			
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____ Open _____ Small Scattered Patches _____ Continuous Cover _____			
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____			
SOIL VARIABLES			
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____			
HYDROLOGIC VARIABLES			
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____			
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____			
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____			
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____			
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____			
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____			
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____			
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____			
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____			
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____			
LANDSCAPE VARIABLES (M)			
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____			
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____			
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____			
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____			

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60 HT 010

Field Target: 143

Date: 06-12-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Zoe Meade

Signature / Date

06-12-14

X

Dej Laplant

Field Crew Chief (print)

X

Dej Laplant

Signature / Date

6/12/14

Vegetation Classification Data Form

Site Description		
Date: 06-13-14	Project Name & #: Alaska LNG 26221306	Field Target: 144
Investigators: Dan LaPlant, Zoe Meade		Feature ID: W60HT011
Latitude: 62°23'44.53"	Longitude: 150°15'57.64"	Datum: WGS84
Logbook #: 002 pg. 020	Logbook Page #: 020	Picture #: P_W60HT011 - veg - veg
Location Description:		
Common Species Observed (Scientific Name)		
Betula neoalaskana	dryopteris expansa	
Alnus ssp.	trientalis europaea	
Calamagrostis canadensis		
Sambucus racemosa		
Percent Cover of Dominant Structure Level: Bet neo - 50% , Alnus ssp. - 50%		
Habitat Description:		
upland - Birch/Spruce forest		
Alaska Vegetation Classification: Level I, Level II, Level III		
I	C	2
Notes:		
Field target approximately 3' off of recreational ATV trail, easily accessible and no signs of wetland features.		

Field Crew Chief:



Field Scientist/Technician



Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II Scrub	A Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C Low scrub	(1) Closed low scrub (2) Open low scrub
	D Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III Herbaceous	A Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C Bryoid herbaceous	(1) Mosses (2) Lichens
	D Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant)		7
I Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	IA Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	IA 1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	IA 2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	IA 3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	IB Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	IB 1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	IB 2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	IB 3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	IC 1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	IC 2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	IC 3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a	Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub 9
8b	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c	Dwarf tree canopy of 10-24 percent cover	II A 3 Dwarf tree scrub woodland
10a	Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub 11
10b	Shrubs less than 1.5 meters (5ft) tall	12
11 a	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11 b	Shrub canopy cover of 25-74 percent	II B 2 Open tall scrub
12a	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a	Shrub canopy cover greater than 75 percent	II C 1 Closed low scrub
13b	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C 2 Open low scrub
14a	Dryas species dominant in the dwarf shrub layer	II D.1 Dryas dwarf scrub
14b	Ericaceous species dominant in the dwarf shrub layer	II D.2 Ericaceous dwarf scrub
14c	Willow species dominant in the dwarf scrub layer	II D 2 Willow dwarf scrub
III. Herbaceous		
15a	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous 21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Enophorum</i> spp.; tussocks often present	III A 2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III A 3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained, mostly tundra sites	III B 1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B 2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B 3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C 2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D.1 Freshwater aquatic herbaceous	
21 b. Vegetation submerged or floating in brackish water	III D 2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D 3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: 144

Field Target: W60HT011

Date: 06-13-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X Zoe Meade

Signature

X Don Lohr

Field Crew Chief (print)

X Don Lohr 6/13/14

Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 145	Map #: 100 Map Date: 5/27
Date: 06-13-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT012
Investigators: Dan LaPlant, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 119.2	
Latitude: 62° 22' 45.36"		Longitude: 150° 16' 10.02"	Datum: WGS84
Logbook No.: 002	Logbook Page No.: 021	Picture No.: P-W, E, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): stream bed
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PSS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): II B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in Logbook 002, page 021.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>50</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>10</u> X 1 = <u>10</u> FACW species: <u>30</u> X 2 = <u>60</u> FAC species: <u>155</u> X 3 = <u>465</u> FACU species: <u>79</u> X 4 = <u>316</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>274</u> (A) <u>551</u> (B) PI = B/A = <u>2.01</u>
<u>Sapling/Shrub Stratum</u> (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Ainus ssp.</i>	50	Y	FAC	
2. <i>Spiraea stevenii</i>	2		FACU	
3. <i>Viburnum edule</i>	5		FACU	
4. <i>Oplopanax horridus</i>	15	Y	FACU	
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>72</u> 50% of total cover: <u>36</u> 20% of total cover: <u>14.4</u>				

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <u>Y</u> <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Equisetum arvens</i>	70	Y	FAC	
2. <i>Gymnocarpium dryopteris</i>	2		FACU	
3. <i>Viola palustris</i>	30		FACW	
4. <i>Streptopus amplexifolius</i>	T		FACU	
5. <i>Calamagrostis Canadensis</i>	10		FAC	
6. <i>Dryopteris expansa</i>	55	Y	FACU	
7. <i>Carex aquatilis</i>	10		OBL	
8. <i>Equisetum sylvaticum</i>	25		FAC	
9.				
Total Cover: <u>202</u> 50% of total cover: <u>101</u> 20% of total cover: <u>40.4</u>				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-13-14</u> Feature ID <u>W60H1012</u>				Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0-2							Histic 0
2-3	7.5 YR 3/1	100					← glacial till
3-15 +	gley 2-3/5B6	100					glacial till
	5B6 3/1						
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						INDICATORS FOR PROBLEMATIC HYDRIC SOILS³	
Histosol or Histel (A1) _____			Alaska Gleyed (A13) <u>X</u> <u>vw</u>			Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____			Alaska Redox (A14) <u>X</u> <u>vw</u>			Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____			Alaska Gleyed Pores (A15) _____			Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____						Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____						Other (Explain in Notes) _____	
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 Notes.							
Restrictive Layer (if present): Type: <u>glacial till</u> Depth (inches): <u>3+</u>							
Hydric Soil Present (Y/N): <u>Y</u>							
Notes: <u>soil was rechecked on 6/25/14 by S. Christophen. See W60-3 logbook page 9.</u> <u>0-4 fibric org. saturated</u> <u>4-8 4/1N sandy sand 80% with small gravel / Redox 10YR 4/4 20% C, PL Refusal at 8"</u>							
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)				SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>X</u>		Surface Soil Cracks (B6) _____		Water-stained Leaves (B9) _____		Stunted or Stressed Plants (D1) _____	
High Water Table (A2) <u>X</u>		Inundation Visible on Aerial Imagery (B7) <u>X</u>		Drainage Patterns (B10) _____		Geomorphic Position (D2) <u>X</u>	
Saturation (A3) <u>X</u>		Sparsely Vegetated Concave Surface (B8) _____		Oxidized Rhizospheres along Living Roots (C3) <u>X</u>		Shallow Aquitard (D3) _____	
Water Marks (B1) _____		Marl Deposits (B15) _____		Presence of Reduced Iron (C4) _____		Microtopographic Relief (D4) _____	
Sediment Deposits (B2) _____		Hydrogen Sulfide Odor (C1) _____		Salt Deposits (C5) _____		FAC-Neutral Test (D5) _____	
Drift Deposits (B3) _____		Dry-Season Water Table (C2) _____		Notes:			
Algal Mat or Crust (B4) _____		Other (Explain in Notes):					
Iron Deposits (B5) _____							
Surface Water Present (Y/N): <u>Y</u>		Depth (in): <u>0-3 *</u>		Wetland Hydrology Present (Y/N): <u>Y</u>			
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>0-3 *</u>					
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>5</u>					
Notes: <u>* perched water table over gley layer (glacial till)</u>							

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>67</u> Short shrub (0.5-2m) <u>5</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>55</u> Short herb (<1m) <u>147</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) <u>X</u> Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine <u>X</u> Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey <u>X</u>	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet <u>X</u>	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs <u>X</u> Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable <u>X</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

[Signature]

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT012

Field Target: 145

Date: 6/13/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Zoe Meade 6/13/14

Signature / Date

X

Dan LaPoint

Field Crew Chief (print)

X

Dan LaPoint 6/13/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				outside 2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 146		Map #: 101 Map Date: 5/27/14			
Date: 06-14-14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT013	
Investigators: Dan LaPlant, Zoe Meade				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 118.2	
Latitude: 62° 21' 54.69"		Longitude: 150° 15' 36.99"		Datum: WGS84	
Logbook No.: 002		Logbook Page No.: 023		Picture No.: P-W, NW, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): upland 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PEM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): III A 1.

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See sketch in logbook 002 page 024.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Betula neolasiana</i>	10	Y	FACU	
2. <i>Rubus idaeus</i>	4	Y	FACU	
3. <i>Salix alaxensis</i>	5	Y	FAC	
4. <i>Spiraea stevenii</i>	T		FACU	
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>19</u> 50% of total cover: <u>9.5</u> 20% of total cover: <u>3.8</u>				

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 2 X 2 = 4
 FAC species: 97 X 3 = 291
 FACU species: 54 X 4 = 216
 UPL species: 0 X 5 = 0
 Column Totals: 153 (A) 511 (B)
 PI = B/A = 3.34

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Chamaerion angustifolium</i>	10		FACU	
2. <i>Equisetum sylvaticum</i>	2		FAC	
3. <i>Chamaerion canadensis</i>	85	Y	FAC	
4. <i>Streptopus amplexifolius</i>	T		FACU	
5. <i>Eleocharis horridus</i>	—	—	—	
6. <i>Rubus idaeus</i>	—	—	—	
7. <i>Gymnocarpium dryopteris</i>	15		FACU	
8. <i>Dryopteris expansa</i>	15		FACU	
9. <i>Equisetum arvense</i>	5		FAC	
10. <i>Viola palustre</i>	2		FACW	
Total Cover: <u>132</u> 50% of total cover: <u>66</u> 20% of total cover: <u>26.4</u>				
<i>Geocaulon lividicum</i> T N FACU				

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
0 % Cover of Wetland Bryophytes
0 Total Cover of Bryophytes
5 % Cover of Water
 Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-14-14</u> Feature ID <u>W60HT013</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0 - 1								organics
1 - 7	10 YR 3/1	100					silt loam	
7 - 22	10 YR 4/3	70	5 YR 4/6	30	C	M	silt loam	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³		
Histosol or Histel (A1) _____			Alaska Gleyed (A13) _____			Alaska Color Change (TA4) ⁴ <u>X</u> ?		
Histic Epipedon (A2) _____			Alaska Redox (A14) X <u>X</u> * r.w			Alaska Alpine Swales (TA5) _____		
Black Histic (A3) _____			Alaska Gleyed Pores (A15) _____			Alaska Redox with 2.5Y Hue _____		
Hydrogen Sulfide (A4) _____						Alaska Gleyed without 5Y Hue or Redder Underlying Layer		
Thick Dark Surface (A12) _____						Other (Explain in Notes)		
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 Notes.								
Restrictive Layer (if present): Type: _____ Depth (inches): _____								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: Soil was rechecked on 6/25/14 by J. Christopher, see W60-3 logbook page 8. 0-2 organics 2-10 10YR 5/3 90%, Redox 7.5 YR 4/6 100% PL 10-20 5Y 4/1 85%, Redox 10YR 4/6 15% PL - meets AK Redox indicator								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)					SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>X</u>		Surface Soil Cracks (B6) _____		Water-stained Leaves (B9) _____		Stunted or Stressed Plants (D1) _____		
High Water Table (A2) <u>X</u>		Inundation Visible on Aerial Imagery (B7) _____		Drainage Patterns (B10) _____		Geomorphic Position (D2) _____		
Saturation (A3) <u>X</u>		Sparsely Vegetated Concave Surface (B8) _____		Oxidized Rhizospheres along Living Roots (C3) _____		Shallow Aquitard (D3) _____		
Water Marks (B1) _____		Marl Deposits (B15) _____		Presence of Reduced Iron (C4) _____		Microtopographic Relief (D4) _____		
Sediment Deposits (B2) _____		Hydrogen Sulfide Odor (C1) _____		Salt Deposits (C5) _____		FAC-Neutral Test (D5) _____		
Drift Deposits (B3) _____		Dry-Season Water Table (C2) _____		Notes: _____				
Algal Mat or Crust (B4) _____		Other (Explain in Notes): _____						
Iron Deposits (B5) _____								
Surface Water Present (Y/N): <u>Y</u>		Depth (in): <u>0</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>12</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>5</u>						
Notes: _____								

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>9</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>85</u> Short herb (<1m) <u>41</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) <u>X</u> Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>N/A</u>		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.59</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

[Signature]

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT013

Field Target: 146

Date: 06-14-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X Zoe Meade

Signature / Date

6/14/14

X Don LaPlant

Field Crew Chief (print)

X Don LaPlant

Signature / Date

6/14/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 2000' corridor			
Survey Type: Centerline	Access Road (explain)	Other (explain) <u>X</u>	Field Target: <u>147</u>
Date: <u>06-11-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Map #: <u>102</u> Map Date: <u>5/27/14</u>
Investigators: <u>Dan LaPlant, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>118</u>	
Latitude: <u>62° 21' 42.015"</u>	Longitude: <u>150° 15' 28.701"</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>002</u>	Logbook Page No.: <u>012</u>	Picture No.: <u>P-S, SW, pit. plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hillslope</u>
Slope (%): <u>5-10</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEM1B</u>	Soil Map Unit Name: <u></u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No <u></u> (If no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No <u></u> (If no, explain in Notes.)
Are Vegetation <u></u> , Soil <u></u> , or Hydrology <u></u> Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation <u></u> , Soil <u></u> , or Hydrology <u></u> Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No <u></u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u></u>
Hydric Soil Present? Yes <u>X</u> No <u></u>	Wetland Type: <u>PEM1B/PUBF</u>
Wetland Hydrology Present? Yes <u>X</u> No <u></u>	Alaska Vegetation Classification (Viereck): <u>IIIA2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Several large boulders in the Pond/islands

upland ICI

400'

Parker Highway

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.				
2.				
3.				
4.				
Total Cover: <u>0</u>				
50% of total cover: <u>0</u>		20% of total cover: <u>0</u>		
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>0</u>				
50% of total cover: <u>0</u>		20% of total cover: <u>0</u>		

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 8 X 1 = 8
 FACW species: 0 X 2 = 0
 FAC species: 165 X 3 = 495
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 173 (A) 503 (B)
 PI = B/A = 2.91

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Carex aquatilis</u>	<u>8</u>		<u>OBL</u>
2.	<u>Equisetum arvense</u>	<u>80</u>	<u>Y</u>	<u>FAC</u>
3.	<u>Calamagrostis Can.</u>	<u>85</u>	<u>Y</u>	<u>FAC</u>
4.	<u>Viola palustris</u>	<u>T</u>		<u>FACW</u>
5.				
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>173</u>				
50% of total cover: <u>86.5</u>		20% of total cover: <u>34.6</u>		

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

_____ % Bare Ground
0 % Cover of Wetland Bryophytes
0 % Total Cover of Bryophytes
 _____ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-11-14</u> Feature ID <u>W60T1044 W60HT014</u> <small>vw</small> Soil Pit Required (Y/N) <u>Y</u>						
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	—	—	—	—	—	—	—	organics
2-8	10YR 3/1	—	—	—	—	—	Silt loam	
8-22	10YR 5/3	60	10YR 5/8	30	C	M	clay loam	

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) <u>X</u> <u>3</u> <u>+</u>
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Redox with 2.5Y Hue _____
Thick Dark Surface (A12) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: * Soil reflected on 7/8/14 by J. Christopher. See logbook W60-3. confirmed Alaska Redox

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) <u>X</u>	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>12</u>	

Notes: Pit dug on 5-10% gradient above depression pond. See site sketch.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>85</u> Short herb (<1m) <u>0</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <input checked="" type="checkbox"/> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) <input checked="" type="checkbox"/> Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few <input checked="" type="checkbox"/> Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey <input checked="" type="checkbox"/>	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>5.45</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <input checked="" type="checkbox"/>	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <input checked="" type="checkbox"/> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W60T1041~~ ^{W60HT014}

Field Target: 147

Date: 6/11/2014

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

Zoe Meade 6/11/14

X Dan Lalor

Field Crew Chief (print)

X

Signature / Date

Dan Lalor 6/11/14

soils recheck

WETLAND DETERMINATION DATA FORM

Soils check FT 147

SOIL		Date <u>7/8/14</u> Feature ID _____		Soil Pit Required (Y/N) <u>Y</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features			Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
0-1							Fibric	organics; dry
1-8	10YR 4/1						Silt loam	
8-12	10YR 5/1						Silt loam	
12-20	5Y 5/1	90	10YR 4/6	10	C	PL	silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) <u>X</u>	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) <u>X</u>	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): _____	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): _____	Depth (in): _____	
Saturation Present (Y/N): (includes capillary fringe)	Depth (in): _____	

Notes: * area appears to be type of vernal pool

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 091	Map #: 63 Map Date: 5/27/14
Date: 06-24-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT015
Investigators: Joe Christopher, Valerie Watkins, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 167.4	
Latitude: 62°56'05.42"		Longitude: 149°41'14.17"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 001	Picture No.: PE, PW, Pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 0-3	Local relief (concave, convex, none): CONCAVE
Pre-mapped Alaska LNG/NWI classification: PSS1B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (If no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation <input checked="" type="checkbox"/> , Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation <input checked="" type="checkbox"/> , Soil <input checked="" type="checkbox"/> , or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PSS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): II B2, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

2.5-4 Hrs w/ R. box.

- Site sketch in Logbook

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Picea glauca</u>	<u>1</u>		<u>FACU</u>
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Betula nana</u>	<u>70</u>	<u>Y</u>	<u>FAC</u>
2. <u>Salix fuscescens</u>	<u>5</u>		<u>FAC</u>
3. <u>Spiraea stewartii</u>	<u>4</u>		<u>FACU</u>
4. <u>Empetrum nigrum</u>	<u>1</u>		<u>FAC</u>
5. <u>Picea glauca</u>	<u>2</u>		<u>FACU</u>
6. <u>Vaccinium uliginosum</u>	<u>35</u>	<u>Y</u>	<u>FAC</u>
7. <u>Salix pulchra</u>	<u>5</u>		<u>FACW</u>
8. <u>Betula neoalaskana</u>	<u>2</u>		<u>FACU</u>
9. <u>Salix barclayi</u>	<u>2</u>		<u>FAC</u>
Total Cover: <u>127</u> 50% of total cover: <u>63.5</u> 20% of total cover: <u>25.4</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 13 X 2 = 26

FAC species: 123 X 3 = 369

FACU species: 10 X 4 = 40

UPL species: 0 X 5 = 0

Column Totals: 146 (A) 435 (B)

PI = B/A = 2.98

Picea glauca tree added to shrubs.

Burnet

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Chamerion angustifolium</u>	<u>1</u>		<u>FACU</u>
2. <u>Calamagrostis canadensis</u>	<u>7</u>	<u>Y</u>	<u>FAC</u>
3. <u>Equisetum Arvense</u>	<u>3</u>		<u>FAC</u>
4. <u>Trientalis europaea</u>	<u>T</u>		<u>FACU</u>
5. <u>Sanguisorba canadensis</u>	<u>7</u>	<u>Y</u>	<u>FACW</u>
6. <u>Rubus chamaemorus</u>	<u>1</u>		<u>FACW</u>
7. <u>Vaccinium uliginosum</u>			<u>FAC</u>
8. <u>Equisetum sylvaticum</u>	<u>T</u>		<u>FAC</u>
9. <u>Rubus arcticus</u>	<u>T</u>		<u>FAC</u>
10.			
Total Cover: <u>19</u> 50% of total cover: <u>9.5</u> 20% of total cover: <u>3.8</u>			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-24-14</u> Feature ID <u>W60HT015</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	—	—	—	—	—	—	Fibric	organics
6-8	10 YR 2/1	90					Silt loam	10% cobbles & gravels
8-18	2.5 Y 2/1	85	10 YR 4/4	15	C	PL	Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue <u>X</u>
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes: Saturated @ 5"
Have Primary Hydric & Hyd. Veg.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) <u>X</u>	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>6</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>5</u>	

Notes: Localized Standing H₂O In Low Pockets to East.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>1</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) <u>7</u> Short shrub (0.5-2m) <u>107</u> Dwarf shrub (<0.5m) <u>6</u> Tall herb (≥1m) <u>12</u> Short herb (<1m) <u>19</u> Moss-Lichen <u>90</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet <u>X</u> Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>6.1</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check: [Signature]

GPS Technician QA/QC check: _____

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6HT015

Field Target: 91

Date: 6/24/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Joe Christoph

Wetland Scientist (print)

X 6/24/14

Signature / Date

X Zoe Meade

Field Crew Chief (print)

X 6/24/14

Signature / Date

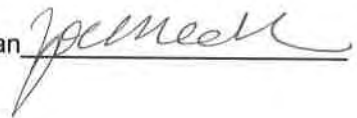
Vegetation Classification Data Form

Site Description		
Date: 06-24-14	Project Name & #: Alaska LNG 26221306	Field Target: HT091
Investigators: Joe Christopher, Zoe Meade, Valerie Watkins		Feature ID: W60HT016
Latitude: 02° 56' 04.24"	Longitude: 149° 41' 13.92"	Datum: WGS84
Logbook #: 003	Logbook Page #: 002	Picture #: P-N ₂ -5
Location Description:		
South of W60HT015		
Common Species Observed (Scientific Name)		
Betula nana	Vaccinium vitis-idaea	
Picea	Empetrum nigrum	
Rhododendron tomentosum		
Geocaulon lividum		
Percent Cover of Dominant Structure Level: 30%		
Habitat Description:		
Spruce birch forest		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2	II C2	
Notes:		
Upland knoll Adj to FT91		

Field Crew Chief:



Field Scientist/Technician



Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters (10 ft) tall may be present and abundant)		7
I Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I A.1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I A.2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I A.3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	I B.1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I B.2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I B.3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	I C.1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	I C.2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I C.3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters (10 ft) tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II A.3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11a. Shrub canopy cover greater than 75 percent	II B.1 Closed tall scrub	
11b. Shrub canopy cover of 25-74 percent	II B.2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II C Low scrub	13
12b. Shrubs under 20 centimeters in height	II D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II C.1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C.2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II D.1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II D.2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II D.2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eriophorum</i> spp.; tussocks often present	III A.2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III A.3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III B.1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B.3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C.2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D.1 Freshwater aquatic herbaceous	
21b. Vegetation submerged or floating in brackish water	III D.2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D.3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: 091

Field Target: W60HT016

Date: 06-24-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X Zoe Meade

Signature

X [Signature]

Field Crew Chief (print)

X 1/1 Zoe Christopher

Signature

Vegetation Classification Data Form

Site Description		
Date:	Project Name & #: Alaska LNG 26221306	Field Target: HT120 120
Investigators: Joe Christopher, Valerie Watkins, ZM		Feature ID: W60HT017
Latitude: 62° 32' 04.71"	Longitude: 150° 14' 11.73"	Datum: WGS84
Logbook #: 003	Logbook Page #: 003	Picture #: P-W-E-E
Location Description:		
FT120 West of Parks Hwy		
Common Species Observed (Scientific Name)		
Alnus ssp.	Oplopanax horridus	
Veratrum viride	Ribes triste	
Mertensia paniculata	Gymnocarpium dryopteris	
Athyrium cyclosorum	Streptopus amplexifolius	
Percent Cover of Dominant Structure Level: 70%		
Habitat Description:		
Tall birch, alder thicket with devils club		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC 2	II B 2	
Notes:		
Tall Birch w/ Alnus, Fern, D. club understory. Depression 12m to west.		

Field Crew Chief:

Field Scientist/Technician:

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters (10 ft) tall may be present and abundant)		7
I. Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	IA Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	IA 1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	IA 2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	IA 3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	IB Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	IB 1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	IB 2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	IB 3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	IC 1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	IC 2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	IC 3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters (10 ft) tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub

8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II A 3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11a. Shrub canopy cover greater than 75 percent	II B 1 Closed tall scrub	
11b. Shrub canopy cover of 25-74 percent	II B 2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II C Low scrub	13
12b. Shrubs under 20 centimeters in height	II D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II C 1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C 2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II D 1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II D 2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II D 2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A 1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eniophorum</i> spp.; tussocks often present	III A 2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses, includes wet tundra, bogs, marshes, and fens	III A.3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained, mostly tundra sites	III B 1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B 3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C 2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D.1 Freshwater aquatic herbaceous	
21b. Vegetation submerged or floating in brackish water	III D 2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D.3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60HT17

Field Target: 120

Date: 6/24/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X

Signature

X Joe Christopher

Field Crew Chief (print)

X

Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				corridor 300'	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Date: 06-24-14		Project Name & No.: Alaska LNG 26221306		Field Target: J21	
				Map #: 85 Map Date: 5/27/14	
Investigators: Valerie Watkins, Joe Christensen, Zoe Meade		Feature Id: W60HT018		Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 647.8	
Latitude: 62° 32' 03.32"		Longitude: 150° 14' 10.84"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 4		Picture No.: P-N, S, pit plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hill slope
Slope (%): 40	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: NIA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC2, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

- Bare/open Areas in mapping appear to be from early season photo
I have not ground up yet.

See page 3 for Diagram

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Betula neoalaskana</i>	75	Y	FACU	No. of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>50</u> (A/B)
2. <i>Picea glauca</i>	1		FACU	
3.				
4.				
Total Cover: <u>76</u> 50% of total cover: <u>38</u> 20% of total cover: <u>15.2</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>0</u> X 2 = <u>0</u> FAC species: <u>65</u> X 3 = <u>195</u> FACU species: <u>124</u> X 4 = <u>496</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>189</u> (A) <u>691</u> (B) PI = B/A = <u>3.67</u>
Sapling/Shrub Stratum (<u>26'</u>)				
	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Vaccinium uliginosum</i>	15	Y	FAC	
2. <i>Opiopanax horridus</i>	15	Y	FACU	
3. <i>Alnus</i> ssp.	25	Y	FAC	
4. <i>Picea glauca</i>	1		FACU	
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>56</u> 50% of total cover: <u>28</u> 20% of total cover: <u>11.2</u>				

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Streptopus amplexifolius</i>	10		FACU	<input type="checkbox"/> Dominance Test is > 50% <input type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <i>Dryopteris expansa</i>	15	Y	FACU	
3. <i>Gymnocarpium dryopteris</i>	5		FACU	
4. <i>Athyrium cyclosorum</i>	15	Y	FAC	
5. <i>Calamagrostis canadensis</i>	10		FAC	<u>0</u> % Bare Ground <u>0</u> % Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>0</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
6. <i>Equisetum sylvaticum</i>	1		FACU	
7. <i>Cornus canadensis</i>	1		FACU	
8.				
9.				
10.				
Total Cover: <u>57</u> 50% of total cover: <u>28.5</u> 20% of total cover: <u>11.4</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-24-14</u> Feature ID <u>WG0HT018</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4							Fibric	dry organics
4-19	10 YR 4/3	100					Silt loam	
19-21	2.5 Y 5/1	100					SANDY silt	small gravels

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: Fine sand & Gravels @ 20"
- NO hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u>N/A</u>	
Notes: _____		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		
SOIL VARIABLES		
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____		
HYDROLOGIC VARIABLES		
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____		
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____		
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____		
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____		
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____		
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____		
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____		
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____		
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____		
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____		
LANDSCAPE VARIABLES (M)		
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____		
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____		
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____		
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____		

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT018

Field Target: 121

Date: 06-24-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *ZoMeade* 06-24-14

Signature / Date

X Joe Christensen

Field Crew Chief (print)

X *[Signature]* 8/24/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				300' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 122		Map #: 85 Map Date: 5/27/14			
Date: 06-24-14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT019	
Investigators: Joe Christopher, Valerie Watkins, Zoe Meade				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 647.8	
Latitude: 62° 32' 03.52"		Longitude: 150° 14' 06.47"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 005		Picture No.: R-W60HT019-N-S-SURFACE	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): flat
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: 1A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)	
Are Vegetation, Soil, or Hydrology Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation, Soil, or Hydrology Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PEMIF
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): IIIA 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See PAGE 3 for DIAGRAM

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
<u>Sapling/Shrub Stratum</u> (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Atrius ssp.</u>			<u>FAC</u>
2. <u>Salix pulchra</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>20</u> 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 7 X 1 = 7
 FACW species: 20 X 2 = 40
 FAC species: 95 X 3 = 285
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 122 (A) 332 (B)
 PI = B/A = 2.72

*Salix up on mounds
all other vegetation @ plot
site lower in marshy waters*

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Comarum palustre</u>	<u>5</u>		<u>OBL</u>
2. <u>Equisetum arvense</u>	<u>20</u>		<u>FAC</u>
3. <u>Carex utriculata</u>	<u>2</u>		<u>OBL</u>
4. <u>Calamagrostis canadensis</u>	<u>75</u>	<u>Y</u>	<u>FAC</u>
5. <u>Viola palustris</u>	<u>7</u>		<u>FACW</u>
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>102</u> 50% of total cover: <u>51</u> 20% of total cover: <u>20.4</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
— % Cover of Wetland Bryophytes
10 Total Cover of Bryophytes
5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

[illegible]

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____	_____		
Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2 - 3</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0</u>		
Notes: <u>Toe of slope, next to Parks Hwy</u>			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>10</u> Moss-Lichen <u>10</u> Floating _____ Submerged _____		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>X</u> N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____ <i>Assumed</i>	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.93</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected <u>X</u> Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT019

Field Target: 122

Date: 06-24-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete? - no pit dug due to inundation
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 06-24-14

Signature / Date

X *Suzanne Christopher*

Field Crew Chief (print)

X *[Signature]* 6/24/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				300' study	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	Field Target: 125
Map #: 86		Map Date: 5/27/14			
Date: 06-25-14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60HT020	
Investigators: Joe Christopher, Zoe Meade					Team No.: W60
State: Alaska		Region: Alaska		Milepost: 130	
Latitude: 62° 31' 41.97"			Longitude: 150° 14' 16.16"		Datum: WGS84
Logbook No.: 003		Logbook Page No.: 005		Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion:	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): interior 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1C	Soil Map Unit Name: UA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (If no, explain in Notes.)	
Are Vegetation, Soil, or Hydrology Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation, Soil, or Hydrology Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC1 IB2, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

field sketch on page 005 of logbook 003

the field target Viereck Code of IB2, IIIA2 is correct
and the polygon Viereck Code of IC2, IB2 is also
correct. The polygon represents a much larger area than
the field target site.

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Saxex bebbiana</i>	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>10</u>			
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 103 X 3 = 489

FACU species: 0 X 4 = 0

UPL species: 0 X 5 = 0

Column Totals: _____ (A) _____ (B)

PI = B/A = 3.0

Dom of all FAC veg.

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	90	Y	FAC
2. <i>Equisetum sylvaticum</i>	3		FAC
3. <i>Equisetum arvense</i>	60	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>153</u>			
50% of total cover: <u>16.5</u> 20% of total cover: <u>30.6</u>			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>5/6/24/14</u> Feature ID <u>W60H7020</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
1-4							Fibric	organics
4-8	10YR 3/3						Silt loam	
8-20	10YR 5/3						Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: No hydric soils observed. Bright high chroma soils, no Redox.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): _____	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): _____	

Notes: Depressional Area within tall mixed forest.
- Holds snow pack for extended duration.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		
SOIL VARIABLES		
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____		
HYDROLOGIC VARIABLES		
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____		
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____		
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____		
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____		
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____		
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____		
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____		
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____		
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____		
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____		
LANDSCAPE VARIABLES (M)		
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____		
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____		
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____		
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____		

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60 HT 020

Field Target: 125

Date: 06-25-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? Not wetland

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 06-25-14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X *Joe Christopher* 6/25/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 126	Map #: 86 Map Date: 5/27/14
Date: 06-25-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT021
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 130	
Latitude: 62° 31' 39.96" N	Longitude: 150° 14' 19.14" W	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 006	Picture No.: P_N, S, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1F	Soil Map Unit Name: NA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: UPL
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC1 , IC2, IIA

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 006 of Logbook Ser DINGMAN

See note on F# 125 data form —
same issue.

off

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Betula nealaskana</i>	3	X	FACU	No. of Dominant Species that are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>50%</u> (A/B)
2. <i>Picea glauca</i>	3	X	FACU	
3.				
4.				
Total Cover: <u>6</u> 50% of total cover: <u>3</u> 20% of total cover: <u>1.2</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>2</u> X 2 = <u>2</u> FAC species: <u>88</u> X 3 = <u>264</u> FACU species: <u>19</u> X 4 = <u>76</u> UPL species: <u>1</u> X 5 = <u>5</u> Column Totals: <u>108</u> (A) <u>347</u> (B) PI = B/A = <u>3.21</u>
Sapling/Shrub Stratum (<u>26'</u>)				
	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Salix bebbiana</i>	20	✓	FAC	
2. <i>Rosa acicularis</i>	3		FACU	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>23</u> 50% of total cover: <u>11.5</u> 20% of total cover: <u>4.6</u>				

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Veratrum viride</i>	10		FAC	_____ Dominance Test is > 50% _____ Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <i>Streptopus amplexifolius</i>	3		FACU	
3. <i>Calamagrostis canadensis</i>	90	✓	FAC	
4. <i>Equisetum arvense</i>	5		FAC	
5. <i>Sanguisorba canadensis</i>	1		FACW	
6. <i>Fragaria virginiana</i>	1		UPL	
7. <i>Dryopteris expansa</i>	4		FACU	
8. <i>Geranium erianthum</i>	2		FACU	
9. <i>Equisetum sylvaticum</i>	3		FAC	
10. <i>Thalictrum sparsiflorum</i>	1		FACU	
Total Cover: <u>120</u> 50% of total cover: <u>60</u> 20% of total cover: <u>24</u>				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>✓</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>062614</u> Feature ID <u>W60HT021</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4							Fibric	organics
4-6		40					Fibric	organics
	10 YR 4/3	60					Silt loam	
6-20	10 YR 5/4	100					Silt loam	few large rocks

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: NO Hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): _____	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): _____	Depth (in): _____	
Saturation Present (Y/N): (includes capillary fringe)	Depth (in): _____	

Notes: NO Hydrology observed. LOW AREA HILLS SHOWN

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (R): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6 01T021

Field Target: 126

Date: 06-25-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? upland

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Moade

Wetland Scientist (print)

X

Signature / Date

Zoe Moade 06-25-14

X

Field Crew Chief (print)

X

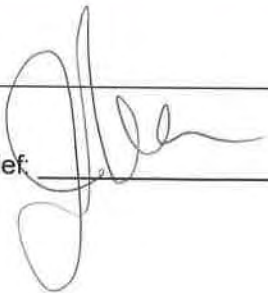
Signature / Date

Joe Christopher 6/25/14

Vegetation Classification Data Form

Site Description		
Date: 06-25-14	Project Name & #: Alaska LNG 26221306	Field Target: 127
Investigators: Joe Christopher, Zoe Meade		Feature ID: W60HT022
Latitude: 62° 31' 22.46"	Longitude: 160° 14' 25.84"	Datum: WGS84
Logbook #: 003	Logbook Page #: 007	Picture #: P-N.S
Location Description:		
Approx. MP 129.5, west of Highway		
Common Species Observed (Scientific Name)		
Equisetum arvense	Picea glauca	
Calamagrostis canadensis	Betula nealaskana	
Salix bebbiana		
Percent Cover of Dominant Structure Level: 60% forested 40% tall shrub		
Habitat Description:		
upland mixed forest		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC 2	HB 1 HB 2	
Notes:		

Field Crew Chief:



Field Scientist/Technician:



Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters (10 ft) tall may be present and abundant)		7
I. Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover.	I.C.1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover.	I.C.2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters (10 ft) tall)		
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11a. Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub	
11b. Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub	13
12b. Shrubs under 20 centimeters in height	II.D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II.D.2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eriophorum</i> spp.; tussocks often present	III A.2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III A.3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III B.1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B.3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C.2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous	
21b. Vegetation submerged or floating in brackish water	III D.2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60 HT 022 Field Target: 127

Date: 06-25-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X [Signature]

Signature

X [Signature]

Field Crew Chief (print)

X Ive Christopher

Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION <i>300ft study</i>			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <i>128</i>	Map #: <i>88</i> Map Date: <i>5/27/14</i>
Date: <i>06-25-</i>	Project Name & No.: <i>Alaska LNG 26221306</i>		Feature Id: <i>W60HT023</i>
Investigators: <i>Joe Christopher, Zoe Meade</i>			Team No.: <i>W60</i>
State: <i>Alaska</i>	Region: <i>Alaska</i>	Milepost: <i>129</i>	
Latitude: <i>62.5153</i>	Longitude: <i>-150.2521</i>		Datum: <i>WGS84</i>
Logbook No.: <i>003</i>	Logbook Page No.: <i>006</i>	Picture No.: <i>P-N, S, pit plug</i>	

SITE PARAMETERS	
Subregion: <i>Interior</i>	Landform (hillslope, terrace, hummocks, etc.): <i>hummocks</i>
Slope (%): <i>3-5</i>	Local relief (concave, convex, none): <i>convex</i>
Pre-mapped Alaska LNG/NWI classification: <i>upland</i>	Soil Map Unit Name: <i>2A</i>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <i>IC2, IIC2 upland</i>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <i>upland</i>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Diagram
Page 6

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Tree Stratum (Plot sizes: <u>26'</u>)						
1.	<i>Betula neoalaskana</i>		5	X	FACU	
2.	<i>Picea glauca</i>		15	X	FACU	
3.						
4.						
Total Cover: <u>20</u>						
50% of total cover: <u>10</u>			20% of total cover: <u>4</u>			
Sapling/Shrub Stratum (<u>26'</u>)			Indicator Status	Dominant Species? (Y/N)	Absolute % Cover	
1.	<i>Betula neoalaskana</i>		25	X	FACU	
2.	<i>Vaccinium uliginosum</i>		15	X	FAC	
3.	<i>Rosa acicularis</i>		8		FACU	
4.	<i>Spiraea stevenii</i>		1		FACU	
5.	<i>Ribes triste</i>		10		FAC	
6.						
7.						
8.						
9.						
Total Cover: <u>59</u>						
50% of total cover: <u>29.5</u>			20% of total cover: <u>11.8</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 16.6 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 30 X 3 = 90

FACU species: 73 X 4 = 292

UPL species: 0 X 5 = 0

Column Totals: 163 (A) 382 (B)

PI = B/A = 3.70

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Herb Stratum (<u>26'</u>)						
1.	<i>Geranium erithrium</i>		1		FACU	
2.	<i>Veratrum viride</i>		4		FAC	
3.	<i>Cornus canadensis</i>		5		FACU	
4.	<i>Streptopus amplexifolius</i>		8	X	FACU	
5.	<i>Gymnocarpium dryopteris</i>		10	X	FACU	
6.	<i>Calamagrostis Canadensis</i>		1		FAC	
7.						
8.						
9.						
10.						
Total Cover: <u>29</u>						
50% of total cover: <u>14.5</u>			20% of total cover: <u>5.8</u>			

Hydrophytic Vegetation Indicators:

_____ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

1 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6-25-14</u> Feature ID <u>W60HT023</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3							Fibric	Organics Dry
3-5	2.5 Y 5/1						Ash	
5-14	10 YR 4/4						Silt loam	
14-16	10 YR 3/2						Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes:
Refusal at 16", large rocks present

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): _____	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): _____	

Notes:
Plot taken in Low point of Area

WETLAND DETERMINATION DATA FORM

upland

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60 HT 023

Field Target: 128

Date: 6-25-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? - *Upland*

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zo Meade* 6-25-14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X 6/25/14

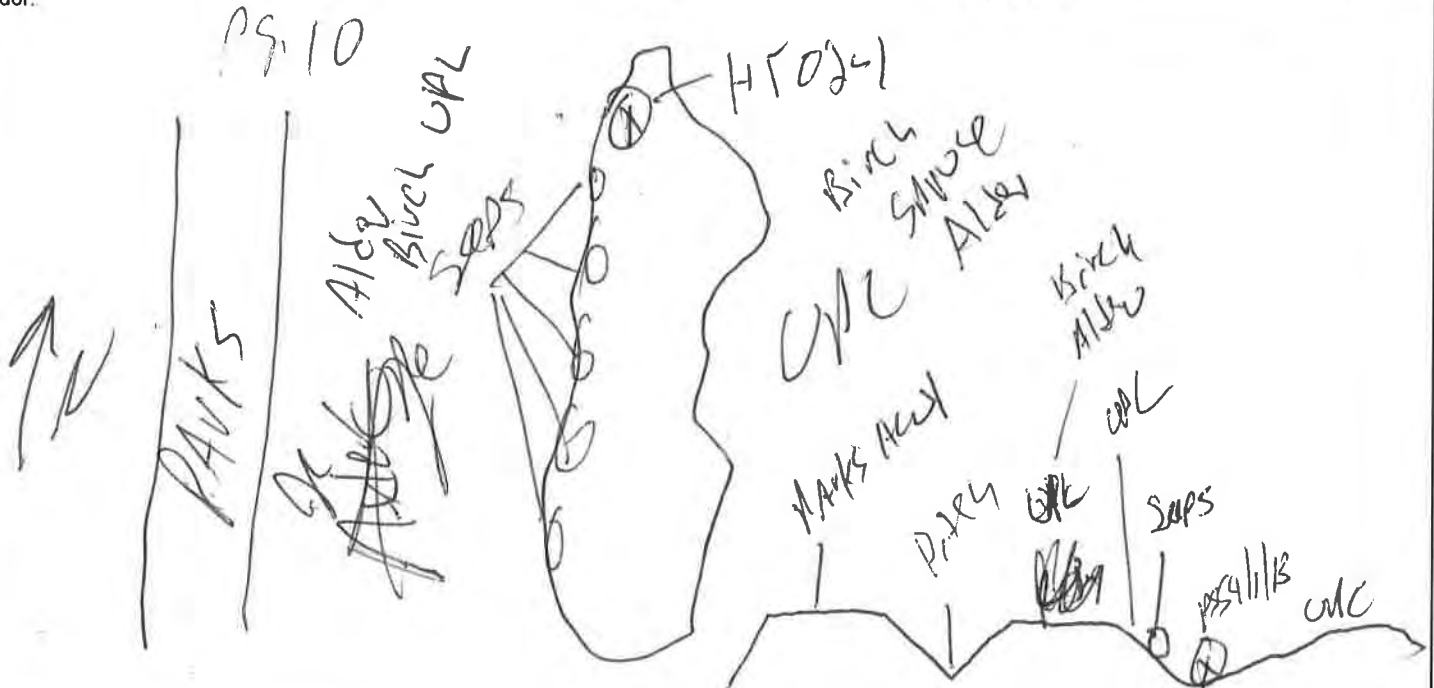
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				300 ft study			
Survey Type: Centerline		Access Road (explain)		Other (explain) <u>X</u>		Field Target: <u>104</u>	
Map #:		73		Map Date:		5/27/14	
Date: <u>06-26-14</u>		Project Name & No.: Alaska LNG 26221306			Feature Id: <u>W60HT024</u>		
Investigators: <u>Joe Christopher, Zoe Meade</u>					Team No.: <u>W60</u>		
State: Alaska		Region: Alaska		Milepost: <u>150.5</u>			
Latitude: <u>62° 46' 22"</u>			Longitude: <u>150° 02' 43.05"</u>			Datum: <u>WGS84</u>	
Logbook No.: <u>003</u>		Logbook Page No.: <u>010</u>		Picture No.: <u>P_N, S, pit, plug</u>			

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>depressional</u>
Slope (%): <u>0-2</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4/1B</u>	Soil Map Unit Name: <u>N/A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PSS4/1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Viereck): <u>IIA2, IIB2, IIC2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	No. of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A)	
1. <i>Picea mariana</i>	25	Y	FACW	Total Number of Dominant Species Across All Strata: <u>3</u> (B)	
2. <i>Conyza</i> tree & shrub				% Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)	
3. <i>Carex</i>					
4.					
Total Cover: _____				Prevalence Index worksheet:	
50% of total cover: _____ 20% of total cover: _____				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: <u>36</u> X 1 = <u>36</u>	
1. <i>Betula nana</i>	5		FAC	FACW species: <u>37</u> X 2 = <u>74</u>	
2. <i>Rhododendron tomentosum</i>	2		FACW	FAC species: <u>10</u> X 3 = <u>30</u>	
3. <i>Empetrum nigrum</i>	2		FAC	FACU species: <u>2</u> X 4 = <u>8</u>	
4. <i>Vaccinium oxycoccus</i>	1		OBL	UPL species: <u>0</u> X 5 = <u>0</u>	
5. <i>Vaccinium uliginosum</i>	2		FAC	Column Totals: <u>85</u> (A) <u>148</u> (B)	
6. <i>Vaccinium vitis-idaea</i>	1		FAC	PI = B/A = <u>1.74</u>	
7.					
8.					
9.					
Total Cover: <u>38</u>					
50% of total cover: <u>19</u> 20% of total cover: <u>7.6</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50%	
1. <i>Rubus chamaemorus</i>	10	Y	FACW	<input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0	
2. <i>Cornus canadensis</i>	2		FACU	_____ Morphological Adaptations ¹ (Provide supporting data in Notes)	
3. <i>Carex utriculata</i>	35	Y	OBL	_____ Problematic Hydrophytic Vegetation ¹ (Explain)	
4.				¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
5.					
6.					
7.					
8.					
9.					
10.					
Total Cover: <u>47</u>				<u>0</u> % Bare Ground <u>100</u> % Cover of Wetland Bryophytes <u>100</u> Total Cover of Bryophytes <u>1</u> % Cover of Water	
50% of total cover: <u>23.5</u> 20% of total cover: <u>9.4</u>				Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06/26/14</u> Feature ID <u>W60HT024</u>		Soil Pit Required (Y/N) <u>Y</u>			
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0-20							Fibric Organics Saturated

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: Thick sat Fibric Ouss.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>1.5</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>1</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: TOE IN DEPRESSION
- stressed/stunted Black spruce
Localized pockets of H₂O

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved <u>X</u> Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>25</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>7</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>47</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>3.90</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed <u>X</u> Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check: [Signature]

GPS Technician QA/QC check: [Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT024

Field Target: 104

Date: 06-26-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Zoe Meade

Signature / Date

6/26/14

X Joe Christopher

Field Crew Chief (print)

X

Joe Christopher

Signature / Date

6/26/14

WETLAND DETERMINATION DATA FORM

FID: W60HT025

SITE DESCRIPTION				2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 148		Map #: 103		Map Date: 5/27/14	
Date: 7/9/14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1051 W60HT025	
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 661.7	
Latitude: 62° 20' 41.49"		Longitude: 150° 15' 50.77"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 048-049		Picture No.: P. N.S. pit, plug	

SITE PARAMETERS	
Subregion: south central	Landform (hillslope, terrace, hummocks, etc.): depression
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS 4/1/EM1C	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PEM1 XC HT
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): IIIA3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See MS 49 for sketches

→ GPS data recorded in the HT spread.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>46</u> X 1 = <u>46</u> FACW species: <u>12</u> X 2 = <u>24</u> FAC species: <u>4</u> X 3 = <u>12</u> FACU species: <u>0</u> X 4 = <u>0</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>62</u> (A) <u>82</u> (B) PI = B/A = <u>1.3</u>
Sapling/Shrub Stratum (<u>26'</u>)				
	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Chamaedaphne calyculata</i>	<u>5</u>	<u>Y</u>	<u>FACW</u>	
2. <i>Picea mariana</i>	<u>2</u>		<u>FACW</u>	
3. <i>Andromeda polifolia</i>	<u>5</u>	<u>Y</u>	<u>FACW</u>	
4. <i>Betula nana</i>	<u>4</u>	<u>Y</u>	<u>FAC</u>	
5. <i>Vaccinium oxycoccus</i>	<u>1</u>		<u>OBL</u>	
6.				
7.				
8.				
9.				
Total Cover: <u>17</u> 50% of total cover: <u>8.5</u> 20% of total cover: <u>3.4</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Carex aquatilis</i>	<u>35</u>	<u>Y</u>	<u>OBL</u>	
2. <i>Carex microglochin</i>	<u>10</u>	<u>Y</u>	<u>OBL</u>	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>45</u> 50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ % Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
10.				

⑤

⑤

⑤

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>2</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>14</u> Dwarf shrub (<0.5m) <u>1</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>45</u> Moss-Lichen <u>90</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>3</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet <u>X</u> No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT025 (LUP)
W60HT051 Field Target: 148 Date: 7/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

Zoe Meade 7/9/14

X

Field Crew Chief (print)

X

Signature / Date

Joe Christoph

7/4/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 106	Map #: 75 Map Date: 5/27/14
Date: 06-26-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT026
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 149.7	
Latitude: 62° 45' 56.51"		Longitude: 150° 04' 07.56"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 13	Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: n/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IB-3 , IIB-1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 13

Site data correct,
but the greater polygon
is correct also.
CJG

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	80	Y	FACU
2. <i>Picea glauca</i>	8		FACU
3.			
4.			
Total Cover: <u>88</u>			
50% of total cover: <u>44</u> 20% of total cover: <u>17.6</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Sanguisorba canadensis</i>			FACW
2. <i>Ainus ssp.</i>	15	Y	FAC
3. <i>Picea glauca</i>	3		FACU
4. <i>Betula neoalaskana</i>	3		FACU
5. <i>Fraxinus ssp.</i>	T		UPL
6. <i>Sorbus scopulina</i>	T		FACU
7.			
8.			
9.			
Total Cover: <u>21</u>			
50% of total cover: <u>10.5</u> 20% of total cover: <u>4.2</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 19 X 3 = 57

FACU species: 132 X 4 = 528

UPL species: 0 X 5 = 0

Column Totals: 151 (A) 585 (B)

PI = B/A = 3.87

FRAXINUS NOT IN US LIST (Common AS4)

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	10	Y	FACU
2. <i>Chamerion angustifolium</i>	1		FACU
3. <i>Dryopteris expansa</i>	25	Y	FACU
4. <i>Equisetum sylvaticum</i>	1		FAC
5. <i>Calamagrostis can.</i>	3		FAC
6. <i>Cornus canadensis</i>	2		FACU
7.			
8.			
9.			
10.			
Total Cover: <u>42</u>			
50% of total cover: <u>21</u> 20% of total cover: <u>8.4</u>			

Hydrophytic Vegetation Indicators:

_____ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

1 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>06-26-14</u> Feature ID <u>W60 HT 020</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5							Fibric	organics, dry
5-7								Rock/cobble
7-9	10 YR 5/1	100						Ash
9-20	10 YR 3/3	100					Silt loam	Dry

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: no hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u> </u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u> </u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u> </u>	

Notes: No hydrology indicators present

WETLAND DETERMINATION DATA FORM

upland

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (>1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____ Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (>2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT026

Field Target: 106

Date: 06-26-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? Upland

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X Zoemede 06-26-14
Signature / Date

X Joe Christophe
Field Crew Chief (print)

X [Signature] 6/26/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 107	Map #: 75 Map Date: 5/27
Date: 6/26/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT027
Investigators: SC/ZM			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 149.7	
Latitude: 62° 45' 56.25"		Longitude: 150° 04' 09.80'	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 014	Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): TERRACE/DEPRESSION
Slope (%): 0-1	Local relief (concave, convex, none): CONCAVE
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B	Soil Map Unit Name: A/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): III A3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See Page 14.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	2		FACW
2.			
3.			
4.			
Total Cover: <u>2</u> 50% of total cover: <u>1</u> 20% of total cover: <u>0.4</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	3	Y	FACW
2. <i>Betula nana</i>	5	Y	FAC
3. <i>Empetrum nigrum</i>	10	Y	FAC
4. <i>Vaccinium uliginosum</i>	3		FAC
5. <i>Vaccinium oxycoccus</i>	2		OBL
6.			
7.			
8.			
9.			
Total Cover: <u>25</u> 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 45 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: 117 Multiply by: 1

OBL species: 117 X 1 = 117

FACW species: 13 X 2 = 26

FAC species: 18 X 3 = 54

FACU species: 3 X 4 = 12

UPL species: 6 X 5 = 30

Column Totals: 151 (A) 209 (B)

PI = B/A = 1.38

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	7		FACW
2. <i>Carex aquatilis</i>	15		OBL
3. <i>Pedicularis lobrydonica</i>	1		FACW
4. <i>Trichophorum caespitosum</i>	40	Y	OBL
5. <i>Cornus canadensis</i>	3		FACU
6. <i>Carex magellanica</i>	60	Y	OBL
7.			
8.			
9.			
10.			
Total Cover: <u>126</u> 50% of total cover: <u>63</u> 20% of total cover: <u>25.2</u>			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☒ Prevalence Index is ≤ 3.0

 Morphological Adaptations¹ (Provide supporting data in Notes)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

100 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

25 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/20/14</u>	Feature ID <u>HT026</u>	Soil Pit Required (Y/N) <u>Y</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-16							Firm?	Sand
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						INDICATORS FOR PROBLEMATIC HYDRIC SOILS³		
Histosol or Histel (A1) <u>X</u>			Alaska Gleyed (A13) _____			Alaska Color Change (TA4) ⁴ _____		
Histic Epipedon (A2) _____			Alaska Redox (A14) _____			Alaska Alpine Swales (TA5) _____		
Black Histic (A3) _____			Alaska Gleyed Pores (A15) _____			Alaska Redox with 2.5Y Hue _____		
Hydrogen Sulfide (A4) _____						Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____		
Thick Dark Surface (A12) _____						Other (Explain in Notes) _____		
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 Notes.								
Restrictive Layer (if present): Type: <u>ice</u> Depth (inches): <u>14</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>ice at 16"</u>								

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) <u>X</u>
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: <u>4-5" standing H₂O.</u>	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____	_____		
Surface Water Present (Y/N): <u>Y</u>		Depth (in): <u>4-5</u>	
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>0</u>	
Notes: _____			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0.2</u> Sapling (<5 dbh, <6m tall) <u>0.5</u> Tall shrub (2-6m) <u>3</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>20</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>120</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u> Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <input checked="" type="checkbox"/>		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <input checked="" type="checkbox"/> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover <input checked="" type="checkbox"/> 26-75% Scattered or Peripheral Cover <input checked="" type="checkbox"/> >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few <input checked="" type="checkbox"/> Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <input checked="" type="checkbox"/>	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <input checked="" type="checkbox"/> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>5.12</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <input checked="" type="checkbox"/> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60H097

Field Target: 107

Date: 4/26/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

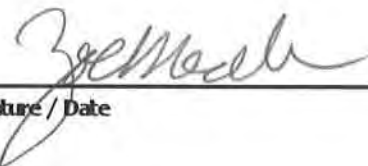
8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

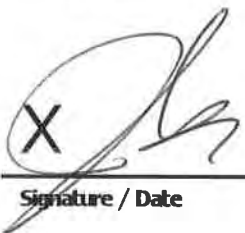
Wetland Scientist (print)

X  6/26/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X  6/26/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 092	Map #: 64 Map Date: 9/27/14
Date: 08-27-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT028
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 166.9	
Latitude: 62° 55' 45.28"	Longitude: 149° 41' 48.59"	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 15	Picture No.: PM, S, pit, plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 0-5%	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: LA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes _____ No <input checked="" type="checkbox"/> (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology <input checked="" type="checkbox"/> Naturally Problematic?	No _____ (If yes, explain in Notes.) * see notes

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: Upland
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/> * see notes	Alaska Vegetation Classification (Viereck): IC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

SU Pg. 15

* heavy rains with biased hydrology indicators
Flood Warnings for last 2 days.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	4	X	FACU
2. <i>Picea glauca</i>	15	X	FACU
3.			
4.			
Total Cover: <u>19</u> 50% of total cover: <u>9.5</u> 20% of total cover: <u>3.8</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum edule</i>	3		FACU
2. <i>Sorbus scopulina</i>	T		FACU
3. <i>Alnus ssp.</i>	5	X	FAC
4. <i>Vaccinium uliginosum</i>	3		FAC
5. <i>Salix barclayii</i>	5	X	FAC
6. <i>Picea glauca</i>	1		FACU
7.			
8.			
9.			
Total Cover: <u>16.7</u> <u>3.4</u> 50% of total cover: <u>8.5</u> 20% of total cover: <u>3.2</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: _____ X 2 = _____

FAC species: 53 X 3 = 159

FACU species: 71 X 4 = 284

UPL species: 124 X 5 = _____

Column Totals: 124 (A) 443 (B)

PI = B/A = 3.57

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Geranium erithrium</i>	2		FACU
2. <i>Chamerion angustifolium</i>	3		FACU
3. <i>Gymnocarpium dryopteris</i>	40	X	FACU
4. <i>Calamagrostis canadensis</i>	35	X	FAC
5. <i>Veratrum viride</i>	T		FAC
6. <i>Equisetum arvense</i>	1		FAC
7. <i>Rubus pedatus</i>	3		FAC
8. <i>Streptopus amplexifolius</i>	1		FAC
9. <i>Dryopteris expansa</i>	T		FACU
10. <i>Cornus canadensis</i>	3		FACU
Total Cover: <u>88</u> 50% of total cover: <u>44</u> 20% of total cover: <u>17.6</u>			

Hydrophytic Vegetation Indicators:

_____ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

_____ % Bare Ground

_____ % Cover of Wetland Bryophytes

5 % Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): ✓

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>062714</u> Feature ID <u>W60HT028</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)					
Depth (inches)	Matrix		Redox Features		Notes
	Color (moist)	%	Color (moist)	%	
0-1					Fibric organics; dry
1-3					large rock
3-17	10 YR 4/3	10			coarse sand - sandy loam, coarse
		90			gravel + coarse sand

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Color Change (TA4) ⁴ _____
Thick Dark Surface (A12) _____	Alaska Alpine Swales (TA5) _____
	Alaska Redox with 2.5Y Hue _____
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: Soils saturated due to heavy rains over past few days
- Flood warnings posted

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>N</u> *
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>3</u>	

Notes: * Water observed draining into pit, percolating downward into pit & water from heavy rains. Soils are well drained coarse sands/gravels

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____			
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____			
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____			
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____			
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____			
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____			
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____			
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____			
SOIL VARIABLES			
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____			
HYDROLOGIC VARIABLES			
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____			
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____			
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____			
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____			
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____			
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____			
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____			
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____			
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____			
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____			
LANDSCAPE VARIABLES (M)			
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____			
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____			
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____			
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____			

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT028

Field Target: W 092

Date: 06-27-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X Zmeade 6/27/14

Signature / Date

X Joe Christy

Field Crew Chief (print)

X [Signature] 6/27/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 093	Map #: 65 Map Date: 5/27
Date: 06-27-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT029
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 164	
Latitude: 62°53'53.95"		Longitude: 149°44'19.45"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 16	Picture No.: PLS, P/P	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): Plot 0-3 matrix 20-30%	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology <input checked="" type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See PAGE 16

Recent HEAVY RAINS + Flood warnings

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>2p</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	7	X	FACU
2. <i>Betula neoalaskana</i>	3	X	FACU
3.			
4.			
Total Cover: <u>15</u> 10 2			
50% of total cover: <u>7.5</u> 20% of total cover: <u>3.0</u>			
Sapling/Shrub Stratum ()	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	5	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>5</u>			
50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 40 (A/B) 50

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 8 X 2 = 16

FAC species: 92 X 3 = 276

FACU species: 27 X 4 = 108

UPL species: _____ X 5 = _____

Column Totals: 127 (A) 400 (B)

PI = B/A = 3.14

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis Canadensis</i>	80	X	FAC
2. <i>Vilatum viride</i>	1		FAC
3. <i>Chamerion angustifolium</i>	15		FACU
4. <i>Equisetum sylvaticum</i>	18		FAC
5. <i>Equisetum Arvense</i>	10		FAC
6. <i>Mertensia paniculata</i>	1		FACU
7. <i>Sanguisorba canadensis</i>	2		FACW
8. <i>Viola palustris</i>	1		FACW
9. <i>Streptopus amplexifolius</i>	1		FACU
10. <i>Rubus arcticus</i>	1		FAC
Total Cover: <u>130</u>			
50% of total cover: <u>65</u> 20% of total cover: <u>26</u>			

Hydrophytic Vegetation Indicators:

_____ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

1 % Cover of Wetland Bryophytes

3 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

062714

SOIL		Date	Feature ID	Soil Pit Required (Y/N)				
		06/17	W60HT029	Y				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5							Fibric	
5-9	10YR 4/3	98					Silt loam	
		2						sm. gravels
9-14	10YR 4/4	70					Sandy silt	
		30						medium gravels

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: Rocks Depth (inches): 14

Hydric Soil Present (Y/N): N

Notes: No hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u>—</u>	

Notes: No Hydrology Observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____
 Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____
 Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____
 Aquatic Bed _____

Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____
 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____

Number of Wetland Types (M): _____ Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____
 Very High Density (80-100%) _____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____
 >75% Scattered or Peripheral Cover _____ N/A _____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____

Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____
 Open _____ Small Scattered Patches _____ Continuous Cover _____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____
 Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____
 High (small groupings, diverse and interspersed) _____

HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____

SOIL VARIABLES

Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemlc _____ Histosol:Sapric _____
 Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____
 Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____
 Perennial Inlet/Perennial Outlet _____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____

Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____

Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____
 Return Interval >5 yrs _____

Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____

Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____
 Glacial Till/Not Permeable _____

Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____

Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____
 Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____

Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____

Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____

Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____

Crew Chief QA/QC check: _____

GPS Technician QA/QC check: _____

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W404T029

Field Target: 13

Date: 8/27/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☐ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X 

Signature / Date

X 

Field Crew Chief (print)

X Joe Christopher

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 300 ft study			
Survey Type: Centerline	Access Road (explain)	Other (explain) <u>X</u>	Field Target: <u>094</u> Map #: _____ Map Date: <u>5/27/14</u>
Date: <u>06-27-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT030</u>
Investigators: <u>Joe Christopher, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>161</u>	
Latitude: <u>62°52'43.05"</u>		Longitude: <u>149°49'32.25"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>017</u>	Picture No.: <u>P-N, S, ground</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): <u>PSS1/EM1B</u> <u>0-2%</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>✓</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PSS1/EM1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <u>IIc2, III A3</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

The sketch depicts a central wetland area labeled 'PSS1/EM1B' and 'PSS1/EM1B'. Surrounding this area are various vegetation types: 'Birch', 'spruce', 'Alder', 'DASE 17 U', 'DARKS', and 'Hill'. A north arrow points upwards, and a survey corridor is indicated by a line with arrows at both ends.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spirea alba</i>	10	X	FACW
2. <i>Saxifraga</i>		X	FAC
3. <i>Saxifraga</i>	15	X	FACW
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>25</u>			
50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 45 X 1 = 45

FACW species: 25 X 2 = 50

FAC species: 3 X 3 = 9

FACU species: _____ X 4 = _____

UPL species: _____ X 5 = _____

Column Totals: 73 (A) 104 (B)

PI = B/A = 1.42

Permissible inclusion
surrounding matrix is
more of permissible, standing
H₂O @ 4"

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex aquatilis</i>	15	X	OBL
2. <i>Comarum palustre</i>	25	X	OBL
3. <i>Calamagrostis canadensis</i>	3		FAC
4. <i>Equisetum fluviatile</i>	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>48</u>			
50% of total cover: <u>24</u> 20% of total cover: <u>9.6</u>			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

2 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

30 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL						Date062714 Feature ID W60HT030	Soil Pit Required (Y/N) N							
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)														
Depth (inches)	Matrix		Redox Features											
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes						
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						INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³								
Histosol or Histel (A1) X			Alaska Gleyed (A13) _____			Alaska Color Change (TA4) ⁴ _____								
Histic Epipedon (A2) _____			Alaska Redox (A14) _____			Alaska Alpine Swales (TA5) _____								
Black Histic (A3) _____			Alaska Gleyed Pores (A15) _____			Alaska Redox with 2.5Y Hue _____								
Hydrogen Sulfide (A4) _____						Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____								
Thick Dark Surface (A12) _____						Other (Explain in Notes)								
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 Notes.														
Restrictive Layer (if present): Type: _____ Depth (inches): _____														
Hydric Soil Present (Y/N): Y														
Notes: assume histosol - due to vegetation, presence of ground water - checked with shovel test → NO mineral HISTOSOL TO 10" (SHDL Dept)														
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)						SECONDARY INDICATORS (2 or more required)								
Surface Water (A1) X	Surface Soil Cracks (B6) _____		Water-stained Leaves (B9) _____		Stunted or Stressed Plants (D1) X									
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____		Drainage Patterns (B10) X		Geomorphic Position (D2) X									
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____		Oxidized Rhizospheres along Living Roots (C3) _____		Shallow Aquitard (D3) _____									
Water Marks (B1) _____	Marl Deposits (B15) _____		Presence of Reduced Iron (C4) _____		Microtopographic Relief (D4) X									
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____		Salt Deposits (C5) _____		FAC-Neutral Test (D5) V									
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____		Notes: Standing H2O IN AREAS, 4" IN SURROUNDING PERIMETER WHEN											
Algal Mat or Crust (B4) _____	Other (Explain in Notes):													
Iron Deposits (B5) _____														
Surface Water Present (Y/N): Y			Depth (in): 4		Wetland Hydrology Present (Y/N): Y									
Water Table Present (Y/N): Y			Depth (in): 0											
Saturation Present (Y/N): (includes capillary fringe) Y			Depth (in): 0											
Notes: 4" Standing H2O In perimeter														

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>25</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>48</u> Moss-Lichen <u>30</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) <u>X</u> Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <u>X</u> Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>(X -> in perimeter wetland)</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.78</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT030

Field Target: 94

Date: 6/22/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ ³ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)? *NO soil pit/plug due to standing water*
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade*

Signature / Date

X *Joe Christoph*

Field Crew Chief (print)

X *[Signature]* 4/27/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 095	Map #: 67 Map Date: 5/27/14
Date: 06-28-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT031
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 160	
Latitude: 62° 52' 04.83"		Longitude: 149° 51' 06.87"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 019	Picture No.: P-E, W. ground	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): flood plain
Slope (%): 0-1% (20400 20400)	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS1A	Soil Map Unit Name: NA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IB1, IIc2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Populus balsamifera</i>	40	X	FACU
2.			
3.			
4.			
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Saxex Aleveensis</i>	25	X	FAC
2. <i>Picea glauca</i>	TR		FACU
3. <i>Salix Karstii</i>	25	X	FAC
4. <i>Schf</i>			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: _____ X 2 = _____
 FAC species: 48 X 3 = 144
 FACU species: 72 X 4 = 288
 UPL species: _____ X 5 = _____
 Column Totals: 120 (A) 432 (B)
 PI = B/A = 3.60

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum Arvense</i>	20	X	FAC
2. <i>Spala 10</i>			
3. <i>Chamaerion angustifolium</i>	3.		FAC
4. <i>Arythrium cyclosorum</i>	2.		FAC
5. <i>Geranium erianthum</i>	3.		FACU
6. <i>Pyrola aserifolia</i>	25	X	FACU
7. <i>Streptopus amplexifolius</i>	1.		FACU
8. <i>Gallium triflorum</i>	1.		FAC
9. <i>Heracleum maximum</i>	TR		FACU
10. <i>Lupinus Arctivus</i>	TR		FACU
Total Cover: <u>45.55</u> 50% of total cover: <u>22.5</u> 20% of total cover: <u>9.0</u> <div style="text-align: center;"> 27.5 11 </div>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

☒ % Bare Ground
☐ % Cover of Wetland Bryophytes
☒ Total Cover of Bryophytes
☒ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>02-28-14</u> Feature ID <u>W60HT031</u>				Soil Pit Required (Y/N) <u>N</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0.5"							Fine	dry organic det
1.5 +	Red							Rock / coarse / gravel

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Redox with 2.5Y Hue _____
Thick Dark Surface (A12) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: Rock Depth (inches): .5"

Hydric Soil Present (Y/N): N

Notes:
 Actual Flood plain - rock, coarse under .5" dry orgs.
 2 days HAM prior.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N):	Depth (in):	Wetland Hydrology Present (Y/N): <u>X</u>
Water Table Present (Y/N):	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe)	Depth (in):	

Notes:
 No hydrology observed. Toe of slope in Flood plain.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT031

Field Target: 095

Date: 06-28-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete? *unable to dig due to impermeable soils*
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? *upland*

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

Zoe Meade

06-28-14

X

Field Crew Chief (print)

X

Signature / Date

Joe Christoph

[Signature] 6/28/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 97	Map #: 62 Map Date: 5/27/14
Date: 06-28-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT032
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 160	
Latitude: 62° 52' 04.47"	Longitude: 149° 51' 11.70"	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 20	Picture No.: P-E, W, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): TERNAL
Slope (%): 15-10% (South) 70 to 400% North	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: Upl	Soil Map Unit Name: M/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: UPL
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC2, IC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>65</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>33</u> (A/B) <u>40</u>
1. <i>Betula neolaskana</i>	25	X	FACU	
2. <i>Populus Balsamifera</i>	5	X	FACU	
3. <i>Picea glauca</i>	1		FACU	
4.				
Total Cover: <u>31</u> 50% of total cover: <u>15.5</u> 20% of total cover: <u>6.2</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species: <u>—</u> X 1 = _____ FACW species: _____ X 2 = _____ FAC species: <u>61</u> X 3 = <u>183</u> FACU species: <u>49</u> X 4 = <u>196</u> UPL species: <u>9</u> X 5 = <u>45</u> Column Totals: <u>119</u> (A) <u>424</u> (B) PI = B/A = <u>3.56</u>
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Empetrum nigrum</i>	35	X	FAC	
2. <i>Vaccinium-vitis idaea</i>	6		FAC	
3. <i>Betula nana</i>	3		FAC	
4. <i>Picea glauca</i>	4		FACU	
5. <i>Vaccinium uliginosum</i>	5		FAC	
6. <i>Sorbus scopulina</i>	3		FACU	
7. <i>Alnus ssp.</i>	12	X	FAC	
8. <i>Lycopodium complanatum</i>	9		UPL	
9.				
Total Cover: <u>77</u> 50% of total cover: <u>38.5</u> 20% of total cover: <u>15.4</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: _____ Dominance Test is > 50% _____ Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Cornus canadensis</i>	2	X	FACU	
2. <i>Lupinus arcticus</i>	3	X	FACU	
3. <i>Trientalis Europaea</i>	7		FACU	
4. <i>Geocaulon lividum</i>	2		FACU	
5. <i>Gymnocarpium dryopteris</i>	4	X	FACU	_____ % Bare Ground <u>NA</u> % Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>✓</u> Notes: (If observed, list morphological adaptations below):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/28/19</u> Feature ID <u>W60 HT032</u>				Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0-2							Episil
2-4		80					Rock/gravel
2-4	10-12 4/4	20					Sandy loam
							lower sand

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Color Change (TA4) ⁴ _____
Thick Dark Surface (A12) _____	Alaska Alpine Swales (TA5) _____
	Alaska Redox with 2.5Y Hue _____
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: 4 Depth (inches): Rock/gravel

Hydric Soil Present (Y/N): N

Notes: NO Hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: <u>NO Field Indicators of Hydrology</u>	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u> </u>	Wetland Hydrology Present (Y/N): <u>P</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u> </u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u> </u>	

Notes: NO Hydrology observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check: _____

GPS Technician QA/QC check: _____

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W604T032

Field Target: 97

Date: 6/28/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked? N/A no hyd soil

4. Hydrology

- ☒ Appropriate hydrology indicators are marked? none
- ☒ Surface water, water table, and saturation depths are recorded if present? none

5. Functions and Values N/A up

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 06/28/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X *[Signature]* 6/28/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				300' study	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 089		Map #: 61 Map Date: 6/26/14			
Date: 07-01-2014		Project Name & No.: Alaska LNG 26221306		Feature Id: W60 HT 033	
Investigators: Joe Christopher, Zoe Meade				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 606.3 (LNG)	
Latitude: 62° 58' 23.41"		Longitude: 149° 37' 53.20"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 241		Picture No.: P-N, -S, -P/P	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): CONCAVE
Pre-mapped Alaska LNG/NWI classification: PSS1/SS1B	Soil Map Unit Name: M/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (If no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): IIC2, IIIA3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Point collected @ edge of 300' corridor to stay off RR property
The data represents the wetland the Q will cross.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>66</u> X 1 = <u>66</u> FACW species: <u>13</u> X 2 = <u>26</u> FAC species: <u>24</u> X 3 = <u>72</u> <u>132</u> FACU species: _____ X 4 = _____ UPL species: _____ X 5 = _____ Column Totals: <u>133</u> (A) <u>164</u> (B) PI = B/A = <u>1.59</u> <u>1.82</u>
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dasifora fruticosa T In the plot - Emergent Late ¹ has more AGG ¹ coverage but the shrub Late appears to be the dominant layer in the habitat matrix
1. Picea Mariana	2		FACW	
2. Betula nana	5	X	FAC	
3. Rhododendron tomentosum	1		FACW	
4. Empetrum nigrum	4	X	FAC	
5. Saxe fuscenscens	T		FACW	
6. Vaccinium oxycoccus	5	X	OBL	
7. Spirea stevenii	T		FACW	
8. Saxe pulchra	1		FACW	
9. Andromeda polifolia	2		FACW	
Vaccinium ovalifolium	Total Cover: <u>20</u> <u>40</u> 50% of total cover: <u>10</u> <u>20</u> 20% of total cover: <u>4</u> <u>8</u>			
VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) <small>¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</small>
1. Carex vaginata	40	X	OBL	
2. Comarum palustre	1		OBL	
3. Equisetum arvense	10		FAC	
4. Viola	T		—	
5. Carex microglochin	20	X	OBL	
6. Calamagrostis canadensis	5		FAC	
7. Rubus arcticus	T		FAC	
8. Carex ssp.	T		—	
9. Sanguisorba canadensis	7		FACW	
10. Pedicularis ssp.	T		—	
Total Cover: <u>83</u> 50% of total cover: <u>41.5</u> 20% of total cover: <u>16.6</u>				_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>100</u> Total Cover of Bryophytes <u>1</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>07-01-14</u> Feature ID <u>W60HT033</u>				Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0-10						Fibric	organic
10-20						hemic	organic

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: Hydric soils observed, H2S smell

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) <u>X</u>	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) <u>X</u>	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>1</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: Localized surface water in pockets, H2S smell

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>200</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>2</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>10</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>83</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <u>X</u> Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <u>X</u> Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.13</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Pemeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT033

Field Target: 089

Date: 07-01-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 07-01-14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X *[Signature]* 7/1/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X</u>
Field Target: <u>090</u>		Map #: <u>62</u> Map Date: <u>4/26/14</u>	
Date: <u>07-01-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT034</u>
Investigators: <u>Joe Christopher, Zoe Meade</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>607.6 (LNG)</u>	
Latitude: <u>62° 57' 23.34"</u>	Longitude: <u>149° 39' 01.64"</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>003</u>	Logbook Page No.: <u>25</u>	Picture No.: <u>P-N.S. pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>interior</u>	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>Upland</u>	Soil Map Unit Name: <u>U1A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No (if no explain in Notes)	
Are "Normal Circumstances" present? Yes <u>X</u> No (if no, explain in Notes.)	
Are Vegetation, Soil, or Hydrology Significantly Disturbed? No <u>X</u> (If yes, explain in Notes)	
Are Vegetation, Soil, or Hydrology Naturally Problematic? No <u>X</u> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No	Is the Sampled Area within a Wetland? Yes <u>X</u> No
Hydric Soil Present? Yes <u>X</u> No	Wetland Type: <u>PSS1/Em1B</u>
Wetland Hydrology Present? Yes <u>X</u> No	Alaska Vegetation Classification (Vioreck): <u>II C2, III A2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i> glauca	3		FACW
2. <i>Betula nana</i>	70	Y	FAC
3. <i>Vaccinium uliginosum</i>	15		FAC
4. <i>Rhododendron tomentosum</i>	1		FACW
5. <i>Empetrum nigrum</i>	3		FAC
6. <i>Vaccinium oxycoccus</i>	2		OBL
7. <i>Andromeda polifolia</i>	1		FACW
8.			
9.			
Total Cover: <u>95</u>			
50% of total cover: <u>47.5</u> 20% of total cover: <u>19</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 2 X 1 = 2
 FACW species: 5 X 2 = 10
 FAC species: 110 X 3 = 330
 FACU species: 1 X 4 = 4
 UPL species: 0 X 5 = 0
 Column Totals: 118 (A) 346 (B)
 PI = B/A = 2.93

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	35		FACW
2. <i>Calamagrostis canadensis</i>	15	Y	FAC
3. <i>Equisetum arvense</i>	7	Y	FAC
4. <i>Trientalis europaea</i>	TR		FACU
5. <i>Pedicularis labradorica</i>	TR		FACW
6. <i>Cornus canadensis</i>	1		FACU
7. <i>Rubus arcticus</i>	TR		FACW
8. <i>Pinguicula villosa</i>	TR		OBL
9.			
10.			
Total Cover: <u>28</u>			
50% of total cover: <u>14</u> 20% of total cover: <u>5.6</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

_____ % Bare Ground
N/A % Cover of Wetland Bryophytes
100 Total Cover of Bryophytes
 _____ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7-1-14</u> Feature ID <u>W60HT034</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>Fibric</u>	<u>organics</u>

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) <u> </u>	Alaska Color Change (TA4) ⁴ <u> </u>
Histic Epipedon (A2) <u> </u>	Alaska Redox (A14) <u> </u>	Alaska Alpine Swales (TA5) <u> </u>
Black Histic (A3) <u> </u>	Alaska Gleyed Pores (A15) <u> </u>	Alaska Redox with 2.5Y Hue <u> </u>
Hydrogen Sulfide (A4) <u> </u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>
Thick Dark Surface (A12) <u> </u>		Other (Explain in Notes) <u> </u>

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

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

Hydric Soil Present (Y/N): Y

Notes: Hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____	_____		
Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>3</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>X</u>	Depth (in): <u>0</u>		
Notes:			

WETLAND DETERMINATION DATA FORM


VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <input checked="" type="checkbox"/> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <input type="checkbox"/> Sapling (<5 dbh, <6m tall) <input checked="" type="checkbox"/> Tall shrub (2-6m) <input type="checkbox"/> Short shrub (0.5-2m) <input type="checkbox"/> Dwarf shrub (<0.5m) <input checked="" type="checkbox"/> Tall herb (≥1m) <input type="checkbox"/> Short herb (<1m) <input checked="" type="checkbox"/> Moss-Lichen <input checked="" type="checkbox"/> Floating <input type="checkbox"/> Submerged <input type="checkbox"/>		
Number of Wetland Types (M): <input checked="" type="checkbox"/> Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <input checked="" type="checkbox"/>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____ Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <input checked="" type="checkbox"/> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent <input checked="" type="checkbox"/> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <input checked="" type="checkbox"/> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <input checked="" type="checkbox"/> N/A _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <input checked="" type="checkbox"/> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check: 

GPS Technician QA/QC check: 

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W90HT034

Field Target: 090

Date: 7-1-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 7-1-14

Signature / Date

X *Joe Christopher*

Field Crew Chief (print)

X *[Signature]* 7/1/14

Signature / Date

SITE DESCRIPTION

300' study

Picture No.: P-N, S, pit, plug

Alaska Vegetation Classification (Viereck): III A 3, II C 2

PN

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.				
2.				
3.				
4.				
Total Cover: <u>0</u>		50% of total cover: <u>0</u> 20% of total cover: <u>0</u>		
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Salix pulchra</i>	3	Y	FACW
2.	<i>Alnus ssp.</i>	1		FAC
3.	<i>Picea glauca</i>	TR		FACU
4.	<i>Spirea stevenii</i>	TR		FACU
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>4</u>		50% of total cover: <u>2</u> 20% of total cover: <u>0.8</u>		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 103 X 1 = 103

FACW species: 3 X 2 = 6

FAC species: 7 X 3 = 21

FACU species: 2 X 4 = 8

UPL species: 0 X 5 = 0

Column Totals: 115 (A) 138 (B)

PI = B/A = 1.2

Plot had Low Shrub Dominance but matrix of Area had Shrub Dominance
→ pem/ss

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Comarum palustre</i>	18		OBL
2.	<i>Equisetum fluviale</i>	15		OBL
3.	<i>Trientalis europaea</i>	1		FACU
4.	<i>Carex aquatilis</i>	70	Y	OBL
5.	<i>Mertensia paniculata</i>	TR		FACU
6.	<i>Calamagrostis canadensis</i>	5		FAC
7.	<i>Heracleum maximum</i>	1		FACU
8.	<i>Veratrum viride</i>	1		FAC
9.	<i>Chamerion angustifolium</i>	TR		FACU
10.				
Total Cover: <u>111</u>		50% of total cover: <u>55.5</u> 20% of total cover: <u>22.2</u>		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

N/A % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

standing water in adjacent beaver pond ≈ 100 ft.

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/1/14</u>		Feature ID <u>44041038</u>		Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 - 20							Fibric	SLg

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: none Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes: NO H₂S odor

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>adjacent pond 1 ft (+)</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>3</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: Depression

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) <u>1</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>111</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even <u>1</u>	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>N/A</u> <25% Scattered/Peripheral Cover <u>X</u> 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet <u>X</u> Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow <u>X</u> Unrestricted Outflow _____ <u>Beaver Agm</u>	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT035

Field Target: 098

Date: 07-01-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X zoe meade

Wetland Scientist (print)

X *zmeade* 7-1-14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

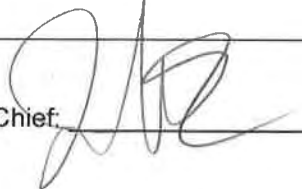
X *[Signature]* 7/1/14

Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 7-1-14	Project Name & #: Alaska LNG 26221306	Field Target: 098
Investigators: Joe Christopher, Zoe Meade		Feature ID: W60HT036
Latitude: 62° 51' 46.92"	Longitude: 149° 52' 19.26"	Datum: WGS84
Logbook #: 003	Logbook Page #: 027	Picture #: P-N, S
Location Description:		
SE of FT 098 - hillside		
Common Species Observed (Scientific Name)		
Betula neoalaskana		
Gymnocarpium dryopteris	Viburnum edule	
Picea glauca	Cornus canadensis	
Veratrum viride	Calamagrostis canadensis	
Streptopus amplexifolius	Dryopteris expansa	
Percent Cover of Dominant Structure Level: 40% forrest		
Habitat Description:		
upland mixed forrest, low open shrub understory		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2	II C2	
Notes:		
10-15% sippe		

Field Crew Chief:



Field Scientist/Technician

Zoe Meade

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant)		7
I Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I A 1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I A 2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I A 3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	I B 1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I B 2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I B 3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	I C 1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	I C 2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I C 3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II A 3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11 a. Shrub canopy cover greater than 75 percent	II B 1 Closed tall scrub	
11 b. Shrub canopy cover of 25-74 percent	II B 2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II C Low scrub	13
12b. Shrubs under 20 centimeters in height	II D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II C 1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C 2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II D 1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II D 2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II D 2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A 1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eriophorum</i> spp.; tussocks often present	III A 2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra bogs, marshes, and fens	III A 3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III B 1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B 2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B 3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C 1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C 2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D 1 Freshwater aquatic herbaceous	
21 b. Vegetation submerged or floating in brackish water	III D 2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D 3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60HT036

Field Target: 098

Date: 07-01-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X

Signature

7-1-14

X Toe Christoph

Field Crew Chief (print)

X

Signature

7/1/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				2000' study	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 099		Map #: 08		Map Date: 05-27	
Date: 07-02-14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT037	
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 617.9	
Latitude: 62° 51' 47.01"		Longitude: 149° 52' 27.05"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 28		Picture No.: P-N.S. pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEMSS1/B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): IBI, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site sketch on pg. 28 in logbook 003

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Saxex barclayii</i>	<u>65</u>	<u>Y</u>	<u>FAC</u>
2. <i>Picea glauca</i>	<u>12</u>		<u>FACU</u>
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 67

50% of total cover: 33.5 20% of total cover: 13.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 7 X 1 = 7

FACW species: 0 X 2 = 0

FAC species: 112 X 3 = 336

FACU species: 2 X 4 = 8

UPL species: 0 X 5 = 0

Column Totals: 121 (A) 351 (B)

PI = B/A = 2.90

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	<u>7</u>		<u>OBL</u>
2. <i>Equisetum arvense</i>	<u>12</u>	<u>Y</u>	<u>FAC</u>
3. <i>Calamagrostis canadensis</i>	<u>35</u>	<u>Y</u>	<u>FAC</u>
4. <i>Viola palustris</i>	<u>TR</u>		<u>FACW</u>
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 54

50% of total cover: 27 20% of total cover: 10.8

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

5 % Bare Ground

N/A % Cover of Wetland Bryophytes

2 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7-2-14</u> Feature ID <u>W60 HT037</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 - 9							Fibric	organics
9 - 20	10 YR 2/2						Silt loam	wood/root fragments

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Redox with 2.5Y Hue _____
Thick Dark Surface (A12) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>N/A</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>9</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>2</u> Tall shrub (2-6m) <u>65</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>54</u> Moss-Lichen <u>2</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent <u>X</u> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT037

Field Target: 099

Date: 07-02-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X Zoe Meade 07-02-14
Signature / Date

X Joe Christopher
Field Crew Chief (print)

X [Signature] 7/2/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <u>W0</u>	Map #: <u>20</u> Map Date: <u>5/27/14</u>
Date: <u>7/2/14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT038</u>
Investigators: <u>Joe Christopher, Zoe Meade, Abigail Fisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>619.4 (LNG)</u>	
Latitude: <u>62° 50' 26.87"</u>		Longitude: <u>149° 53' 21.92"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>29</u>	Picture No.: <u>P-N, S, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>Scrub center</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Depression</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEM1/SS1B</u>	Soil Map Unit Name: <u>N/A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: <u>PEM1/SS1B F</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IIA³ IC2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See page 29

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>50'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u>			
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>50'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	15	Y	FAC
2. <i>Myrica gale</i>	35	Y	OBL
3. <i>Dasaphora fruticosa</i>	4		FAC
4. <i>Picea glauca</i>	8		FACU
5. <i>Vaccinium oxycoccus</i>	1		OBL
6. <i>Spiraea stevenii</i>	5		FACU
7. <i>Andromeda polifolia</i>	TR		FACW
8.			
9.			
Total Cover: <u>66</u>			
50% of total cover: <u>34</u> 20% of total cover: <u>13.6</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:
 Total % Cover of: 156 Multiply by:
 OBL species: 3 X 1 = 156
 FACW species: 23 X 2 = 6
 FAC species: 13 X 3 = 69
 FACU species: 13 X 4 = 52
 UPL species: — X 5 = —
 Column Totals: 197 (A) 285 (B)
 PI = B/A = 1.45

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>50'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum arvense</i>	2		FAC
2. <i>Carex aquatilis</i>	40	Y	OBL
3. <i>Carex microglochin</i>	80	Y	OBL
4. <i>Pedicularis labradorica</i>	2		FACW
5. <i>Comarum palustre</i>	2		OBL
6. <i>Rubus chamaemorus</i>	1		FACW
7. <i>Trientalis europaea</i>	TR		FACU
8. <i>Drosera rotundifolia</i>	TR		OBL
9. <i>Rubus arcticus</i>	2		FAC
10.			
Total Cover: <u>129</u>			
50% of total cover: <u>64.5</u> 20% of total cover: <u>25.8</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
— % Cover of Wetland Bryophytes
80% Total Cover of Bryophytes
2 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7-2-14</u> Feature ID <u>W60HT 038</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-22	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Fibric	organics

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u> X </u>	Alaska Gleyed (A13) <u> </u>	Alaska Color Change (TA4) ⁴ <u> </u>
Histic Epipedon (A2) <u> </u>	Alaska Redox (A14) <u> </u>	Alaska Alpine Swales (TA5) <u> </u>
Black Histic (A3) <u> </u>	Alaska Gleyed Pores (A15) <u> </u>	Alaska Redox with 2.5Y Hue <u> </u>
Hydrogen Sulfide (A4) <u> </u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>
Thick Dark Surface (A12) <u> </u>		Other (Explain in Notes) <u> </u>

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

Restrictive Layer (if present): Type: Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes: Hydric soil observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u> X </u>	Surface Soil Cracks (B6) <u> </u>	Water-stained Leaves (B9) <u> </u>	Stunted or Stressed Plants (D1) <u> X </u>
High Water Table (A2) <u> X </u>	Inundation Visible on Aerial Imagery (B7) <u> </u>	Drainage Patterns (B10) <u> </u>	Geomorphic Position (D2) <u> X </u>
Saturation (A3) <u> X </u>	Sparsely Vegetated Concave Surface (B8) <u> </u>	Oxidized Rhizospheres along Living Roots (C3) <u> </u>	Shallow Aquitard (D3) <u> </u>
Water Marks (B1) <u> </u>	Marl Deposits (B15) <u> </u>	Presence of Reduced Iron (C4) <u> </u>	Microtopographic Relief (D4) <u> X </u>
Sediment Deposits (B2) <u> </u>	Hydrogen Sulfide Odor (C1) <u> </u>	Salt Deposits (C5) <u> </u>	FAC-Neutral Test (D5) <u> X </u>
Drift Deposits (B3) <u> </u>	Dry-Season Water Table (C2) <u> </u>	Notes: <u> </u>	
Algal Mat or Crust (B4) <u> </u>	Other (Explain in Notes): <u> </u>		
Iron Deposits (B5) <u> </u>			

Surface Water Present (Y/N): <u> Y </u>	Depth (in): <u> 1 </u>	Wetland Hydrology Present (Y/N): <u> Y </u>
Water Table Present (Y/N): <u> Y </u>	Depth (in): <u> 1 </u>	
Saturation Present (Y/N): <u> Y </u> (includes capillary fringe)	Depth (in): <u> 0 </u>	

Notes: Spaced starting, toe of slope in depression

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>8</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>60</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>8</u> Short herb (<1m) <u>129</u> Moss-Lichen <u>80</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <input checked="" type="checkbox"/> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <input checked="" type="checkbox"/> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <input checked="" type="checkbox"/> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <input checked="" type="checkbox"/> Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <input checked="" type="checkbox"/> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>4.75</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (>2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <input checked="" type="checkbox"/> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT038

Field Target: 100

Date: 7/2/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps


- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

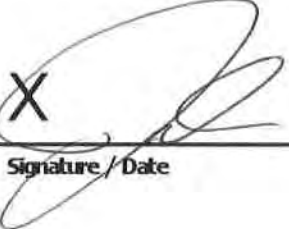
Wetland Scientist (print)

X  7/2/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X  7/2/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 100	Map #: 69 Map Date: 5/27/14
Date: 7/2/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W00 HT039
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher			Team No.: W00
State: Alaska	Region: Alaska	Milepost: 619.5 (LNG) → 7157.5 Parks	
Latitude: 62° 50' 24.91"		Longitude: 149° 53' 19.85"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 29/30	Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): hillslope
Slope (%): 7-10	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): IC3, II B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	65	Y	FACU
2. <i>Populus balsamifera</i>	2		FACU
3.			
4.			
Total Cover: <u>67</u> 50% of total cover: <u>33.5</u> 20% of total cover: <u>13.4</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> ssp.	35	Y	FAC
2. <i>Picea glauca</i>	TR		FACU
3. <i>Ribes triste</i>	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 50 X 3 = 150
 FACU species: 166 X 4 = 664
 UPL species: 0 X 5 = 0
 Column Totals: 216 (A) 814 (B)
 PI = B/A = 3.77

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	75	Y	FACU
2. <i>Dryopteris expansa</i>	20		FACU
3. <i>Chamerion angustifolium</i>	1		FACU
4. <i>Calamagrostis canadensis</i>	10		FAC
5. <i>Streptopus amplexifolius</i>	3		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>109</u> 50% of total cover: <u>54.5</u> 20% of total cover: <u>21.8</u>			

Hydrophytic Vegetation Indicators:
 _____ Dominance Test is > 50%
 _____ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

_____ % Bare Ground
 _____ % Cover of Wetland Bryophytes
 _____ % Total Cover of Bryophytes
 _____ % Cover of Water
Hydrophytic Vegetation Present (Y/N): N
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/2/14</u> Feature ID <u>W60HJ039</u>		Soil Pit Required (Y/N) <u>Y</u>			
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0-2							Fibric organic
2-20	10YR 8/3	100					Coarse sandy loam

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

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

Restrictive Layer (if present): Type: — Depth (inches): N/A

Hydric Soil Present (Y/N): N

Notes: no hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in):	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in):	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in):	

Notes: no field indicators of hydrology observed

WETLAND DETERMINATION DATA FORM

upland

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT039

Field Target: 100

Date: 7/2/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X  7/2/14

Signature / Date

X Joe Christophe

Field Crew Chief (print)

X  7/2/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>101</u>	Map #: <u>S2</u> Map Date: <u>5/27/14</u>
Date: <u>7/2/14</u>	Project Name & No.: Alaska LNG 26221306		Feature Id: <u>W60H8040</u>
Investigators: <u>Joe Christopher, Zoe Meade, Awiqayle Fisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>620.3</u>	
Latitude: <u>62.8326</u>		Longitude: <u>-149.8480</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>30</u>	Picture No.: <u>P-N, S, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): _____
Slope (%): <u>0-1</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEM1/SS1B</u>	Soil Map Unit Name: <u>MA</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (If no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PEM1/SS1BF</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>IIIA3, IIC2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See PAS 30

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Myrica gale</i>	45	Y	OBL
2. <i>Betula nana</i>	5		FAC
3. <i>Dasiphora fruticosa</i>	1		FAC
4. <i>Andromeda polifolia</i>	TR 2		FACW
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>53</u> 50% of total cover: <u>26.5</u> 20% of total cover: <u>10.6</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 143 x 1 = 143
 FACW species: 2 x 2 = 4
 FAC species: 13 x 3 = 39
 FACU species: 0 x 4 = 0
 UPL species: 0 x 5 = 0
 Column Totals: 158 (A) 186 (B)
 PI = B/A = 1.18

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex magellanica</i>	20		OBL
2. <i>Comarum palustre</i>	5		OBL
3. <i>viola</i> ssp.	TR		FACW
4. <i>Trichophorum cespitosum</i>	70	Y	OBL
5. <i>Tridentalis arcticus</i>	5		FAC
6. <i>Equisetum fluviatile</i>	3		OBL
7. <i>Equisetum pratense</i>	TR		FACW
8. <i>Cal can.</i>	2		FAC
9.			
10.			
Total Cover: <u>105</u> 50% of total cover: <u>52.5</u> 20% of total cover: <u>21</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
N/A % Cover of Wetland Bryophytes
95 Total Cover of Bryophytes
8 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/2/14</u> Feature ID <u>W60HT040</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)					
Depth (inches)	Matrix		Redox Features		Notes
	Color (moist)	%	Color (moist)	%	
0-22					Fibric organics SAT.

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) <u>X</u>			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>53</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>106</u> Moss-Lichen <u>95</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u> Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <input checked="" type="checkbox"/> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <input checked="" type="checkbox"/> N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <input checked="" type="checkbox"/> Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <input checked="" type="checkbox"/>	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <input checked="" type="checkbox"/> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>5.21</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <input checked="" type="checkbox"/> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT040

Field Target: 101

Date: 7/2/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

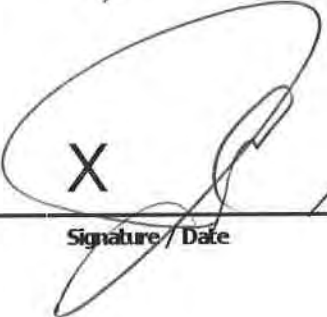
Wetland Scientist (print)

X  7/2/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X  7/2/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>102</u>	Map #: <u>71</u> Map Date: <u>5/17</u>
Date: <u>7/2/14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT041</u>
Investigators: <u>Christopher Z Meade AFisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>621.4</u>	
Latitude: <u>62° 49' 16.52"</u>		Longitude: <u>149° 55' 10.67"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>31</u>	Picture No.: <u>P-W60HT041-P1, Pugin, S</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flat</u>
Slope (%): <u>0-1</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEMIF</u>	Soil Map Unit Name: _____
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PEM1/SS1F</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>III<3, II<2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 31

III A 3, II C 2

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: _____			
50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	20	X	FAC
2. <i>Empetrum nigrum</i>	5		FAC
3. <i>Vaccinium oxycoccus</i>	3		OBL
4. <i>Picea glauca</i>	5		FACU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>33</u>			
50% of total cover: <u>16.5</u> 20% of total cover: <u>6.6</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 104 X 1 = 104

FACW species: 6 X 2 = 12

FAC species: 35 X 3 = 105

FACU species: 5 X 4 = 20

UPL species: — X 5 = —

Column Totals: 150 (A) 241 (B)

PI = B/A = 1.6

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Drosera rotundifolia</i>	1		OBL
2. <i>Carex magellanica</i>	40	X	OBL
3. <i>Eriophorum vaginatum</i>	3		FACW
4. <i>Pedicularis labradorica</i>	1		FACW
5. <i>Trichophorum cespitosum</i>	60	X	OBL
6. <i>Rubus chamaemorus</i>	7		FACW
7. <i>Cornus suecica</i>	10		FAC
8.			
9.			
10.			
Total Cover: <u>117</u>			
50% of total cover: <u>58.5</u> 20% of total cover: <u>23.4</u>			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☒ Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

50 Total Cover of Bryophytes

50 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>07/2/14</u> Feature ID <u>W60HJ041</u>		Soil Pit Required (Y/N) <u>X</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features			Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
<u>0-20</u>							<u>Fibre</u>	<u>Saturated</u>

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: N/A Depth (inches): N/A

Hydric Soil Present (Y/N): X

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2-4"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	
Notes: <u>top of mountain</u>		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>5</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>28</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>122</u> Moss-Lichen <u>50</u> Floating <u>0</u> Submerged <u>20</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <input checked="" type="checkbox"/> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <input checked="" type="checkbox"/> High Density (60-80%) _____ Very High Density (80-100%) <input checked="" type="checkbox"/>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <input checked="" type="checkbox"/> >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____ Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <input checked="" type="checkbox"/> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <input checked="" type="checkbox"/> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <input checked="" type="checkbox"/>	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <input checked="" type="checkbox"/> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>4.33</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <input checked="" type="checkbox"/> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) <input checked="" type="checkbox"/>	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60 HT 041

Field Target: 102

Date: 7/2/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 7/2/14

Signature / Date

X Joe Christophe

Field Crew Chief (print)

X *[Signature]* 7/2/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>103</u>	Map #: <u>72</u> Map Date: <u>5/27/14</u>
Date: <u>07-03-14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W6HTD 42</u>
Investigators: <u>Joe Christopher, Zoe Meade, Awigayle Fisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>623.25</u>	
Latitude: <u>62°48' 16.95"</u>		Longitude: <u>149°57' 58.76"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>32</u>	Picture No.: <u>P_N, S, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): _____
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS 4/1 B</u>	Soil Map Unit Name: <u>N/A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PSS 1 B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>II C2, III A3</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See Pgs 32

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	No. of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A)	
1.				Total Number of Dominant Species Across All Strata: <u>3</u> (B)	
2.				% Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)	
3.					
4.					
Total Cover: <u>0</u>				Prevalence Index worksheet:	
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: <u>80</u> X 1 = <u>80</u>	
1. Myrica gale	80	Y	OBL	FACW species: <u>10</u> X 2 = <u>20</u>	
2. Betula nana	10		FAC	FAC species: <u>29</u> X 3 = <u>87</u>	
3. Spiraea stevenii	15		FACU	FACU species: <u>15</u> X 4 = <u>60</u>	
4. Picea mariana	10		FACW	UPL species: <u>0</u> X 5 = <u>0</u>	
5. Empetrum nigrum	3		FAC	Column Totals: <u>134</u> (A) <u>247</u> (B)	
6. Vaccinium uliginosum	7		FAC	PI = B/A = <u>1.84</u>	
7. Andromeda polifolia	TR		FACW		
8.					
9.					
Total Cover: <u>12.5</u>					
50% of total cover: <u>62.5</u> 20% of total cover: <u>2.5</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50%	
1. Equisetum arvense	4	Y	FAC	<input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0	
2. Calamagrostis canadensis	5	Y	FAC	_____ Morphological Adaptations ¹ (Provide supporting data in Notes)	
3. Comarum palustre	TR		OBL	_____ Problematic Hydrophytic Vegetation ¹ (Explain)	
4. Trientalis arcticus	TR		FAC	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
5.					
6.					
7.					
8.					
9.					
10.					
Total Cover: <u>9</u>				<u>0</u> % Bare Ground <u>N/A</u> % Cover of Wetland Bryophytes <u>90</u> Total Cover of Bryophytes <u>0</u> % Cover of Water	
50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</u>				Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/3/14</u>	Feature ID <u>W60HT042</u>	Soil Pit Required (Y/N) <u>Y</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	<u> </u>	<u>—</u>	<u> </u>	<u>—</u>	<u> </u>	<u> </u>	Fibric	organic

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____ Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____ Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____ Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			
Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>0</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0</u>		
Notes:			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>112</u> Dwarf shrub (<0.5m) <u>3</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>9</u> Moss-Lichen <u>90</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT042

Field Target: 103

Date: 7/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

Zoe Meade 7/3/14

X

Field Crew Chief (print)

X

Signature / Date

Joe Christopherson 7/3/14

Vegetation Classification Data Form

Site Description		
Date: 7/3/14	Project Name & #: Alaska LNG 26221306	Field Target: 103
Investigators: JC, ZM, AF		Feature ID: W60HT043
Latitude: 62°	Longitude: 149°	Datum: WGS84
Logbook #: 003	Logbook Page #: 33	Picture #: P-N, S
Location Description:		
500 ft W of HT 103 in upland mixed forest		
Common Species Observed (Scientific Name)		
Alnus ssp.	Oplopanax horridus	
Betula neoglaskana	Sambucus racemosa	
Arythrum cyclosorum		
Gymnocarpium dryopteris		
Percent Cover of Dominant Structure Level: 30% Bet neo.		
Habitat Description:		
Mixed forest		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2	II B1	
Notes:		

Field Crew Chief:



Field Scientist/Technician

Zoemede

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
		(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
		(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
	B. Broadleaf forest	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
		(1) Closed tall scrub (2) Open tall scrub
		(1) Closed low scrub (2) Open low scrub
II. Scrub	A. Dwarf tree scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
		(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
		(1) Mosses (2) Lichens
	B. Tall scrub	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous
III. Herbaceous	A. Graminoid herbaceous	
	B. Forb herbaceous	
	C. Bryoid herbaceous	
	D. Aquatic (nonemergent) herbaceous	

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant)		7
I Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I A.1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I A.2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I A.3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		8
5a. Tree canopy of 60-100 percent cover	I B.1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I B.2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I B.3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	I C.1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	I C.2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I C.3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)		15
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II A.3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11 a. Shrub canopy cover greater than 75 percent	II B.1 Closed tall scrub	
11 b. Shrub canopy cover of 25-74 percent	II B.2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II C Low scrub	13
12b. Shrubs under 20 centimeters in height	II D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II C.1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C.2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II D.1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II D.2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II D.2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eniophorum</i> spp.; tussocks often present	III A.2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III A.3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III B.1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B.3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C.2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D.1 Freshwater aquatic herbaceous	
21 b. Vegetation submerged or floating in brackish water	III D.2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D.3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W604T043 Field Target: 103 Date: 7/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Muade

Field Technician (print)

X  7/3/14

Signature

X Joe Charles

Field Crew Chief (print)

X  7/3/14

Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 2000' corridor			
Survey Type: Centerline <u>40</u> Access Road (explain) _____ Other (explain) <u>X</u>		Field Target: <u>108</u>	Map #: <u>76</u> Map Date: <u>5/21/14</u>
Date: <u>7/2/14</u>	Project Name & No.: Alaska LNG 26221306		Feature Id: <u>W60HT044</u>
Investigators: <u>Joe Christopher, Zoe Meade, Abigail Fisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>628.45</u>	
Latitude: <u>62° 45' 29.44"</u>		Longitude: <u>150° 08' 36.91"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>33</u>	Picture No.: <u>P-N.S.pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Depression / meadow</u>
Slope (%): <u>0-1</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>Pemi / SS / I3</u>	Soil Map Unit Name: <u>41A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <u>X</u> No _____ (if no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <u>X</u> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <u>X</u> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PEMI / PSS 1 B</u> → <u>PEMI / SS 1 B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Viereck): <u>III A3, II C2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

P: 33 See map

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea</i>	1		FACW
2.			
3.			
4.			
Total Cover: <u>1</u> 50% of total cover: <u>0.5</u> 20% of total cover: <u>0.2</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	10	Y	FAC
2. <i>Picea mariana</i>	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>15</u> 10 <u>15</u> <u>16</u> 50% of total cover: <u>7.5</u> 5 <u>7.5</u> 20% of total cover: <u>3.2</u> 2 <u>3.2</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: 85 Multiply by:
 OBL species: 85 x 1 = 85
 FACW species: 5 x 2 = 10
 FAC species: 17 x 3 = 51
 FACU species: 0 x 4 = 0
 UPL species: 0 x 5 = 0
 Column Totals: 107 (A) 146 (B)
 PI = B/A = 1.36

*Tree stratum added to shrub stratum
 since there was < 5% cover.*

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Trichophorum caespitosum</i>	85	Y	OBL
2. <i>Iris setosa</i>	TR		FAC
3. <i>Pedicularis labradorica</i>	TR		FACW
4. <i>Calamagrostis canadensis</i>	3		FACW
* 5. <i>Platanthera aquilonis</i>	TR		FACW
6. <i>Drosera rotundifolia</i>	TR		OBL
7. <i>Viola</i> ssp.	TR		FACW
8. <i>Cornus suecica</i>	4		FAC
9.			
10.			
Total Cover: <u>92</u> 50% of total cover: <u>46</u> 20% of total cover: <u>18.4</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
N/A % Cover of Wetland Bryophytes
100 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

name may have changed

WETLAND DETERMINATION DATA FORM

SOIL		Date	Feature ID		Soil Pit Required (Y/N)					
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)										
Depth (inches)	Matrix		Redox Features				Texture	Notes		
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²				
0-32	<u>[faint]</u>	-	<u>[faint]</u>	-	<u>[faint]</u>	<u>[faint]</u>	Fibric	organics		
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							INDICATORS FOR PROBLEMATIC HYDRIC SOILS³			
Histosol or Histel (A1) <u>X</u>			Alaska Gleyed (A13) _____			Alaska Color Change (TA4) ⁴ _____				
Histic Epipedon (A2) _____			Alaska Redox (A14) _____			Alaska Alpine Swales (TA5) _____				
Black Histic (A3) _____			Alaska Gleyed Pores (A15) _____			Alaska Redox with 2.5Y Hue _____				
Hydrogen Sulfide (A4) _____						Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____				
Thick Dark Surface (A12) _____						Other (Explain in Notes) _____				
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 Notes.										
Restrictive Layer (if present): Type: _____ Depth (inches): _____										
Hydric Soil Present (Y/N): <u>Y</u>										
Notes: <u>Fresh Indicators of hydric soil observed.</u>										

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____	_____		
Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>		
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>		
Notes: <u>Depression @ toe of small slope</u>			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>10</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved <u>8</u> Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>1</u> Sapling (<5 dbh, <6m tall) <u>45</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>10</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>92</u> Moss-Lichen <u>100</u> Floating _____ Submerged _____		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) <u>X</u> Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated <u>X</u> Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown <u>2000</u>	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT044

Field Target: 108

Date: 7/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X  7/3/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X  7/3/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 109	Map #: 77 Map Date: 8/27/14
Date: 7/3/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT045
Investigators: JC, ZM, AF			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 631	
Latitude: 62.73765	Longitude: -150.14656	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 34-35	Picture No.: P-N.S. pit, plug	

SITE PARAMETERS	
Subregion: south central	Landform (hillslope, terrace, hummocks, etc.): Terrace / Seeps
Slope (%): 3-5	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SS1B (Seeps)
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): IIA2 II C2 II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See pg 33-35 for
Notes & Drawings

* Paper birch was salt in
the tree layer to account
for groups in plot & matrix

with morphological adaptation (changed to FAC)
to growing in Seeps PEM1/SS1B.

* See W60HT045-OP for notes on AdS, R4SB

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A)	
1. <i>Betula neoalaskana</i>	5	Y	FAC	Total Number of Dominant Species Across All Strata: <u>57</u> (B)	
2. <i>Betula neoalaskana</i>	3	Y	FACU	% Dominant Species that are OBL, FACW, or FAC: <u>80</u> (A/B)	
3. <i>Picea glauca</i>	3	Y	FACU	<u>57</u>	
4.					
Total Cover: <u>11</u>				Prevalence Index worksheet:	
50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: <u>29</u> X 1 = <u>29</u>	
1. <i>Spiraea stevenii</i>	10	Y	FACU	FACW species: <u>1</u> X 2 = <u>2</u>	
2. <i>Alnus</i> ssp.	15	Y	FAC	FAC species: <u>75</u> X 3 = <u>225</u>	
3.				FACU species: <u>17</u> X 4 = <u>68</u>	
4.				UPL species: <u>0</u> X 5 = <u>0</u>	
5.				Column Totals: <u>122</u> (A) <u>324</u> (B)	
6.				PI = B/A = <u>2.66</u>	
7.				* morphological adaptation - multiple trunks	
8.				→ See note on front page.	
9.					
Total Cover: <u>25</u>					
50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50%	
1. <i>Comarum palustre</i>	25	Y	OBL	<input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0	
2. <i>Equisetum sylvaticum</i>	7		FAC	_____ Morphological Adaptations ¹ (Provide supporting data in Notes)	
3. <i>Cornus canadensis</i>	1		FACU	_____ Problematic Hydrophytic Vegetation ¹ (Explain)	
4. <i>Calamagrostis canadensis</i>	45	Y	FAC	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
5. <i>Chamerion angustifolium</i>	T		FAC		
6. <i>Carex magellanica</i>	4		OBL		
7. <i>Equisetum arvense</i>	3		FAC		
8. <i>Rubus chamaemorus</i>	1		FACW		
9. <i>Viola</i> ssp.	TR				
10.					
Total Cover: <u>86</u>				Hydrophytic Vegetation Present (Y/N): <u>Y</u>	
50% of total cover: <u>43</u> 20% of total cover: <u>17.2</u>				Notes: (If observed, list morphological adaptations below):	
				<u>0</u> % Bare Ground <u>N/A</u> % Cover of Wetland Bryophytes <u>40</u> Total Cover of Bryophytes <u>0</u> % Cover of Water	

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/3/14</u> Feature ID <u>W604T 045</u>		Soil Pit Required (Y/N) <u>Y</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features			Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
0-9							Fibric	organics,
9-20	10 YR 2/2	100					Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) <u>X</u>	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: <u>seeps present But NO Standing H₂O.</u>	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>6</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>4</u>	

Notes: Birch are adapted But stressed
- Ads. R45B

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>11</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>15</u> Short shrub (0.5-2m) <u>10</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>86</u> Moss-Lichen <u>40</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <u>X</u> Intermittent Inlet/Intermittent Outlet <u>X</u> Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>Y</u> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>Y</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.5</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed <u>X</u> Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown <u>X</u>	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT045

Field Target: 109

Date: 7/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

 7/3/14

X Joe Christoph

Field Crew Chief (print)

X

Signature / Date

 7/3/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>110</u>	Map #: <u>77</u> Map Date: <u>5/27/14</u>
Date: <u>7/3/14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W60HT046</u>
Investigators: <u>Joe Christopher, Zoe Meade, Abigail Fisher</u>			Team No.: <u>W60</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>631</u>	
Latitude: <u>62° 44' 14.46"</u>		Longitude: <u>150° 08' 50.71"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>003</u>	Logbook Page No.: <u>36/37</u>	Picture No.: <u>P-N-3, P-P</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Slope/Terrace</u>
Slope (%): <u>0 - 5</u>	Local relief (concave, convex, none): <u>Convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1/EM1B</u>	Soil Map Unit Name: <u>N/A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PSS1/EM1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>IIC2, IIIA2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See map 36

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Myrica gale</i>	<u>60</u>	<u>X</u>	<u>OBL</u>
2. <i>Betula nana</i>	<u>17</u>		<u>FAC</u>
3. <i>Spiraea stevenii</i>	<u>5</u>		<u>FACU</u>
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>72</u> 50% of total cover: <u>36</u> 20% of total cover: <u>14.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: 103 Multiply by: 103
 OBL species: 103 X 1 = 103
 FACW species: 0 X 2 = 0
 FAC species: 22 X 3 = 66
 FACU species: 5 X 4 = 20
 UPL species: 0 X 5 = 0
 Column Totals: 130 (A) 189 (B)
 PI = B/A = 1.45

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	<u>10</u>		<u>FAC</u>
2. <i>Carex microglochin</i>	<u>40</u>	<u>X</u>	<u>OBL</u>
3. <i>Equisetum arvense</i>	<u>5</u>		<u>FAC</u>
4. <i>Comarum palustre</i>	<u>3</u>		<u>OBL</u>
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>58</u> 50% of total cover: <u>29</u> 20% of total cover: <u>11.6</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
— % Cover of Wetland Bryophytes
100 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>07/18/14</u> Feature ID <u>W60HI 045</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20							Fibric	organics - wet

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____
 Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved ☒
 Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 72
 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 0 Moss-Lichen 0 Floating _____ Submerged _____

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M):** Even ☒ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) ☒ Very High Density (80-100%) _____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water ☒ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) ☒ High (>25) _____

Presence of Islands (M): Absent (none) ☒ One or Few _____ Several to Many _____ N/A ☒

Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____
 Open _____ Small Scattered Patches _____ Continuous Cover ☒

Dead Woody Material (P): Low Abundance (0-25% of surface) ☒ Moderately Abundant (25-50% of surface) _____
 Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings) ☒ Moderate (broken irregular rings) _____
 High (small groupings, diverse and interspersed) _____

HGM Class (P): Slope ☒ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____

SOIL VARIABLES

Soil Factors (P): Soil Lacking _____ Histosol:Fibric ☒ Histosol:Hemic _____ Histosol:Sapric _____
 Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet ☒ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____
 Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated ☒
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed ☒ Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____

Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) ☒ Well Developed (6-18in.) _____ Pronounced (>18in.) _____

Frequency of Overbank Flooding (P): No Overbank Flooding ☒ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____
 Return Interval >5 yrs _____

Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow ☒

Water pH (P): No surface water ☒ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits ☒
 Glacial Till/Not Permeable _____

Basin Topographic Gradient (M): Low Gradient (<2%) ☒ High Gradient (≥2%) _____

Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed ☒ Intermittent Spring _____ Perennial Spring _____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below ☒
 Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____

Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) ☒

Watershed Land Use: 0-5% Rural ☒ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____

Size: Small (<10 acres) ☒ Medium (10-100 acres) _____ Large (>100 acres) _____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT046

Field Target: 110

Date: 7/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X *Zoe Meade* 7/3/14
Signature / Date

X Joe Christoph
Field Crew Chief (print)

X *Joe Christoph* 7/3/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 149	Map #: 151 Map Date: 3/17/14
Date: 7/9/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1052 W60HT047
Investigators: Joe Christopher, Zoe Meade, Abigayle Fisher			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 661.7	
Latitude: 62° 20' 40.00"	Longitude: 150° 16' 16.87"	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 050/049	Picture No.: P-N.S. pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0 - 3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWJ classification: PF04B 2/2	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PF04/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): I A 2, I C 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

site sketch on pg. 049 }
data on pg. 50 } Logbook 003

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	50	Y	FACW
2.			
3.			
4.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	5		FAC
2. <i>Vaccinium oxycoccus</i>	TR		OBL
3. <i>Betula nana</i>	TR		FACW
4. <i>Rhododendron tomentosum</i>	4		FACW
5. <i>Empetrum nigrum</i>	3		FAC
6. <i>Vaccinium uliginosum</i>	35	Y	FAC
7. <i>Betula neoalaskana</i>	1		FACU
8. <i>Picea mariana</i>	3		FACW
9.			

Total Cover: 51

50% of total cover: 25.5 20% of total cover: 10.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 5 X 1 = 5

FACW species: 122 X 2 = 244

FAC species: 44 X 3 = 132

FACU species: 2 X 4 = 8

UPL species: 0 X 5 = 0

Column Totals: 173 (A) 389 (B)

PI = B/A = 2.25

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	65	Y	FACW
2. <i>Geocaulon lividum</i>	1		FACU
3. <i>Equisetum sylvaticum</i>	1		FAC
4. <i>Carex microglochin</i>	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 72

50% of total cover: 36 20% of total cover: 14.4

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☒ Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W60HT047

SOIL		Date <u>7/9/14</u>		Feature ID <u>W60HT047</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0 - 15	—	—	—	—	—	—	Fibric organics, wet
15 - 20	—	—	—	—	—	—	Hemic organics, wet

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>2</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: Spore slinked somewhat.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved <u>X</u> Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>50</u> Sapling (<5 dbh, <6m tall) <u>4</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>42</u> Dwarf shrub (<0.5m) <u>5</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>72</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u> Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above <u>X</u> Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1052 ^{W60HT047}

Field Target: 149

Date: 7/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X *Zoe Meade* 7/9/14

Signature / Date

X *Zoe Meade*

Field Crew Chief (print)

X *[Signature]* 7/9/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 112		Map #: 79		Map Date: 5/27/14	
Date: 7/5/14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT048	
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 640.35	
Latitude: 62° 37' 34.63"		Longitude: 150° 13' 42.64"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 38		Picture No.: P-N, S. pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flood plain
Slope (%):	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PSS1A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes No <input checked="" type="checkbox"/>	Wetland Type: upland
Wetland Hydrology Present? Yes No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IB1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PA 838

UPLAND FLOOD PLAIN near
Gravel ADDT Access to
Water Source @ Troublesome Creek

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Populus balsamifera</i>	70	Y	FACU
2.			
3.			
4.			
Total Cover: <u>70</u> 50% of total cover: <u>35</u> 20% of total cover: <u>14</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus ssp.</i>	4		FAC
2. <i>Saxex scouleriana</i>	20	Y	FAC
3. <i>Ribes triste</i>	1		FAC
4. <i>Rosa asicularis</i>	5		FACU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>30</u> 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 41 X 3 = 123
 FACU species: 75 X 4 = 300
 UPL species: 0 X 5 = 0
 Column Totals: 116 (A) 423 (B)
 PI = B/A = 3.65

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum arvense</i>	6	Y	FAC
2. <i>Calamagrostis canadensis</i>	10	Y	FAC
3. <i>Chamaerion angustifolium</i>	TR		FAC
4. <i>Galium triflorum</i>	TR		FAC
5. <i>Dryopteris expansa</i>	TR		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>16</u> 50% of total cover: <u>8</u> 20% of total cover: <u>3.2</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

80 % Bare Ground
0 % Cover of Wetland Bryophytes
0 % Total Cover of Bryophytes
0 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/5/14</u> Feature ID <u>W60HT048</u>				Soil Pit Required (Y/N) <u>X</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Notes
	Color (moist)	%	Color (moist)	%				
0-3	—	—	—	—	—	—	coarse sand/gravel	
3+	—	—	—	—	—	—	Large cobble - refusal	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: Large cobble Depth (inches): 3

Hydric Soil Present (Y/N): N

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u>—</u>	
Notes: _____		

WETLAND DETERMINATION DATA FORM

Upland

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent- Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____ Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT048

Field Target: 112

Date: 7/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X  7/5/14

Signature / Date

X Tom Christopherson

Field Crew Chief (print)

X  7/5/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X</u>
Date: <u>7/5/14</u>		Project Name & No.: <u>Alaska LNG 26221306</u>	Field Target: <u>118</u> Map #: <u>84</u> Map Date: <u>5/27</u>
Investigators: <u>JC, Z.M. AF</u>		Feature Id: <u>W60HT049</u>	
State: <u>Alaska</u>		Region: <u>Alaska</u>	Team No.: <u>W60</u>
Latitude: <u>62° 32' 45.40"</u>		Milepost: <u>646.8</u>	Datum: <u>WGS84</u>
Longitude: <u>150° 15' 02.27"</u>		Logbook No.: <u>003</u>	
Logbook Page No.: <u>39</u>		Picture No.: <u>P-N, S, pit, plug</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flat</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>none</u>
Pre-mapped Alaska LNG/NWI classification: <u>PFO 4/SS1B</u>	Soil Map Unit Name: <u>N/A</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No	Is the Sampled Area within a Wetland? Yes <u>X</u> No
Hydric Soil Present? Yes <u>X</u> No	Wetland Type: <u>PFO 4/SS1B</u>
Wetland Hydrology Present? Yes <u>X</u> No	Alaska Vegetation Classification (Vioreck): <u>IA3, IB2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAG 39 sample area ~ 20' tail, classified as PFO 4/SS1B

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	15	Y	FACW
2.			
3.			
4.			
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>			
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> spp.	10	Y	FAC
2. <i>Betula nana</i>	20	Y	FAC
3. <i>Empetrum nigrum</i>	3		FAC
4. <i>Vaccinium uliginosum</i>	7		FAC
5. <i>Chamaedaphne calyculata</i>	7		FACW
6.			
7.			
8.			
9.			
Total Cover: <u>47</u> 50% of total cover: <u>23.5</u> 20% of total cover: <u>9.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 60 x 1 = 60
 FACW species: 32 x 2 = 64
 FAC species: 40 x 3 = 120
 FACU species: 0 x 4 = 0
 UPL species: 0 x 5 = 0
 Column Totals: 132 (A) 244 (B)
 PI = B/A = 1.85

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex aquatilis</i>	60	Y	OBL
2. <i>Rubus chamaemorus</i>	10		FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>70</u> 50% of total cover: <u>35</u> 20% of total cover: <u>14</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

_____ % Bare Ground
 _____ % Cover of Wetland Bryophytes
100 Total Cover of Bryophytes
 _____ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/5/14</u> Feature ID <u>W60HT049</u>		Soil Pit Required (Y/N) <u>Y</u>			
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹		
0-18						Fibric	organics saturated
18							Refusal large roots

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes)	

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

Restrictive Layer (if present): Type: large roots Depth (inches): 18

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u> </u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>6</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>5</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved <u>X</u> Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>15</u> Sapling (<5 dbh, <6m tall) <u>00</u> Tall shrub (2-6m) <u>10</u> Short shrub (0.5-2m) <u>37</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>20</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) <u>X</u> Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WG0HT049

Field Target: 118

Date: 7/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X Zoe Meade 7/5/14
Signature / Date

X Joe Christoph
Field Crew Chief (print)

X [Signature] 7/5/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 119		Map #: 84		Map Date: 5/27/14	
Date: 7/5/14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT050	
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 64.6.8 (LNG)	
Latitude: 62° 32' 47.26"		Longitude: 150° 14' 58.82"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 40		Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input checked="" type="checkbox"/> , Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PFO 1/4/551B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): IC2, II B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Birch Dominated. Morphological Adaptations, problematic
PS. 40

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	5		FACW
2. <i>Betula neoalaskana</i> *	30	Y	FAC
3.			
4.			
Total Cover: <u>35</u> 50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> spp.	25	Y	FAC
2. <i>Spiraea steverii</i>	2		FACU
3. <i>Ribes triste</i>	2		FAC
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>29</u> 50% of total cover: <u>14.5</u> 20% of total cover: <u>5.8</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 4 X 1 = 4
 FACW species: 5 X 2 = 10
 FAC species: 74 X 3 = 222
 FACU species: 2523 X 4 = 10092
 UPL species: 0 X 5 = 0
 Column Totals: 108106 (A) 336323 (B)
 PI = B/A = 3.1 JTB

*Convers Det Neo
to FAC due to
morph. Adaptations*

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	4		OBL
2. <i>Gymnocarpium dryopteris</i>	8		FACU
3. <i>Cornus canadensis</i>	2		FACU
4. <i>Dryopteris expansa</i>	10	Y	FACU
5. <i>Streptopus amplexifolius</i>	1		FACU
6. <i>Equisetum arvense</i>	15	Y	FAC
7. <i>Equisetum sylvaticum</i>	2		FAC
8.			
9.			
10.			
Total Cover: <u>42</u> 50% of total cover: <u>21</u> 20% of total cover: <u>8.4</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☒ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

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

5 % Bare Ground
— % Cover of Wetland Bryophytes
20 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/5/14</u>	Feature ID <u>W60H7050</u>	Soil Pit Required (Y/N) <u>Y</u>				
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features			Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
0-20	<u> </u>	<u>-</u>	<u> </u>	<u>-</u>	<u> </u>	<u> </u>	Fibric	organic

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: NA Depth (inches): 12

Hydric Soil Present (Y/N): Y

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____	_____		
Surface Water Present (Y/N): <u>—</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>		
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>3</u>		
Notes: _____			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <u>X</u> Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>35</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>25</u> Short shrub (0.5-2m) <u>4</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>42</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

3m

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT050

Field Target: 119

Date: 7/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X *Zoe Meade*

Wetland Scientist (print)

X

Signature / Date

7/5/14

X *Joe Christoph*

Field Crew Chief (print)

X

Signature / Date

7/5/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 300' corridor			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 123	Map #: 85 Map Date: 5/27/14
Date: 7/5/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT 051
Investigators: Joe Christopher, Zoe Meade, Abigayle Fisher			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 647.8	
Latitude: 62° 31' 58.84"		Longitude: 150° 14' 13.85"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 040	Picture No.: P-N, S, water	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 1-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PEM1/C
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 40

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix barclayi</i>	TR	N	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 75 X 1 = 75
 FACW species: 10 X 2 = 20
 FAC species: 71 X 3 = 213
 FACU species: - X 4 = -
 UPL species: - X 5 = -
 Column Totals: 156 (A) 308 (B)
 PI = B/A = 1.97

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	35	N	OBL
2. <i>Carex aquatilis</i>	25		OBL
3. <i>Equisetum arvense</i>	18		FAC
4. <i>Equisetum sylvaticum</i>	31		FAC
5. <i>Viola palustris</i>	10		FACW
6. <i>Carex magellanica</i>	5		OBL
7. <i>Carex limosa</i>	10		OBL
8. <i>Calamagrostis Canadensis</i>	50	Y	FAC
9.			
10.			
Total Cover: <u>156</u> 50% of total cover: <u>78</u> 20% of total cover: <u>31.2</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

_____ % Bare Ground
 _____ % Cover of Wetland Bryophytes
20 Total Cover of Bryophytes
30 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

138
18
156

WETLAND DETERMINATION DATA FORM

[illegible]

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			
Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2-4"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>		
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>		
Notes: <u>Depression</u>			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>15</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>TR</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>15</u> Moss-Lichen <u>20</u> Floating <u>5</u> Submerged <u>—</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>✓</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>✓</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A <u>X</u> <u>OP</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems <u>✓</u> 1 or More Large Patches; Parts of Site Open <u>✓</u> Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking <u>OP</u> Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____ <u>Assumed</u>	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet <u>X</u> Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u> <u>OP</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.29</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60H1051

Field Target: 123

Date: 7/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Zoe Meade 7/5/14

Signature / Date

X

Tue Churlyk

Field Crew Chief (print)

X

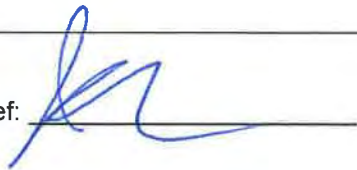
Tue Churlyk 7/5/14

Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 7/5/14	Project Name & #: Alaska LNG 26221306	Field Target: W60HT052
Investigators: JC, ZM, AF		Feature ID: 124
Latitude: 62° 31' 58.35"	Longitude: 150° 14' 11.36"	Datum: WGS84
Logbook #: 003	Logbook Page #: 041	Picture #: P_N, S
Location Description:		
E of 123 - on centerline		
Common Species Observed (Scientific Name)		
Betula neoalaskana	Veratrum viride	
Picea glauca	Sambucus racemosa	
Vaccinium uliginosum	Sorbus scopulina	
Viburnum edule	Alnus ssp	
Percent Cover of Dominant Structure Level: 25% pic gla, Bet neo		
Habitat Description:		
Mixed forrest		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2	II B2	
Notes:		
3-7% hillside slope, 30' birch		

Field Crew Chief:



Field Scientist/Technician



Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant)		7
I. Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11a. Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub	
11b. Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub	13
12b. Shrubs under 20 centimeters in height	II.D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II.D.2 Encaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II.D.2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beeches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III.A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eriophorum</i> spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III.C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III.C.2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous	
21b. Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60HT052 Field Target: 124 Date: 7/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade

Field Technician (print)

X

Signature

7/5/14

X Tue Christoph

Field Crew Chief (print)

X

Signature

7/5/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 138	Map #: <input type="checkbox"/> Map Date: 5/27/14
Date: 7/8/14	Project Name & No.: Alaska LNG 26221306		Feature Id: WG0 HT060 053
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher			Team No.: WG0
State: Alaska	Region: Alaska	Milepost: 123 (PH)	
Latitude: 62° 25' 52.59"	Longitude: 150° 16' 07.58"	Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 47	Picture No.: P-N.S. pit, plug	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): depression
Slope (%): 0 - 2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IIA2 , III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PS. 47
 90' EWT Corridor

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Chamaedaphne calyculata</u>	<u>65</u>	<u>Y</u>	<u>FACW</u>
2. <u>Betula nana</u>	<u>5</u>		<u>FAC</u>
3. <u>Vaccinium oxycoccus</u>	<u>1</u>		<u>OBL</u>
4. <u>Vaccinium uliginosum</u>	<u>2</u>		<u>FAC</u>
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>73</u> 50% of total cover: <u>36.5</u> 20% of total cover: <u>14.6</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 41 X 1 = 41

FACW species: 65 X 2 = 130

FAC species: 7 X 3 = 21

FACU species: 0 X 4 = 0

UPL species: 0 X 5 = 0

Column Totals: 113 (A) 192 (B)

PI = B/A = 1.67

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Carex microglochin</u>	<u>40</u>	<u>Y</u>	<u>OBL</u>
2. <u>Menyanthes trifoliata</u>	<u>TR</u>		<u>OBL</u>
3. <u>Pedicularis labradorica</u>	<u>TR</u>		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations¹ (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

53 (18)

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

Wetland Hydrology Present (Y/N): Y

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>72</u> Dwarf shrub (<0.5m) <u>1</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>40</u> Moss-Lichen <u>80</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>3</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover <u>N/A</u>		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT060 ^{53 JA}

Field Target: 138

Date: 7/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade
Wetland Scientist (print)

X *Zoe Meade* 7/8/14
Signature / Date

X Joe Christensen
Field Crew Chief (print)

X *Joe Christensen* 7/8/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION 2000' study			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 130	Map #: 90 Map Date: 5/27/14
Date: 7/6/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT054
Investigators: Joe Christopher, Zoe Meade, Abigail Fisher			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 651.5	
Latitude: 62° 29' 18.85"		Longitude: 150° 16' 21.58"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 042	Picture No.: P-N, S, pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): depression
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PEM/SS1F
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): IIIA3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site sketch and notes on page 042 of Logbook 003
Disturbed powerline R.O.W to west.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	25	Y	FAC
2. <i>Salix pulchra</i>	10	Y	FACW
3. <i>Spiraea stevenii</i>	3		FACU
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>38</u> 50% of total cover: <u>19</u> 20% of total cover: <u>7.6</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 80 X 1 = 80

FACW species: 10 X 2 = 20

FAC species: 110 X 3 = 330

FACU species: 3 X 4 = 12

UPL species: 0 X 5 = 0

Column Totals: 203 (A) 442 (B)

PI = B/A = 2.17

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	30		OBL
2. <i>Equisetum arvense</i>	40	Y	FAC
3. <i>Carex aquatilis</i>	30		OBL
4. <i>Carex canescens</i>	10		OBL
5. <i>Carex magellanica</i>	10		OBL
6. <i>Calamagrostis canadensis</i>	45	Y	FAC
7.			
8.			
9.			
10.			
Total Cover: <u>165</u> 50% of total cover: <u>82.5</u> 20% of total cover: <u>33</u>			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☒ Prevalence Index is ≤ 3.0

____ Morphological Adaptations¹ (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

100 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

8 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/6/14</u> Feature ID <u>W60HT054</u>		Soil Pit Required (Y/N) <u>X</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)						
Depth (inches)	Matrix		Redox Features		Texture	Notes
	Color (moist)	%	Color (moist)	%		
0-20					Fibric	Saturated organics

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: SPAGNUM MOG

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: Depression & Drainage Through Depression.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>38</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>165</u> Moss-Lichen <u>110</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover <u>X</u> 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>X</u> N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet <u>X</u> Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow <u>X</u> Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.79</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above <u>X</u> Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT054

Field Target: 130

Date: 7/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

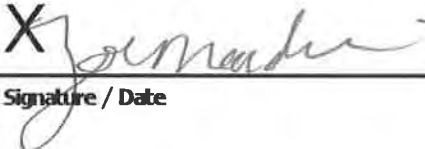
- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X  7/6/14

Signature / Date

X Joe Christian

Field Crew Chief (print)

X  7/6/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				outside 2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	Field Target: 132
Map #: 92		Map Date: 5/27/14			
Date: 7/6/14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60HT057055	
Investigators: JC, ZM, AF				Team No.: W60	
State: Alaska	Region: Alaska		Milepost: 126.1 (Parks)		
Latitude: 62° 28' 38.43"		Longitude: 150° 16' 18.12"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 044		Picture No.: P-N.S. pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): depression
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS1B45	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)	
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PEM1F
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

pg 44 Logbook 003
point located outside 2000' Corridor

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	<u>2</u>		FACU
2. <i>Picea glauca</i>	<u>1</u>		FACU
3.			
4.			

Total Cover: 3

50% of total cover: 1.5 20% of total cover: 0.6

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> esp.	<u>3</u>	<u>Y</u>	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 6

50% of total cover: 3 20% of total cover: 1.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: 40 Multiply by:

OBL species: 40 X 1 = 40

FACW species: 15 X 2 = 30

FAC species: 113 X 3 = 339

FACU species: 3 X 4 = 12

UPL species: 0 X 5 = 0

Column Totals: 171 (A) 421 (B)

PI = B/A = 2.46

Tree stratum added to shrub stratum since there was <5% cover

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	<u>40</u>	<u>Y</u>	OBL
2. <i>Equisetum arvense</i>	<u>20</u>		FAC
3. <i>Calamagrostis canadensis</i>	<u>90</u>	<u>Y</u>	FAC
4. <i>Viola palustris</i>	<u>15</u>		FACW
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 165

50% of total cover: 82.5 20% of total cover: 33

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

 Morphological Adaptations¹ (Provide supporting data in Notes)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

10 % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

30 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/6/14</u>		Feature ID <u>W60HTJ057</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0-10							Fibric
10-20	10YR 2/1	100					Silt loam

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2-4</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	
Notes: <u>Tusssocks</u>		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>3</u> Sapling (<5 dbh, <6m tall) <u>6</u> Tall shrub (2-6m) <u>3</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>90</u> Short herb (<1m) <u>15</u> Moss-Lichen <u>10</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <input checked="" type="checkbox"/> High Density (60-80%) _____ Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <input checked="" type="checkbox"/> >75% Scattered or Peripheral Cover _____ N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____	
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A <input checked="" type="checkbox"/>	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>	
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <input checked="" type="checkbox"/> Mineral: Clayey _____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <input checked="" type="checkbox"/>
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>4.83</u>
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____

LANDSCAPE VARIABLES (M)
Wetland Juxtaposition: Wetland Isolated <input checked="" type="checkbox"/> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____
Size: Small (<10 acres) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT0575 JA Field Target: 132 Date: 7/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

Zoe Meade 7/6/14

X

Field Crew Chief (print)

X

Signature / Date

Sgt Christopher De 7/6/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				2000' corridor	
Survey Type: Centerline		Access Road (explain)		Other (explain) <input checked="" type="checkbox"/>	
Field Target: 139		Map #: 97 Map Date: 5/27/14			
Date: 7/6/14		Project Name & No.: Alaska LNG 26221306		Feature Id: W60HT050056	
Investigators: JC, LM, AF				Team No.: W60	
State: Alaska		Region: Alaska		Milepost: 656	
Latitude: 62°25'35.82"		Longitude: 150°16'03.36"		Datum: WGS84	
Logbook No.: 003		Logbook Page No.: 045		Picture No.: P.N.S. pit. plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-1	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)	
Are Vegetation, Soil, or Hydrology Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation, Soil, or Hydrology Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PSS1EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): III C2, III A X.2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

P45 for Sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1.				
2.				
3.				
4.				
Total Cover: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>52</u> X 1 = <u>52</u> FACW species: <u>61</u> X 2 = <u>122</u> FAC species: <u>8</u> X 3 = <u>24</u> FACU species: <u>0</u> X 4 = <u>0</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>124</u> (A) <u>198</u> (B) PI = B/A = <u>1.64</u>
1. <i>Chamaedaphne calyculata</i>	<u>20</u>	<u>Y</u>	<u>FACW</u>	
2. <i>Rhododendron tomentosum</i>	<u>20</u>	<u>Y</u>	<u>FACW</u>	
3. <i>Empetrum nigrum</i>	<u>5</u>		<u>FAC</u>	
4. <i>Betula nana</i>	<u>3</u>		<u>FAC</u>	
5. <i>Picea mariana</i>	<u>5</u>		<u>FACW</u>	
6. <i>Vaccinium oxycoccus</i>	<u>2</u>		<u>OBL</u>	
7. <i>Vaccinium vitis-idaea</i>	<u>TR</u>		<u>FAC</u>	
8.				
9.				
Total Cover: <u>55</u> 50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Carex microchaeta</i>	<u>10</u>		<u>FACW</u>	
2. <i>Carex microglochin</i>	<u>50</u>	<u>Y</u>	<u>OBL</u>	
3. <i>Rubus Chamdemorvus</i>	<u>6</u>		<u>FACW</u>	
4.				
5.				
6.				
7.				
8.				
9.				
10.				_____ % Bare Ground _____ % Cover of Wetland Bryophytes _____ % Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
Total Cover: <u>66</u> 50% of total cover: <u>33</u> 20% of total cover: <u>13.2</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>7/6/14</u>		Feature ID <u>W60HI 058</u>		Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	—	—	—	—	—	—	Fibric	Organics, saturated

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: _____ Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0</u>	

Notes: Stunted grass (shrub)

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0.5</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>52.4</u> Dwarf shrub (<0.5m) <u>2</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>6.6</u> Moss-Lichen <u>10.0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT586

Field Target: 139

Date: 7/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade

Wetland Scientist (print)

X

Signature / Date

[Signature] 7/6/14

X

Field Crew Chief (print)

X

Signature / Date

[Signature] 7/6/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/>		Field Target: 202	Map #: 1 Map Date: 8/29/14
Date: 9/3/2014	Project Name & No.: Alaska LNG 26221306		Feature Id: W60 HT 052 57 (1)
Investigators: JC, JA			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 664.6	
Latitude: 62° 21' 14.69		Longitude: 150° 16' 28.25	Datum: WGS84
Logbook No.: W60 - B	Logbook Page No.: 1	Picture No.: W60	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 0	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): IIIA3/II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Full
W60-3 P1
LogBook

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>			
2.			
3.			
4.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	5%		Fac W
2. <i>Rhododendrum greenlandicum</i>	5%		Fac
3. <i>Betula nana</i>	7%		Fac
4. <i>Chamaedaphne calyculata</i>	30%	Y	Fac W
5. <i>Empetrum nigrum</i>	3%		Fac
6. <i>Picea glauca</i>	5%		Fac U
7.			
8.			
9.			
Total Cover: <u>55%</u> 50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 63 X 1 = 63
 FACW species: 35 X 2 = 70
 FAC species: 16 X 3 = 48
 FACU species: 5 X 4 = 20
 UPL species: 0 X 5 = 0
 Column Totals: 119 (A) 201 (B)
 PI = B/A = 1.68

VEGETATION (use scientific names of plants)			
Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex limosa</i>	60	Y	Obl
2. <i>Carex microglochin</i>	3%		Obl
3. <i>Calamagrostis canadensis</i>	1%		Fac
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>64%</u> 50% of total cover: <u>32%</u> 20% of total cover: <u>12.8</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
NA % Cover of Wetland Bryophytes
100 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

057 82

SOIL		Date <u>9/3/14</u> Feature ID <u>W100311 852</u>				Soil Pit Required (Y/N) <u>X</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20							Fabric	Saturated

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer	
Thick Dark Surface (A12) _____		Other (Explain in Notes)	

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

Restrictive Layer (if present): Type: None Depth (inches): Na

Hydric Soil Present (Y/N): Y

Notes:
Hydric soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) <u>X</u>
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>Na</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0"</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0"</u>	

Notes:
Hydrology observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <input checked="" type="checkbox"/> Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>—</u> Short shrub (0.5-2m) <u>42</u> Dwarf shrub (<0.5m) <u>3</u> Tall herb (≥1m) <u>64</u> Short herb (<1m) <u>—</u> Moss-Lichen <u>100</u> Floating <u>—</u> Submerged <u>—</u>	
Number of Wetland Types (M): <u>3</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <input checked="" type="checkbox"/> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <input checked="" type="checkbox"/> Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____	
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>	
Dead Woody Material (P): Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estuarine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <input checked="" type="checkbox"/> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <input checked="" type="checkbox"/> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <input checked="" type="checkbox"/> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <input checked="" type="checkbox"/> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <input checked="" type="checkbox"/> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) <input checked="" type="checkbox"/>	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6015057  Field Target: 202 Date: 9/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

X

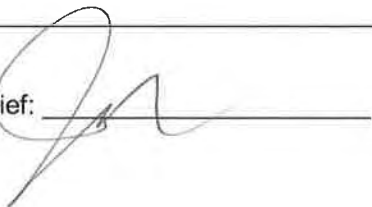
Signature / Date

Jennifer Anderson 9/3/14

Vegetation Classification Data Form

Site Description		
Date: 9/3/14	Project Name & #: Alaska LNG 26221306	Field Target: 202
Investigators: SC/SA		Feature ID: W60 HTO 508
Latitude:	Longitude:	Datum: WGS84
Logbook #: W60-14	Logbook Page #: 2	Picture #: W60 NE, SW
Location Description:		
Upland knoll		
Common Species Observed (Scientific Name)		
Alnus sp	Betula neoalaskana	
Gymnocarpium dryopteris	Lycopodium sp	
Shepherdia canadensis		
Picea glauca		
Percent Cover of Dominant Structure Level:		
Habitat Description:		
Mixed forest (open)		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2, FC2		
Notes:		

Field Crew Chief:



Field Scientist/Technician



Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I Forest	A Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II Scrub	A Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C Low scrub	(1) Closed low scrub (2) Open low scrub
	D Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III Herbaceous	A Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C Bryoid herbaceous	(1) Mosses (2) Lichens
	D Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I Forest	2
1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant)		7
I Forest		
2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species	I A Needleleaf forest	3
2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species		4
3a. Tree canopy of 60-100 percent cover	I A 1 Closed needleleaf forest	
3b. Tree canopy of 25-59 percent cover	I A 2 Open needleleaf forest	
3c. Tree canopy of 10-24 percent cover	I A 3 Needleleaf woodland	
4a. Over 75 percent of tree cover contributed by broadleaf species	I B Broadleaf forest	5
4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover		6
5a. Tree canopy of 60-100 percent cover	I B 1 Closed broadleaf forest	
5b. Tree canopy of 25-59 percent cover	I B 2 Open broadleaf forest	
5c. Tree canopy of 10-24 percent cover	I B 3 Broadleaf woodland	
6a. Tree canopy of 60-100 percent cover	I C 1 Closed mixed forest	
6b. Tree canopy of 25-59 percent cover	I C 2 Open mixed forest	
6c. Tree canopy of 10-24 percent cover	I C 3 Mixed woodland	
7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)		8
7b. Vegetation herbaceous (may have up to 25 percent shrub cover)		15

II. Scrub		
8a. Vegetation with at least 10 percent cover of dwarf trees	II A Dwarf tree scrub	9
8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees		10
9a. Dwarf tree canopy of 60-100 percent cover	II A.1 Closed dwarf tree scrub	
9b. Dwarf tree canopy of 25-59 percent cover	II A.2 Open dwarf tree scrub	
9c. Dwarf tree canopy of 10-24 percent cover	II A 3 Dwarf tree scrub woodland	
10a. Shrubs more than 1.5 meters (5 ft) tall	II B Tall scrub	11
10b. Shrubs less than 1.5 meters (5 ft) tall		12
11 a. Shrub canopy cover greater than 75 percent	II B.1 Closed tall scrub	
11 b. Shrub canopy cover of 25-74 percent	II B 2 Open tall scrub	
12a. Shrubs 20 centimeters to 1.5 meters tall	II C Low scrub	13
12b. Shrubs under 20 centimeters in height	II D Dwarf scrub	14
13a. Shrub canopy cover greater than 75 percent	II C.1 Closed low scrub	
13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II C.2 Open low scrub	
14a. Dryas species dominant in the dwarf shrub layer	II D.1 Dryas dwarf scrub	
14b. Ericaceous species dominant in the dwarf shrub layer	II D.2 Ericaceous dwarf scrub	
14c. Willow species dominant in the dwarf shrub layer	II D.2 Willow dwarf scrub	
III. Herbaceous		
15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation		16
15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III D Aquatic herbaceous	21

16a. Grasses, sedges, or rushes (graminoid) plants dominant	III A Graminoid herbaceous	17
16b. Forbs or bryophytes dominant		18
17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by <i>Elymus</i> spp., <i>Festuca</i> spp., and <i>Deschampsia</i> spp.	III A.1 Dry graminoid herbaceous	
17b. On moist sites, but usually not with standing water. Usually dominated by <i>Calamagrostis</i> spp., <i>Carex</i> spp. or <i>Eriophorum</i> spp.; tussocks often present	III A.2 Mesic graminoid herbaceous	
17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III A 3 Wet graminoid herbaceous	
18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III B Forb herbaceous	19
18b. Vegetation dominated by mosses or lichens	III C Bryoid herbaceous	20
19a. On dry sites, usually rocky and well drained; mostly tundra sites	III B.1 Dry forb herbaceous	
19b. On moist sites but without standing water, mostly within forested areas	III B.2 Mesic forb herbaceous	
19c. On wet sites, usually with standing water for part of the year	III B.3 Wet forb herbaceous	
20a. Vegetation cover dominated by mosses	III C.1 Bryoid moss	
20b. Vegetation cover dominated by lichens	III C.2 Bryoid lichen	
21a. Vegetation submerged or floating in fresh water	III D.1 Freshwater aquatic herbaceous	
21 b. Vegetation submerged or floating in brackish water	III D.2 Brackish water aquatic herbaceous	
21c. Vegetation submerged or floating in salt water	III D 3 Marine aquatic herbaceous	

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60HT0519 Field Target: 202 Date: 9/3/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. General Information

- ☒ Location data recorded?
- ☒ Photo taken and photo number recorded?

2. Location Description

- ☒ Location of site recorded with enough detail to help relocate?

3. Common Species

- ☒ Scientific name of common species recorded?
- ☒ Percent cover of dominant structure level noted?

4. Habitat Description

- ☒ Habitat described?

5. Classification

- ☒ All three levels of classification recorded?

6. Field Log Book

- ☒ Field form entries consistent with log book?
- ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson
Field Technician (print)

X [Signature] 9/3/14
Signature

X Kee Christopher
Field Crew Chief (print)

X [Signature] 9/3/14
Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 203	Map #: 2 Map Date: 8/29/14
Date: 9/3/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60 HT059
Investigators: JC, JA			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 666.43	
Latitude: 62° 19' 47.61" 47.61" N	Longitude: 150° 16' 35.51" W	Datum: WGS84	
Logbook No.: W60-4	Logbook Page No.: 3	Picture No.: W60 HT059	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 3-540	Local relief (concave, convex, none): CONVEY
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: UPL
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): IC2, IC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Recent heavy rainfall

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	10%	Y	Fac U
2. <i>Betula neolaskana</i>	25%	Y	Fac U
3.			
4.			
Total Cover: <u>35%</u>			
50% of total cover: <u>17.5</u> 20% of total cover: <u>7%</u>			
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Shepherdia canadensis</i>	25%	Y	Fac U
2. <i>Spiraea Stevenii</i>	5%		Fac U
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>30%</u>			
50% of total cover: <u>15%</u> 20% of total cover: <u>6%</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: — X 1 = _____
 FACW species: 15 X 2 = 30
 FAC species: 95 X 3 = 285
 FACU species: 80 X 4 = 320
 UPL species: — X 5 = _____
 Column Totals: 190 (A) 635 (B)
 PI = B/A = 3.34

VEGETATION (use scientific names of plants)			
Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Athyrium cylasurum</i>	35%	Y	Fac
2. <i>Calamagrostis canadensis</i>	50%	Y	Fac
3. <i>Rubus Chamaemorus</i>	15%		Fac W
4. <i>Cornus canadensis</i>	15%		Fac U
5. <i>Equisetum sylvaticum</i>	10%		Fac
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>125</u>			
50% of total cover: <u>62.5</u> 20% of total cover: <u>25%</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
☒ Morphological Adaptations¹ (Provide supporting data in Notes)
☒ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

% Bare Ground: 0
 % Cover of Wetland Bryophytes: NA
 Total Cover of Bryophytes: 5
 % Cover of Water: 0
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>8/13/19</u>		Feature ID <u>W000159</u>		Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features			Texture	Notes	
	Color (moist)	%	Color (moist)	%	Type ¹			Loc ²
0-9"							Fibric	Saturated
9-20"	10YR 2/2	100					SL	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer	
Thick Dark Surface (A12) _____		Other (Explain in Notes)	

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

Restrictive Layer (if present): Type: Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes: Recent heavy rains likely influencing field indicator.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: <u>Recent Heavy Rains</u> <u>Like Int. Field Indicators</u>	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>0"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4"</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>X</u>	Depth (in): <u>0"</u>	

Notes: See notes for hydric soil notes.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		
SOIL VARIABLES		
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____		
HYDROLOGIC VARIABLES		
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____		
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____		
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____		
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____		
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____		
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____		
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____		
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____		
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____		
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____		
LANDSCAPE VARIABLES (M)		
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____		
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____		
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____		
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____		

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60HT059 Field Target: 903 Date: 9/13/14
For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

Upland

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

Full point

X

Jennifer Anderson

Wetland Scientist (print)

X

Jennifer Anderson 9/3/14

Signature / Date

X

Joe Christopher

Field Crew Chief (print)

X

Joe Christopher 9/3/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: 053	Map #: 34/130 Map Date: 5/27/14
Date: 6/27/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61 HT 001
Investigators: K DEWITS J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 522.8	
Latitude: 63° 53' 08.043"	Longitude: 149° 04' 30.719"	Datum: WGS84	
Logbook No.: W61-2	Logbook Page No.: 1	Picture No.: P-W61 H001 - P1; Plug: SW, NE	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS 1/4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation, Soil, or Hydrology Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PSS-3 PSS1/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): IIC1, IIA23

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 1 for sketch
 & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea glauca</i>	15	Y	FACU
2.				
3.				
4.				
Total Cover: <u>15</u>				
50% of total cover: <u>7.5</u>		20% of total cover: <u>3</u>		
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula glandulosa</i>	80	Y	FAC
2.	<i>Vaccinium vitis-idaea</i>	10		FAC
3.	<i>Vaccinium uliginosum</i>	20		FAC
4.	<i>Picea glauca</i>	10		FACU
5.	<i>Salix purpurea</i>	15		FAC
6.				
7.				
8.				
9.				
Total Cover: <u>135</u>				
50% of total cover: <u>67.5</u>		20% of total cover: <u>27</u>		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: — X 1 = —

FACW species: 2 X 2 = 4

FAC species: 135 X 3 = 405

FACU species: 29 X 4 = 100

UPL species: — X 5 = —

Column Totals: 162 (A) 509 (B)

PI = B/A = 3.14

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Petasites frigidus</i>	2		FACW
2.	<i>Calamagrostis canadensis</i>	10	Y	FAC
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>12</u>				
50% of total cover: <u>6</u>		20% of total cover: <u>2.4</u>		

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%

☐ Prevalence Index is ≤ 3.0

☐ Morphological Adaptations¹ (Provide supporting data in Notes)

☐ Problematic Hydrophytic Vegetation¹ (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

40% Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/27/14</u> Feature ID <u>W21 HT001</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)					
Depth (inches)	Matrix		Redox Features		Notes
	Color (moist)	%	Color (moist)	%	
<u>0-4</u>					<u>Fabric Saturated</u>
<u>4-5</u>	<u>10YR 5/1</u>	<u>390</u>	<u>7.5YR 5/8</u>	<u>10</u>	<u>C m</u>
<u>5-6</u>	<u>10YR 5/1</u>	<u>100</u>	<u>7.5YR 5/8</u>	<u>40</u>	<u>C M</u>
<u>6"</u>	<u>Frozen</u>				

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Redox with 2.5Y Hue _____
Thick Dark Surface (A12) _____	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: FROZEN Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) <u>X</u>
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>1/2"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0"</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>15</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>115</u> Dwarf shrub (<0.5m) <u>10</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>12</u> Moss-Lichen <u>40</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>0</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>0</u> N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site _____ Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>0</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>0</u>		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>0</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>0</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>0</u> pH Reading <u>5.34</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable <u>0</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>0</u>	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized <u>X</u> 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

[Signature]

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61H001

Field Target: 053

Date: 6/27/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Jennifer Anderson

Wetland Scientist (print)

X

Jennifer Anderson

Signature / Date

X

Kim DeGroot

Field Crew Chief (print)

X

Billy C. Hoff

Signature / Date

6/27/14

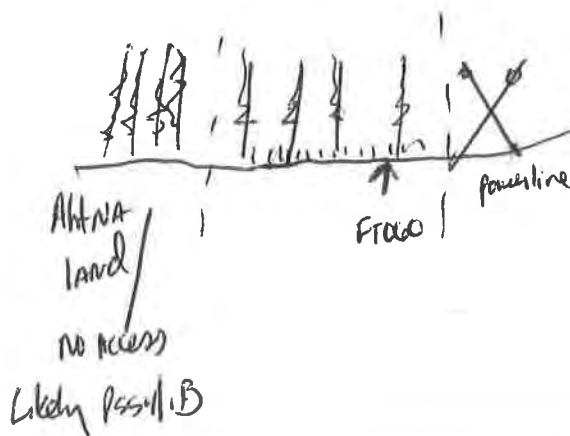
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u>	Access Road (explain) _____	Other (explain) _____	Field Target: <u>060</u>
Date: <u>6/28/14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>	Feature Id: <u>W61 H1002</u>	Map #: <u>39130</u> Map Date: <u>5/27/14</u>
Investigators: <u>L. DeGaris</u>	<u>J. Anderson</u>	<u>A. Fisher</u>	Team No.: <u>W61</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>547.5</u>	
Latitude: <u>63° 36' 26.76"</u>	Longitude: <u>148° 46' 21.20"</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>W61-2</u>	Logbook Page No.: <u>4</u>	Picture No.: <u>P-W61H1002-PT; Plug, SW, SE</u>	

SITE PARAMETERS	
Subregion: <u>Interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>FLAT Slope</u>
Slope (%): <u>2</u>	Local relief (concave, convex, none): <u>NONE</u>
Pre-mapped Alaska LNG/NWI classification: <u>UPLAND</u>	Soil Map Unit Name: _____
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <u>X</u> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <u>X</u> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PFO4/SS1B PSS-14B PSS4/1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <u>IA2, IC1</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 4
for site sketch & notes



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	20	Y	FACW
2.			
3.			
4.			
Total Cover: <u>20</u> 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	35	X	FAC
2. <i>Rhododendron groenlandicum</i>	30	Y	FAC
3. <i>Vaccinium uliginosum</i>	30	Y	FAC
4. <i>Vaccinium vitis-idaea</i>	20		FAC
5. <i>Empetrum nigrum</i>	8		FAC
6. <i>Salix pulchra</i>	5		FACW
7. <i>Picea Mariana</i>	25		FACW
8.			
9.			
Total Cover: <u>153</u> 50% of total cover: <u>76.5</u> 20% of total cover: <u>30.6</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: — X 1 = —
 FACW species: 80 X 2 = 160
 FAC species: 125 X 3 = 375
 FACU species: — X 4 = —
 UPL species: — X 5 = —
 Column Totals: 205 (A) 535 (B)
 PI = B/A = 2.6

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	25	Y	FACW
2. <i>Geocaulon lividum</i>	T		FACU
3. <i>Petasites frigidus</i>	5		FACW
4. <i>Carex spp.</i>	T		FAC
5. <i>Rubus chamaemorus</i>			FACW
6. <i>Calamagrostis canadensis</i>	2		FAC
7.			
8.			
9.			
10.			
Total Cover: <u>32</u> 50% of total cover: <u>16</u> 20% of total cover: <u>6.4</u>			

Hydrophytic Vegetation Indicators:
☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
 _____ Morphological Adaptations¹ (Provide supporting data in Notes)
 _____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

3 % Bare Ground
 _____ % Cover of Wetland Bryophytes
50 Total Cover of Bryophytes
0 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/22/14</u> Feature ID <u>W6LHT002</u>				Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0-7"							Fabric Saturated
7"	Frozen						

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: Frozen Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) <u>X</u>
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>0"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>6.5"</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved <u>X</u> Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>20</u> Sapling (<5 dbh, <6m tall) <u>25</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>118</u> Dwarf shrub (<0.5m) <u>20</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>32</u> Moss-Lichen <u>50</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u> Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope <u>X</u> Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable <u>X</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <u>X</u>	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61HT002

Field Target: 060

Date: 6/28/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Jennifer Anderson
Wetland Scientist (print)

X

Jennifer Anderson 6/28/14
Signature / Date

X

Kimberly DeGroot
Field Crew Chief (print)

X

Kimberly DeGroot 6/28/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 057	Map #: 31130 Map Date: 5/27/14
Date: 6/28/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61HT003
Investigators: K DeGoutis J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 542.55	
Latitude: 63° 40' 19.27"		Longitude: 148° 45' 51.92"	Datum: WGS84
Logbook No.: W61-2	Logbook Page No.: 5	Picture No.: P-W61HT003 Pt. Plug: SE, NW	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 2	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PSS1/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): ILC1, IIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 5
for site sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	12	Y	FACU
2.			
3.			
4.			

Total Cover: 12

50% of total cover: 6 20% of total cover: 2.4

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	20	Y	FACU
2. <i>Betula glandulosa</i>	35	Y	FAC
3. <i>Rhododendron greenlandicum</i>	20	Y	FAC
4. <i>Vaccinium uliginosum</i>	20	Y	FAC
5. <i>Vaccinium vitis-idaea</i>	10		FAC
6. <i>Salix myrtillofolia</i>	12		FACW
7. <i>Empetrum nigrum</i>	20	Y	FAC
8. <i>Arctostaphylos rubra</i>	10		FAC
9. <i>Salix pulchra</i>	5		FACW

Total Cover: 157

50% of total cover: 78.5 20% of total cover: 31.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)
 Total Number of Dominant Species Across All Strata: 8 (B)
 % Dominant Species that are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: — X 1 = —

FACW species: 20 X 2 = 40

FAC species: 128 X 3 = 384

FACU species: 34 X 4 = 136

UPL species: — X 5 = —

Column Totals: 182 (A) 560 (B)

PI = B/A = 3.08

Dasiphora fruticosa T FAC
Salix glauca S FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Petasites frigidus</i>	3	Y	FACW
2. <i>Equisetum scirpoides</i>	T		FACU
3. <i>Calamagrostis canadensis</i>	8	Y	FAC
4. Unknown herb	T		ASSGOTS FAC
5. <i>Mertensia paniculata</i>	2		FACU
6.			
7.			
8.			
9.			
10.			

Total Cover: 13

50% of total cover: 6.5 20% of total cover: 2.6

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

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

5 % Bare Ground
— % Cover of Wetland Bryophytes
39% Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below)

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/28/14</u> Feature ID <u>W61 H7003</u>		Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)						
Depth (inches)	Matrix		Redox Features		Texture	Notes
	Color (moist)	%	Color (moist)	%		
<u>0-7"</u>	<u>2.5Y 4/2</u>				<u>Fibric Silt</u>	<u>Saturated</u>
<u>7-8"</u>						
<u>8"</u>	<u>Frozen</u>					

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) <u>X</u>	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: Frozen Depth (inches): 8"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) <u>X</u>
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): _____	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0'</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>12</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>117</u> Dwarf shrub (<0.5m) <u>20</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>13</u> Moss-Lichen <u>35</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u> Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A <u>X</u>		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty <u>X</u> Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable <u>X</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61 HT003 Field Target: 057 Date: 6/28/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Jennifer Anderson

Wetland Scientist (print)

X

Jennifer Anderson 6/28/14

Signature / Date

X

Kimberly DeGris

Field Crew Chief (print)

X

Kimberly DeGris 6/28/14

Signature / Date

WETLAND DETERMINATION DATA FORM

2000'

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <u>OSB</u>	Map #: <u>31130</u> Map Date: <u>5/27/14</u>
Date: <u>6/28/14</u>	Project Name & No.: Alaska LNG 26221306		Feature Id: <u>W61HT004</u>
Investigators: <u>K DEGUIS</u> <u>J Anderson</u> <u>A Fisher</u>			Team No.: <u>W61</u>
State: Alaska	Region: Alaska	Milepost: <u>542.55</u>	
Latitude: <u>63° 40' 20.59</u>		Longitude: <u>148° 45' 47.96</u>	Datum: WGS84
Logbook No.: <u>W61-2</u>	Logbook Page No.: <u>6</u>	Picture No.: <u>P-W61HT004-Pt; Plug; NE; S</u>	

SITE PARAMETERS	
Subregion: <u>Interion</u>	Landform (hillslope, terrace, hummocks, etc.): <u>FLAT</u>
Slope (%): <u>2</u>	Local relief (concave, convex, none): <u>CONVEX</u>
Pre-mapped Alaska LNG/NWI classification: <u>UPLAND</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>UPLAND</u>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IIc1, I A2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 6
for site sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	No. of Dominant Species that are OBL, FACW, or FAC: <u>6</u> (A)	
1. <i>Picea glauca</i>	15	Y	FACU	Total Number of Dominant Species Across All Strata: <u>6</u> (B)	
2.				% Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)	<u>100%</u>
3.					
4.					
Total Cover: <u>15</u>				Prevalence Index worksheet:	
50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: _____ X 1 = _____	
1. <i>Salix myrtillofolia</i>	10		FACW	FACW species: <u>10</u> X 2 = <u>20</u>	
2. <i>Vaccinium uliginosum</i>	20	Y	FAC	FAC species: <u>134</u> X 3 = <u>402</u>	
3. <i>Arctostaphylos rubra</i>	5		FAC	FACU species: <u>27</u> X 4 = <u>108</u>	
4. <i>Vaccinium vitis-idaea</i>	10		FAC	UPL species: _____ X 5 = _____	
5. <i>Rhododendron groenlandicum</i>	30	Y	FAC	Column Totals: <u>171</u> (A) <u>539</u> (B) <u>530</u>	
6. <i>Salix glauca</i>	10		FAC	PI = B/A = <u>3.0</u> <u>3.10</u>	
7. <i>Betula nana</i>	40	Y	FAC		
8. <i>Alnus tenuifolia</i>	8		FAC	<i>Salix pseudomonticola</i> 5 FAC	
9. <i>Picea glauca</i>	10		FACU	<i>Empetrum nigrum</i> 3 FAC	
Total Cover: <u>153</u>				<i>Rosa acicularis</i> 2 FACU	
50% of total cover: <u>76.5</u> 20% of total cover: <u>30.6</u>				<i>Salix arbusculoides</i> 1 FACU	

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50%	
1. <i>Calamagrostis canadensis</i>	3	Y	FAC	<input type="checkbox"/> Prevalence Index is ≤ 3.0	
2. <i>Mertensia paniculata</i>	T		FACU	<input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes)	
3. <i>Petasites frigidus</i>	T		FACU	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
4. <i>Pea sp</i>	8	Y	Assume FAC	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
5. Unknown herb	T		Assume FAC		
6.					
7.					
8.					
9.					
10.					
Total Cover: <u>11</u>				% Bare Ground: <u>10</u>	
50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				% Cover of Wetland Bryophytes: <u>-</u>	
				Total Cover of Bryophytes: <u>20%</u>	
				% Cover of Water: <u>0</u>	
				Hydrophytic Vegetation Present (Y/N): <u>Y</u>	
				Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/28/14</u> Feature ID <u>W61HT004</u>		Soil Pit Required (Y/N) <u>Y</u>	
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)					
Depth (inches)	Matrix		Redox Features		Notes
	Color (moist)	%	Color (moist)	%	
0-2.5"					Fibric Dry
2.5-5"					Moist Fibric Moist
5"-16"	2.5Y 4/1	70	10YR 5/6	30	C M Not distinct or prominent
16"	Cobbles				

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____
Hydrogen Sulfide (A4) _____	Alaska Color Change (TA4) ⁴ _____
Thick Dark Surface (A12) _____	Alaska Alpine Swales (TA5) _____
	Alaska Redox with 2.5Y Hue _____
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
	Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: Cobbles Depth (inches): 16"

Hydric Soil Present (Y/N): N

Notes: Does not satisfy (A11) or Ak Redox w/2.5Y Hues

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>Ø</u>	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>N</u>	Depth (in): <u>Ø</u>	
Saturation Present (Y/N): <u>N</u> (includes capillary fringe)	Depth (in): <u>Ø</u>	
Notes:		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (≥25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61HToch

Field Target: 050

Date: 6/28/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X Jennifer Anderson 6/28/14
Signature / Date

X Kimberly DEGOTO
Field Crew Chief (print)

X Kelly White 6/28/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>059</u>	Map #: <u>30130</u> Map Date: <u>5/27/13</u>
Date: <u>6/29/14</u>	Project Name & No.: <u>Alaska LNG 26221306</u>		Feature Id: <u>W61HT005</u>
Investigators: <u>K DEGENIS</u> <u>J ANDERSON</u> <u>A Fisher</u>			Team No.: <u>W61</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>544.85</u>	
Latitude: <u>63° 38' 29.10"</u>		Longitude: <u>148° 44' 20.12"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>W61-2</u>	Logbook Page No.: <u>9</u>	Picture No.: <u>P W61HT005_Dit; Plug; SE; NE</u>	

SITE PARAMETERS	
Subregion: <u>Interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flats</u>
Slope (%): <u>2</u>	Local relief (concave, convex, none): <u>Convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>Upland</u>	Soil Map Unit Name: _____
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>UPLAND</u> PERMIB <u>PSS4/13</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>IA2, IIC1, IIB2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 9
for site sketch & notes

IA2, IIC2
changed by
E.H.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	25	Y	FACU
2.			
3.			
4.			
Total Cover: <u>25</u>			
50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	15		FACU
2. <i>Betula glandulosa</i>	10		FAC
3. <i>Arctostaphylos rubra</i>	25	Y	FAC
4. <i>Vaccinium uliginosum</i>	40	Y	FAC
5. <i>Rhododendron groenlandicum</i>	20	Y	FAC
6. <i>Vaccinium vitis-idaea</i>	5		FAC
7. <i>Empetrum nigrum</i>	8		FAC
8. <i>Salix pseudomyrsinites</i>	2		FACU FAC
9. <i>Salix glauca</i>	10		FAC
Total Cover: <u>139</u>			
50% of total cover: <u>68.5</u> 20% of total cover: <u>27.4</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
 OBL species: — X 1 = —
 FACW species: 1 X 2 = 2
 FAC species: 118 X 3 = 354
 FACU species: 40 X 4 = 160
 UPL species: — X 5 = —
 Column Totals: 159 (A) 516 (B)
 PI = B/A = 3.25

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Petasites frigidus</i>	1		FACW
2. <i>Poa</i> sp.	1		Assume FAC
3. <i>Mertensia paniculata</i>	T		FAC
4. Unknown herb	T		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>10</u>			
50% of total cover: _____ 20% of total cover: _____			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%
☐ Prevalence Index is ≤ 3.0
☐ Morphological Adaptations¹ (Provide supporting data in Notes)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

10 % Bare Ground
 _____ % Cover of Wetland Bryophytes
10 % Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Herb stratum added to shrub stratum since < 5% cover

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/29/14</u>	Feature ID <u>W61 HT005</u>		Soil Pit Required (Y/N) <u>Y</u>			
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-3</u>							<u>fibric</u>	<u>Saturated</u>
<u>3-7</u>							<u>hemric</u>	<u>Saturated</u>
<u>7-13"</u>	<u>10YR 3/2</u>	<u>90</u>	<u>10YR 5/6</u>	<u>10</u>	<u>C</u>	<u>M</u>	<u>Sandy silt loam</u>	
<u>13"</u>	<u>Refusal - HARD PAN</u>							

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: HARD PAN Depth (inches): 13"

Hydric Soil Present (Y/N): NY

Notes: 7" of saturated organic

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) <u>X</u>
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			
Surface Water Present (Y/N): <u>N</u>	Depth (in): <u>0</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>13"</u>		
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>3"</u>		
Notes: _____			

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____		
Number of Wetland Types (M): _____		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
Presence of Islands (M): Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____		
SOIL VARIABLES		
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____		
HYDROLOGIC VARIABLES		
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____		
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____		
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____		
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____		
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____		
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____		
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____		
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____		
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) _____		
Evidence of Seeps and Springs (P): No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____		
LANDSCAPE VARIABLES (M)		
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____		
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____		
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____		
Size: Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____		

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61 HT005

Field Target: OS9

Date: 6/29/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X Jennifer Anderson 6/29/14
Signature / Date

X Kim DeGroot
Field Crew Chief (print)

X Andy Mh 6/29/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 072	Map #: 48130 Map Date: 5/27/14
Date: 6/29/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61 HTO06
Investigators: K DeGroot J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 572	
Latitude: 63° 20' 57.98"		Longitude: 149° 04' 30.38"	Datum: WGS84
Logbook No.: W61-2	Logbook Page No.: 10	Picture No.: P-W61 HTO06 - Pit; Plug; W/E	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 0	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PEMIF	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PSS1C
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): III A3 II B1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

NO
1

See logbook W61-2, page
for notes & site sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>240'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>N/A</u>				
2.				
3.				
4.				
Total Cover: <u>N/A</u> 50% of total cover: _____ 20% of total cover: _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>5</u> X 1 = <u>5</u> FACW species: <u>57</u> X 2 = <u>114</u> FAC species: <u>63</u> X 3 = <u>189</u> FACU species: _____ X 4 = _____ UPL species: _____ X 5 = _____ Column Totals: <u>105</u> (A) <u>308</u> (B) PI = B/A = <u>2.46</u>
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Dasiphora fruticosa</u>	<u>40</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Salix pulchra</u>	<u>50</u>	<u>Y</u>	<u>FACW</u>	
3. <u>Vaccinium uliginosum</u>	<u>5</u>		<u>FAC</u>	
4. <u>Andromeda polifolia</u>	<u>2</u>		<u>FACW</u>	
5. <u>Betula glandulosa</u>	<u>2</u>		<u>FAC</u>	
6. <u>Salix arbusculoides</u>	<u>5</u>		<u>FACW</u>	
7. <u>Salix pseudomonticola</u>	<u>5</u>		<u>FAC</u>	
8.				
9.				
Total Cover: <u>109</u> 50% of total cover: <u>54.5</u> 20% of total cover: <u>21.8</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 _____ Morphological Adaptations ¹ (Provide supporting data in Notes) _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic
1. <u>Comarum palustre</u>	<u>3</u>		<u>OBL</u>	
2. <u>Rubus arcticus</u>	<u>1</u>		<u>FAC</u>	
3. <u>Carex sp (no inflores.)</u>	<u>10</u>	<u>Y</u>	<u>Assume FAC</u>	
4. <u>Equisetum fluviatile</u>	<u>1</u>		<u>OBL</u>	
5. <u>Caltha palustris</u>	<u>1</u>		<u>OBL</u>	
6.				<u>0</u> % Bare Ground <u>1</u> % Cover of Wetland Bryophytes <u>45%</u> Total Cover of Bryophytes <u>95</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
7.				
8.				
9.				
10.				
Total Cover: <u>16</u> 50% of total cover: <u>8</u> 20% of total cover: <u>3.2</u>				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/29/14</u>		Feature ID <u>WGA HT006</u>		Soil Pit Required (Y/N) <u>N</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-14</u>							<u>Fibric</u>	<u>Saturated</u>

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³	
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____	
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____	
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____	
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____	
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____	

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

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: unable to excavate soil pit due to excessive ponding; no restrictive layer encountered

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) <u>X</u>	Drainage Patterns (B10) _____	Geomorphic Position (D2) <u>X</u>
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>10"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0"</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes: _____		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>107</u> Dwarf shrub (<0.5m) <u>2</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>10</u> Moss-Lichen <u>45</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine <u>X</u> Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric <u>X</u> Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet <u>X</u>	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding _____ Return Interval 1-2 yrs <u>X</u> Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) <u>X</u> Acid (<5.5) _____ pH Reading <u>7.64</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____ <u>unknown?</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <u>X</u>	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural _____ 5-25% Urbanized <u>X</u> 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W614T006

Field Target: 072

Date: 6/29/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X Jennifer Anderson 6/29/14
Signature / Date

X Kim DeGutis
Field Crew Chief (print)

X Kim DeGutis 6/29/14
Signature / Date

WETLAND DETERMINATION DATA FORM

2000-ft corridor

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target: 080
Date: 6/29/14	Project Name & No.: Alaska LNG 26221306	Feature Id: W61HT007	Map #: 541130 Map Date: 5/27/14
Investigators: K DeGutis J Anderson A Fisher	Team No.: W61		
State: Alaska	Region: Alaska	Milepost: 590.1	
Latitude: 63° 09' 27.33"	Longitude: 149° 24' 38.27"	Datum: WGS84	
Logbook No.: W61-2	Logbook Page No.: 12	Picture No.: P-W61HT007; P+; P+; W; N	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PEMIF	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No	Wetland Type: PEMIF
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): IIIA3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 12
for site sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26' 15'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>N/A</u>			
2.			
3.			
4.			
Total Cover: <u>N/A</u> 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>15'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Picea glauca</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>
2. <u>Betula nana</u>	<u>2</u>	<u>Y</u>	<u>FAC</u>
3. <u>Dasiphora fruticosa</u>	<u>8</u>	<u>Y</u>	<u>FAC</u>
4. <u>Vaccinium oxycoccus</u>	<u>1</u>		<u>OBL</u>
5. <u>Andromeda polifolia</u>	<u>1</u>		<u>FACW</u>
6. <u>Comarum palustre</u>	<u>3</u>		<u>OBL</u>
7. <u>Vaccinium uliginosum</u>	<u>2</u>		<u>FAC</u>
8.			
9.			
Total Cover: <u>27 24</u> 50% of total cover: <u>13.5</u> 20% of total cover: <u>5.4</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
% Dominant Species that are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:
OBL species: 30 X 1 = 30
FACW species: 3 X 2 = 6
FAC species: 75 X 3 = 225
FACU species: 10 X 4 = 40
UPL species: — X 5 = —
Column Totals: 118 (A) 301 (B)
PI = B/A = 2.55

VEGETATION (use scientific names of plants)

Herb Stratum (<u>15'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Pedicularis labradorica</u>	<u>1</u>		<u>FACW</u>
2. <u>Equisetum fluviatile</u>	<u>1</u>		<u>OBL</u>
3. <u>Plantanthera dilatata</u>	<u>1</u>		<u>FACW</u>
4. <u>Drosera rotundifolia</u>	<u>T</u>		<u>OBL</u>
5. <u>Viola lanugolobit palustris</u>	<u>T</u>		<u>FACW</u>
6. <u>Beckmannia syzigachne</u>	<u>25</u>	<u>Y</u>	<u>OBL</u>
7. <u>Festuca altaica</u>	<u>60</u>	<u>Y</u>	<u>FAC</u>
8. <u>Potentilla sp.</u>	<u>3</u>		<u>Assume FAC</u>
9. <u>Unknown sp.</u>	<u>T</u>		<u>Assume FAC</u>
10. <u>Comarum palustre</u>	<u>3</u>		<u>OBL</u>
Total Cover: <u>91 94</u> 50% of total cover: <u>45.5</u> 20% of total cover: <u>18.2</u>			

Hydrophytic Vegetation Indicators:

☒ Dominance Test is > 50%
☒ Prevalence Index is ≤ 3.0
____ Morphological Adaptations¹ (Provide supporting data in Notes)
____ Problematic Hydrophytic Vegetation¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground
0 % Cover of Wetland Bryophytes
0 % Total Cover of Bryophytes
5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Sample plot shape altered to exclude adjacent upland

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/22/14</u> Feature ID <u>WG1HT007</u>				Soil Pit Required (Y/N) <u>Y</u>		
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-10"</u>							<u>Fibric</u>	<u>Saturated</u>
<u>10-18"</u>							<u>Hemic</u>	<u>Saturated</u>

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³
Histosol or Histel (A1) <u>X</u>	Alaska Gleyed (A13) _____	Alaska Color Change (TA4) ⁴ _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) _____

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

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: _____

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X</u>	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) <u>X</u>
High Water Table (A2) <u>X</u>	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) <u>X</u>	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) <u>X</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: _____	
Algal Mat or Crust (B4) _____	Other (Explain in Notes): _____		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>1/2"</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>1"</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>0"</u>	
Notes: _____		

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>12</u> Dwarf shrub (<0.5m) <u>5</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>91</u> Moss-Lichen <u>10</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover <u>X</u> >75% Scattered or Peripheral Cover <u>X</u> N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <u>X</u> Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Micorelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.86</u>	
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits <u>X</u> Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below <u>X</u> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: UG1 HT007 Field Target: 080 Date: 6/29/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. . Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Jennifer Anderson
Wetland Scientist (print)

X

Jennifer Anderson 6/29/14
Signature / Date

X

Kim DEGUAS
Field Crew Chief (print)

X

Kim DeGuis 6/29/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>P</u>
Date: <u>6/29/14</u>		Project Name & No.: Alaska LNG 26221306	Field Target: <u>081</u>
Investigators: <u>K Deyts</u> <u>J Anderson</u> <u>A Fisher</u>		Feature Id: <u>W61 HT008</u>	
State: Alaska	Region: Alaska	Milepost: <u>590.13</u>	Map #: <u>54130</u> Map Date: <u>5/27/14</u>
Latitude: <u>63° 09' 26.62"</u>		Longitude: <u>149° 24' 39.21"</u>	Datum: WGS84
Logbook No.: <u>W61-2</u>	Logbook Page No.: <u>12</u>	Picture No.: <u>P-W61HT008 - Ditch Plug; W; N</u>	

SITE PARAMETERS	
Subregion: <u>Interior</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flat</u>
Slope (%): <u>2</u>	Local relief (concave, convex, none): <u>CONVEX</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEMIF</u>	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No (if no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <u>P</u> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <u>P</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No	Is the Sampled Area within a Wetland? Yes <u>X</u> No
Hydric Soil Present? Yes <u>X</u> No	Wetland Type: <u>PEMIF</u>
Wetland Hydrology Present? Yes <u>X</u> No	Alaska Vegetation Classification (Vioreck): <u>III A3</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, page 12
for site sketch & notes