

ALASKA LNG PROJECT	DOCKET No. CP17-____-000 RESOURCE REPORT No. 2 APPENDIX G PART 11 OF 19	Doc No: USAKE-PT-SRREG-00- 000006-000 APRIL 14, 2017 REVISION: 0
	PUBLIC	

Part 11 of 19 of Appendix G of Resource Report No. 2

AQUATIC SITE ASSESSMENT DATA FORM

7.23.15

W8SLH046

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) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>30</u> Short shrub (0.5-2m) <u>8</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>70</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%) _____ 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 <input checked="" type="checkbox"/> 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 <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 <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) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.65</u>	
Surficial Geologic 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) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

James Brown

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH046 Field Target: 15163 Date: 7-23-15

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 Kaley Volper **X** Kaley Volper 7-23-15
Wetland Scientist (print) Signature / Date

X Jessie Brownlee **X** Jessie Brownlee 7-23-15
Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <input checked="" type="checkbox"/> Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: <u>JS162</u>	Map #: <u>94</u> Map Date: <u>6-18-15</u>
Date: <u>7-23-15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8SLH047</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>473.8</u>	
Latitude: <u>64.56512797°</u>		Longitude: <u>-149.1178127°</u>	Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>25</u>	Picture No.: <u>P-W8SLH047-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>IC1, IC2, U</u>	Evidence of Wildlife Use: <u>NON</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 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>U</u>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>IC1, IC2</u>

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

tall closed forest of Pic Glia, Pop Bal, Bet No. Little understory beside
for rose. FT moved from original location which was a clearing
with cut trees & soil disturbance,

WETLAND DETERMINATION DATA FORM

W85 L4047

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Populus balsamifera</i>	25	Y	FACU
2. <i>Picea canadica</i>	25	Y	FACU
3. <i>Betula nealastana</i>	15	Y	FAC
4.			

Total Cover: 65
50% of total cover: 32.5 20% of total cover: 13

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa acicularis</i>	50	Y	FACU
2. <i>Linnæa borealis</i>	2		FACU
3. <i>Cornus glaberrima</i>	5		FAC
4. <i>Viburnum edule</i>	5		FACU
5.			
6.			
7.			
8.			
9.			

Total Cover: 62
50% of total cover: 31 20% of total cover: 12.4

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: 0 Multiply by:
OBL species: 0 X 1 = 0
FACW species: 0 X 2 = 0
FAC species: 20 X 3 = 60
FACU species: 107 X 4 = 428
UPL species: 0 X 5 = 0
Column Totals: 127 (A) 488 (B)
PI = B/A = 3.8

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum pratense</i>	T		FACU
2. <i>Cornus canadensis</i>	T		FACU
3. <i>Calamagrostis canadensis</i>	BT		FAC
4. <i>Chamaenerion angustifolium</i>	T		FACU
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover:
50% of total cover: 20% of total cover:

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%
N 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
10 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

72315 W85LH047

Y

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		
0-2.5								
2.5-7	2.5Y 3/1	100					silt loam	Dry organics
7-9								
9-11	10YR 4/3						silt loam	
11-12								
12-20	10YR 4/3		2.5Y 4/1		D	M	silt loam	> Pellic
			10YR 4/3		C	M		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): 2

Hydric Soil Present (Y/N): N

Notes: platey soil with buried O horizons.

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

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

AQUATIC SITE ASSESSMENT 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 Geologic 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: W85LH047 Field Target: 15162 Date: 7-23-15

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~~ map

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 Haley Volper

Wetland Scientist (print)

X Haley Volper 7-23-15

Signature / Date

X Jessie Brownlee

Field Crew Chief (print)

X [Signature] 7-23-15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 1545	Map #: 58 Map Date: 6.18.15
Date: 7/30/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8344048
Investigators: Jesse Browner, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 42.4.8	
Latitude: 65°10'45.06"N	Longitude: 148°40'25.28"W	Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 24	Picture No.: P-W8344048-VEG-VEG-PIT-PIT	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 3-5	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U, 1A2	Evidence of Wildlife Use: Moose scat
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: U
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1A2

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

open
Mature Pie Mar/Firest w/trees ~ 20-35' tall. Little diversity in understory with thick feather moss. Frost ~ 12" deep but no signs of hydrology otherwise

Reviewed upland status and soil profile w/ Senior Staff Dan Laplant who agreed with upland call. JB 7.30.15

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100-ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	35	Y	FacW
2.			
3.			
4.			
Total Cover: <u>35</u> 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26-ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spiraea stevenii</i>	4		FacU
2. <i>Rhododendrum groenlandicum</i>	15	Y	Fac
3. <i>Vaccinium uliginosum</i>	1		Fac
4. <i>Vaccinium vitis-idaea</i>	3		Fac
5. <i>Rosa aricularis</i>	2		FacU
6. <i>Picea Mariana</i>	6	Y	FacW
7. <i>Picea glauca</i>	1		FacU
8.			
9.			
Total Cover: <u>31</u> 50% of total cover: <u>15.5</u> 20% of total cover: <u>6.2</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 4 X 1 = 4
 FACW species: 43 X 2 = 86
 FAC species: 31 X 3 = 93
 FACU species: 14 X 4 = 56
 UPL species: 2 X 5 = 10
 Column Totals: 68 (A) 235 (B)
 PI = B/A = 2.67

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26-ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	13	Y	Fac
2. <i>Rubus chamaemorus</i>	2		FacW
3. <i>Geocaulon lividum</i>	7	Y	FacU
4. <i>Arctagrostis latifolia</i>	1		FacW
5. <i>Calamagrostis lapponica</i>	7		Fac
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>22</u> 50% of total cover: <u>11</u> 20% of total cover: <u>4.4</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
4 % 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

7.30.15

W85LH048

Y

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		
0-8								
8-9								
9-12	10YR 3/3	100						Silt loam
12-24	10YR 4/3	95	10YR 5/4	5	C	M		Silt loam very faint concentrations

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>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Thick Dark Surface (A12) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
	Alaska Redox with 2.5Y Hue <u>N</u>
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
	Other (Explain in Notes) <u>N</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: Y Frost Depth (inches): 12

Hydric Soil Present (Y/N): N

Notes: All soil horizons waxy with frost depth variable. Cryoturbated soil with charcoal throughout

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

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Isaiah Brown

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84114048

Field Target: 15/95

Date: 7/30/15

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 Jessie Browner

Wetland Scientist (print)

X [Signature]

Signature / Date

7-30-15

X Abigail Fisher

Field Crew Chief (print)

X [Signature]

Signature / Date

7/30/15

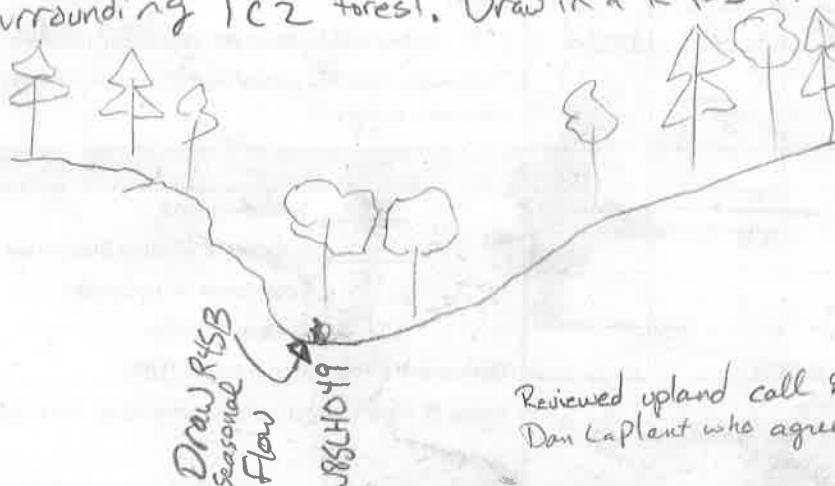
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 1596	Map #: 58 Map Date: 6-18-15
Date: 7/30/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85AH049
Investigators: Jessie Browder, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 424.9	
Latitude: 65°10'41.18"N		Longitude: 148°04'24.75"W	Datum: WGS84
Logbook No.: 02	Logbook Page No.: 24	Picture No.: P-W85AH049-VEG-VEG-PIT-PLUG	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 3-5	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: U, 1A3	Evidence of Wildlife Use: ^{Black} Bear Den, squirrels
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: U
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11B1

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

Swale feature that has a R4SB during spring melt off or ^{heavy} rain events. Soils show signs of repeated ~~consisten~~ flooding events but lack an indicator. Numerous hydrology indicators w/ sediment deposits & drainage patterns forming from the very steep banks. Veg & plot size represent swale feature & not the surrounding 1C2 forest. Draw in a R4SB into polygon.



Reviewed upland call & soil profile w/ Senior Staff
Dan LaPlant who agreed with Upland call. 9/8 9/30/15

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>~50ft x 100ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <i>Alnus viridis</i> ssp. <i>fruticosa</i>	60	Y	Fag	
2. <i>Picea glauca</i>	4		Facu	
3.				
4.				
Total Cover: <u>64</u> 50% of total cover: <u>32</u> 20% of total cover: <u>12.8</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>86</u> X 2 = <u>172</u> FAC species: <u>72</u> X 3 = <u>216</u> FACU species: <u>4</u> X 4 = <u>16</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>162</u> (A) <u>404</u> (B) PI = B/A = <u>2.49</u>
<u>Sapling/Shrub Stratum</u> (<u>26ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Ribes triste</i>	9	Y	Fag	
2. <i>Vaccinium vitis-idaea</i>	1		Fag	
3. <i>Rosa acicularis</i>	T			
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>				

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26ft</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Equisetum pratense</i>	18	Y	FagW	
2. <i>Aconitum delphinifolium</i>	2		Fag	
3. <i>Arctagrostis latifolia</i>	68	Y	FagW	
4. <i>Mertensia paniculata</i>	T		Facu	
5. <i>Equisetum arvense</i>	T		FAC	
6. <i>Gymnocarpium dryopteris</i>	T		FACU	
7. <i>Trientalis europaea</i>	T		FACU	
8.				
9.				
10.				
Total Cover: <u>88</u> 50% of total cover: <u>44</u> 20% of total cover: <u>17.6</u>				15 % Bare Ground — % Cover of Wetland Bryophytes 15 Total Cover of Bryophytes 0 % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

7.30.15

W85LH049

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-24	10YR 3/2	90	7.5YR 3/4	8	con	M	silt loam	
			10YR 4/1	2	Dep	M		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Soils show repeated signs of depositional events with layers of organics throughout entire profile. Little distinction in pit. All same color, text, & percents

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)	SECONDARY INDICATORS (2 or more required)
--	---

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>	Depth (in): <u>—</u>	EC: <u>—</u>

Notes: Swale feature that repeatedly floods during spring melt off

AQUATIC SITE ASSESSMENT 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/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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brounlee

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH049

Field Target: 15196

Date: 7/30/15

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?
Form

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)?

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

X Jessie Brownee

Wetland Scientist (print)

X

Signature / Date

7-30-15

X Abigail Fisher

Field Crew Chief (print)

X

Signature / Date

7/30/15

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15197</u>	Map #: <u>60</u> Map Date: <u>6.18.15</u>
Date: <u>7/30/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W854H050</u>
Investigators: <u>Jessie Brownlee Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>425.3</u>	
Latitude: <u>65°10'26.02"N</u>	Longitude: <u>148°40'51.24"W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>2</u>	Logbook Page No.: <u>24</u>	Picture No.: <u>P-W85AY050-VF6-VF6-Pic-D1-V6</u>	

SITE PARAMETERS	
Subregion: <u>Ray Mountain</u>	Landform (hillslope, terrace, hummocks, etc.): <u>shoulder slope</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U1A2</u>	Evidence of Wildlife Use: <u>Moose tracks</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2</u>

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

Mature Pic Mar open forest 20-40' tall with low diversity in understory
Thick Feather moss. Water slowly seeping in above frost but imperceptible amount
after 30 minutes



W854H050

Reviewed upland status & soil profile with Senior Staff Dan LaPlant
who agreed with upland call. JB 9.30.15

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>80%</u> (A/B)
1. <i>Picea mariana</i>	55	Y	FacW	
2.				
3.				
4.				
Total Cover: <u>55</u> 50% of total cover: _____ 20% of total cover: _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: _____ X 1 = _____ FACW species: <u>69</u> X 2 = <u>138</u> FAC species: <u>25</u> X 3 = <u>75</u> FACU species: <u>5</u> X 4 = <u>20</u> UPL species: _____ X 5 = _____ Column Totals: <u>99</u> (A) <u>233</u> (B) PI = B/A = <u>2.35</u>
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rhododendrum tomentosum</i>	4		FacW	
2. <i>Vaccinium uliginosum</i>	5		Fac	
3. <i>Vaccinium vitis-idaea</i>	4		Fac	
4. <i>Picea mariana</i>	10	Y	FacW	
5. <i>Spiraea stevenii</i>	2		FacU	
6. <i>Rhododendrum groenlandicum</i>	13	Y	Fac	
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)				
Herb Stratum (<u>26 ft</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Gerrhonotus lividum</i>	3	Y	FacU	
2. <i>Calla palustris</i>	3	Y	Fac	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>6</u> 50% of total cover: <u>3</u> 20% of total cover: <u>1.2</u>				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>98</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

7-30-15

W8SLH050

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-5								
5-7								
7-9	10YR 3/2	100					gravelly silt loam	
9-18	10YR 4/3	100					gravelly silt loam	
18-22	10YR 4/3	100					very gravelly silt loam + 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>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Thick Dark Surface (A12) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
	Alaska Redox with 2.5Y Hue <u>N</u>
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
	Other (Explain in Notes) <u>N</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: crust Depth (inches): 18

Hydric Soil Present (Y/N): N

Notes: Homogeneous soil w/ little change to depth. Neg && throughout. Thixotropic soils, gravelly.

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>15</u>	EC: <u>—</u>

Notes: water seeping ~ 17" very slowly above frost + gravel layer.

AQUATIC SITE ASSESSMENT 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 _____ 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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brown

Andy Schen

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH050 Field Target: 15197 Date: 7/30/15

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~~ Form?

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)?

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

1 ☒ Jessie Brownlee

Wetland Scientist (print)

☒

[Signature] 7/30/15

Signature / Date

☒

Abigail Fisher

Field Crew Chief (print)

☒

[Signature] 7/30/15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <input checked="" type="checkbox"/> Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: <u>1546</u>	Map #: <u>68</u> Map Date: <u>6-18-15</u>
Date: <u>7/31/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH051</u>
Investigators: <u>Jessie Brownlee, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>441.8</u>	
Latitude: <u>64° 56' 31.06" N</u>		Longitude: <u>148° 41' 49.12" W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>02</u>	Logbook Page No.: <u>25</u>	Picture No.: <u>P-W85LH051-VEG-VEG-PIC-PIUG</u>	

SITE PARAMETERS	
Subregion: <u>Tanana + Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4/1B 11A2, 11A3</u>	Evidence of Wildlife Use: <u>Moose tracks</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>PSS4/1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>11A2, 11A3</u>

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

Stunted and dead *Picea glauca* woodland with understory of *Betula glandulosa*. Trees 10-20 ft tall. Dense cover of Feather moss with Frost @ 14". Small amount of standing water on outside of Plot.

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	6	Y	FacU
2.			
3.			
4.			
Total Cover: <u>8</u>			
50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	48		FacW
2. <i>Salix richardsoni</i>	1		FacW
3. <i>Betula alandulosa</i>	30	Y	Fac
4. <i>Rhododendrum groenlandicum</i>	20	Y	Fac
5. <i>Vaccinium vitis-idaea</i>	60	Y	Fac
6. <i>Vaccinium uliginosum</i>	3		Fac
7. <i>Alnus viridis</i> ssp. <i>fruticosa</i>	T		Fac
8. <i>Betula neoalaskana</i>	T		Fac
9. <i>Picea glauca</i>	7		FacU
Total Cover: <u>125</u>			
50% of total cover: <u>62.5</u> 20% of total cover: <u>25</u>			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: — X 1 = —

FACW species: 10 X 2 = 20

FAC species: 191 X 3 = 423

FACU species: 18 X 4 = 72

UPL species: 0 X 5 = 0

Column Totals: 169 (A) 515 (B)

PI = B/A = 3.04

Shrub
Rosa acicularis T FacU

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Petasites frigidus</i>	4		FacW
2. <i>Cornus canadensis</i>	1		FacU
3. <i>Equisetum arvense</i>	3		Fac
4. <i>Calamagrostis canadensis</i>	22	Y	Fac
5. <i>Pyrola asarifolia</i>	2		FacU
6. <i>Rubus</i> sp.	1		—
7. <i>Pyrola grandifolia</i>	1		Fac
8. <i>Rubus chamaemorus</i>	1		FacU
9. <i>Calamagrostis lapponica</i>	3		FAC
10. <i>Mertensia paniculata</i>	T		FacU
Total Cover: <u>36</u>			
50% of total cover: <u>18</u> 20% of total cover: <u>7.2</u>			

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N 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

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):
Picea glauca stunted, with many standing dead or with very few spots of growth left. Standing dead *Picea* is also 80%.

WETLAND DETERMINATION DATA FORM

7-31-15 W8SLH051

Y

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		
Oi 0-6	7.5YR 3/2	100						Damp feather moss
Oe 6-8	10YR 3/1	100						Damp organics
A 8-9	7.5YR 2.5/2	100					Silt loam	
Bw1 9-14	2.5Y 4/1	25	7.5YR 4/4	20			Silt loam	7.5YR 4/1 (organics) ~5%
	10YR 4/1	50						
Bw2 14-21	10YR 4/1	30					Silt loam	Ice lenses starting ~16" to depth
	2.5Y 4/1	25	7.5YR 4/4	25				

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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>marginal</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		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: Y Depth (inches): 14

Hydric Soil Present (Y/N): Y

Notes: Neg OX throughout. Strong Con throughout. Thixotropic soil (slightly). Doesn't make A3 or Redox w/ 2.5Y But was close. Could have dug hole ~30 away and had strong soil indicators with A2 etc. Using BPT to throw soils in

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

SECONDARY INDICATORS (2 or more required)

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>12</u>	EC: <u>—</u>

Notes: Surface water on the edge of mapped polygon. ~50% of Pic 6 are dead there are applying D1.

AQUATIC SITE ASSESSMENT DATA FORM

W85LH051

7.31.15

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 <input checked="" type="checkbox"/> Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>8</u> Sapling (<5 dbh, <6m tall) <u>7</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>65</u> Dwarf shrub (<0.5m) <u>60</u> Tall herb (≥1m) <u>22</u> Short herb (<1m) <u>14</u> Moss-Lichen <u>100</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 <input checked="" type="checkbox"/>		
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 _____ 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 <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 _____ 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 Geologic 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:

Jessie Brannlee

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W89L4051

Field Target: 15186

Date: 7/31/15

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)?

NA ☐ 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

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____	Field Target: <u>15185</u>		Map #: <u>68</u> Map Date: <u>6.18.15</u>
Date: <u>7/31/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>	Feature Id: <u>W85LHOS2</u>	
Investigators: <u>Jessie Brownlee, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>441.8</u>	
Latitude: <u>64°56'29.78"N</u>	Longitude: <u>148°41'52.19"W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>02</u>	Logbook Page No.: <u>25</u>	Picture No.: <u>P-W85LHOS2-VEG-VEG AT Pk</u>	

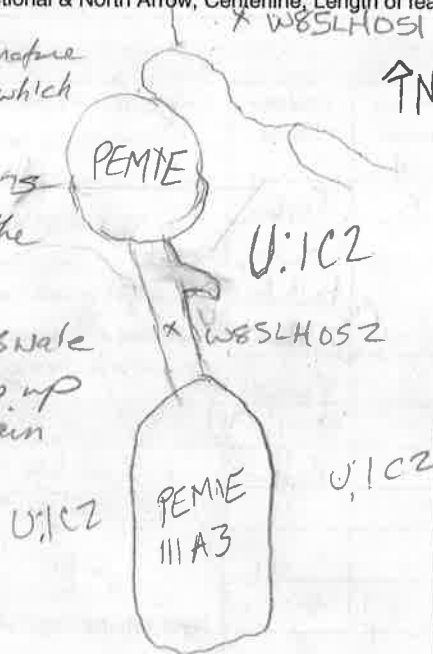
SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>swale</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1/EM1B 1C2, 1A2</u>	Evidence of Wildlife Use: <u>moose droppings</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/SS1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>11A2, 1C3,</u>

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

It's hard to see PEM1/SS1B signature from the surrounding 1C2 which dominates the imagery.

Swale feature that drains the PEM1E south to the PEM1E to the north.

Much downed trees in swale feature. ~~But~~ land dries up with slight elevation gain on either side.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Pinus glauca</i>	3		FacU
2.			
3.			
4.			
Total Cover: <u>4</u> (Added to shrub)			
50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	5	Y	Fac
2. <i>Salix glauca</i>	6	Y	Fac
3. <i>Rosa aricularis</i>	2		FacU
4. <i>Salix pulchra</i>	2		FacU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>22</u>			
50% of total cover: <u>11</u> 20% of total cover: <u>4.4</u>			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 3 X 1 = 3

FACW species: 3 X 2 = 6

FAC species: 10 X 3 = 30

FACU species: 7 X 4 = 28

UPL species: 0 X 5 = 0

Column Totals: 117 (A) 349 (B)

PI = B/A = 2.98

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	80	Y	Fac
2. <i>Equisetum pratense</i>	1		FacU
3. <i>Chamaenerion angustifolium</i>	1		FacU
4. <i>Rubus arcticus</i>	1		FacU
5. <i>Pyrola grandifolia</i>	1		Fac
6. <i>Comarum palustre</i>	3		OBL
7. <i>Aconitum delphinifolium</i>	1		Fac
8.			
9.			
10.			
Total Cover: <u>95</u>			
50% of total cover: <u>47.5</u> 20% of total cover: <u>19</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.

4 % Bare Ground

7 % Cover of Wetland Bryophytes

7 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

7-31-15

W8SLH052

Y

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		
0-3							
3-6							
Bg1 6-10	2.5Y 4/1	98	2.5Y 5/4	2	CoA	M	on only E interface w/ organic layer above
Bg2 10-24	5Y 4/1	100					silt loam 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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		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: Y frost Depth (inches): 24

Hydric Soil Present (Y/N): Y

Notes: Positive & throughout mineral. No concentrations due to water table @ surface throughout the growing season and therefore doesn't meet an indicator but am using BPT to make soils.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

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

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>Ø</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>Ø</u>	
Notes:		EC: <u>141</u> pH: <u>5.04</u>

AQUATIC SITE ASSESSMENT DATA FORM

W85LH052 7.31.15

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>40</u> Sapling (<5 dbh, <6m tall) <u>48</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>10</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>40</u> Short herb (<1m) <u>48</u> Moss-Lichen <u>7</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%) _____ 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 _____ 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) _____		
HCM 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 _____ 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 <u>Observed</u> <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils <u>Sediment Created</u>	
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>5.04</u>	
Surficial Geologic 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:

GPS Technician QA/QC check:

Jessie Brainerd

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH052

Field Target: 5185

Date: 7/31

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

Abigail Fisher

Wetland Scientist (print)

X



Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

 7.31.15

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>5184</u>	Map #: <u>68</u> Map Date: <u>6/18/15</u>
Date: <u>7/31/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85L4053</u>
Investigators: <u>Jessie Brownlee, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>44.8</u>	
Latitude: <u>64°56'32.78"N</u>		Longitude: <u>148°41'59.81"W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>012</u>	Logbook Page No.: <u>25</u>	Picture No.: <u>P-W85L4053-VEG-VEGJRT-PLUG</u>	

SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PFO4B, 1A2</u>	Evidence of Wildlife Use: <u>NO</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 _____ 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>U</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2</u>

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

Mature open Pic Gl forest w/ trees 30-40' tall, understory of rose and Cal Can. Veg & soils do not make indicator and hydrology does only based on 2 weak secondaries. Small R45B was on edge of mapped polygon and drawn on map

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea glauca</i>	35	Y	FacU
2.	<i>Amus viridis ssp. fruticosa</i>	3		Fac
3.				
4.				
Total Cover: <u>38</u>				
50% of total cover: <u>19</u>		20% of total cover: <u>7.6</u>		
Sapling/Shrub Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Rosa acicularis</i>	12	Y	FacU
2.	<i>Vaccinium vitis-idaea</i>	2		Fac
3.	<i>Betula nealashana</i>	17	Y	FacU
4.	<i>Rhododendrum tomentosum</i>	1		FacW
5.	<i>Rhododendrum groenlandicum</i>	4		Fac
6.	<i>Picea glauca</i>	4		FacU
7.	<i>Salix pulchra</i>	1		FacW
8.				
9.				
Total Cover: <u>41</u>				
50% of total cover: <u>20.5</u>		20% of total cover: <u>8.2</u>		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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: 2 X 2 = 4

FAC species: 55 X 3 = 165

FACU species: 62 X 4 = 248

UPL species: _____ X 5 = _____

Column Totals: 119 (A) 413 (B)

PI = B/A = 3.50

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Cornus canadensis</i>	10	Y	FacU
2.	<i>Chamerion angustifolium</i>	1		FacU
3.	<i>Rubus arcticus</i>	2		Fac
4.	<i>Equisetum arvense</i>	2		Fac
5.	<i>Calamagrostis canadensis</i>	25	Y	Fac
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:

☐ 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

100 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

7/31/15

W85LH053

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-3								Dry feather moss
3-5								Dry organics
5-13	10YR 4/2	105	2.5YR 4/6	10	con	m	Silt loam	majority of concentrations ring the pit in a 2" Band from 9-11"
			2.5Y 3/1	5	Dep	m		
13-15								organics & charcoal
15-21	2.5Y 5/2	85	4.5YR 4/6	15	con	m	Silt loam	Matrix color is PM related, Platy structure.

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Frost Depth (inches): 12-13

Hydric Soil Present (Y/N): N

Notes: Does not meet soil or veg so despite concentrations, I'm not calling Hydric soils.

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>N</u> (Includes capillary fringe)	Depth (in): <u>—</u>	EC: <u>—</u>

Notes:

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brumlee

W. J. J. J.

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W88LH53

Field Target: 15184

Date: 7/3/15

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)?

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

X

Abigail Fisher

Wetland Scientist (print)

X

 7/31/15

Signature / Date

X

Jessie Browne

Field Crew Chief (print)

X

 7.31.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: 15313	Map #: 84 Map Date: 6/15
Date: 7/31/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH054
Investigators: Jessie Brownlee, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 467.8 (off ROW)	
Latitude: 64°38'35.69"N	Longitude: 149°02'43.84"W	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 25	Picture No.: P2W85LH054 VEG VEG-PT-PLUS	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0.3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U, IB2	Evidence of Wildlife Use: moose droppings
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: PFOIB
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): IBZ

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

Tall open Bet Neo forest with a few Pic Gla. Low diversity/density understory besides for Cal Can. Forest is wet despite veg. Soils were over 20" of organics & frost @ 24. Hydrology had water table at 6". Forest floor showed signs of long standing water with depressions with little to no growth & water stained leaves. on fly by in helicopter the forest showed large patches of standing water.
Map was used to update lines & surrounding coding.
use topo to draw wet Dry Line

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</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>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>60%</u> (A/B)
1. <i>Betula nealashkensis</i>		Y	FacU	
2. <i>Picea glauca</i>	13	Y	FacU	
3.				
4.				
Total Cover: <u>63</u> 50% of total cover: <u>31.5</u> 20% of total cover: <u>12.6</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>5</u> X 2 = <u>10</u> FAC species: <u>12</u> X 3 = <u>36</u> FACU species: <u>26</u> X 4 = <u>104</u> UPL species: _____ X 5 = _____ Column Totals: <u>153</u> (A) <u>480</u> (B) PI = B/A = <u>3.14</u>
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Salix pulchra</i>	4		FacU	
2. <i>Pinus vitidis ssp. fruticosa</i>	6	Y	Fac	
3. <i>Picea glauca</i>	5	Y	FacU	
4. <i>Betula nealashkensis</i>	4		FacU	
5. <i>Betula alandulosa</i>	1		Fac	
6. <i>Salix richardsonii</i>	1		FacU	
7.				
8.				
9.				
Total Cover: <u>21</u> 50% of total cover: <u>10.5</u> 20% of total cover: <u>4.1</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" 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>	65	Y	FacU	
2. <i>Rubus arcticus</i>	2		FacU	
3. <i>Chamerion angustifolium</i>	2		FacU	
4. <i>Cornus canadensis</i>	1		FacU	
5.				% Bare Ground: <u>03</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>80</u> % Cover of Water: <u>8</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>69</u> 50% of total cover: <u>34.5</u> 20% of total cover: <u>13.8</u>				

7.31.15 W85LH054

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

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>4-5</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): (includes capillary fringe) <u>Y</u>	Depth (in): <u>4</u>	EC: <u>200</u> <u>5.2 pH</u>

AQUATIC SITE ASSESSMENT DATA FORM

7-31-15

W85LH054

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> 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>63</u> Sapling (<5 dbh, <6m tall) <u>9</u> Tall shrub (2-6m) <u>6</u> Short shrub (0.5-2m) <u>6</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>65</u> Short herb (<1m) <u>4</u> Moss-Lichen <u>20</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 <input checked="" type="checkbox"/>		
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 <input checked="" type="checkbox"/> Flat _____ 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 _____ 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>5.20</u>	
Surficial Geologic 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:

[Signature]

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W89LH054

Field Target: 15313

Date: 7/31/15

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?
- NA ☐ 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)?

~~NA~~ ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Margaret Fisher

Wetland Scientist (print)

X

[Signature] 7/31/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

[Signature] 7.31.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <input checked="" type="checkbox"/> Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: 15169	Map #: 87 Map Date: 6-18-15
Date: 8/11/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8SLHOSS
Investigators: Jessie Brownlee, Abigail Fisher			Team No.: W8S
State: Alaska	Region: Alaska	Milepost: 469.5	
Latitude: 64°37'14.44"N		Longitude: 149°05'13.80"W	Datum: WGS84
Logbook No.: 02	Logbook Page No.: 26	Picture No.: P-W8SLHOSS-VEG-VEG-PIT	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim lowlands	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PSSIB 11B2, 11C	Evidence of Wildlife Use: Moose scat
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: PFO1/SS1A
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1B3, 1B2

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

Barren woodland with dense understory of tall shrubs. Marginal Secondary hydrology indicators. Soil shows repeated saturation from 12" to depth. Polygon is likely mosaic but majority of it is wet.

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neolaskana</i>	15	Y	FacU
2.	<i>Picea glauca</i>	3		FacU
3.				
4.				
Total Cover: <u>18</u> 50% of total cover: <u>9</u> 20% of total cover: <u>3.6</u>				
Sapling/Shrub Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Myrica gale</i>	43		OBL
2.	<i>Rosa acicularis</i>	5	Y	FacU
3.	<i>Salix pulchra</i>	12	Y	FacW
4.	<i>Chamaedaphne calyculata</i>	5	Y	FacU
5.	<i>Rhododendron groenlandicum</i>	2		Fac
6.	<i>Betula glandulosa</i>	4		Fac
7.	<i>Picea glauca</i>	1		FacU
8.	<i>Vaccinium uliginosum</i>	3		Fac
9.	<i>Salix richardsonii</i>	2		FacW
Total Cover: <u>37</u> 50% of total cover: <u>18.5</u> 20% of total cover: <u>7.4</u>				

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 3 X 1 = 3
 FACW species: 19 X 2 = 38
 FAC species: 74 X 3 = 222
 FACU species: 9 X 4 = 36
 UPL species: _____ X 5 = _____
 Column Totals: 109 (A) 299 (B)
 PI = B/A = 2.85

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i>	56	Y	Fac
2.	<i>Pyrula ussuriensis</i>	T		FacU
3.	<i>Equisetum pratense</i>	T		FacW
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</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
3 Total Cover of Bryophytes
 _____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):
Dead willow & Betula ~ 5% collectively

WETLAND DETERMINATION DATA FORM

8.1.13

WFS4H055

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)	% ⁴	Type ¹	Loc ²		
0-4								Dry organics w/ thin band of fluvial sediment repeated fluvial organics + sediment throughout
4-12	10YR 3/2	50	10YR 5/4	15	con	M RC	Silt loam	
	2.5Y 5/1	35						
12-24	2.5Y 5/1	85	10YR 4/4	15	con	M RC	Silt loam (Dense)	

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Yes Depth (inches): 27.5

Hydric Soil Present (Y/N): Yes

Notes: Neg. XOX throughout, Marginal soil but shows saturation @ 13" and deeper during growing season soil is slightly thixotropic

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>Y</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
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>N</u>	Depth (in): <u>-</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>16</u>	EC: <u>-</u>	

Notes: very slow seep from 16" Depth

AQUATIC SITE ASSESSMENT DATA FORM

W85LH055

8.1.15

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>12</u> Sapling (<5 dbh, <6m tall) <u>1</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>36</u> Dwarf shrub (<0.5m) <u>6</u> Tall herb (>1m) <u>50</u> Short herb (<1m) <u>0</u> Moss-Lichen <u>3</u> Floating <u>0</u> Submerged _____		
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%) _____ 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) _____ 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 _____ 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 _____	
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 <u>X</u>	
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 Geologic 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:

Jessie Brown

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WESL-Hoss Field Target: 15169 Date: 8/1/15

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?
N/A ☐ 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

Abigail Fisher

Wetland Scientist (print)

X

Abigail Fisher 8/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

8.7.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <input checked="" type="checkbox"/> Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: 19/70	Map #: 87 Map Date: 6/18/15
Date: 8/1/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8SLH056
Investigators: Jessie Brownlee, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 469.3	
Latitude: 64°37'21.83"N	Longitude: 149°05'10.54	Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 26	Picture No.: P_W8SLH056_VEG_PIT_PLOS	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim lowlands	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 0-3	Local relief (concave, convex, none): flat
Pre-mapped Alaska LNG/NWI classification: PFO1/SS1C	Evidence of Wildlife Use: 80 Wasps
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: PFO1/SS1A
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1B2, 11B2

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

Site floods periodically from the Tanana. Soils show signs of saturation from 16-16" w/ frost @ 22". Marginal hydrology w/ only secondary indicators. Mature open Birch forest w/ 40-50' tall w/ Larah? Dense understory of Bet Glauca & willow. Polygonum is likely a mosaic. with The ground undulates slightly with plants showing slight preference for higher areas where water would not pool. Water sample taken between W8SLH055 & W8SLH056 with EC 191 and pH 8.5. Based on high EC, I'm calling Slope HGM.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea glauca</i>	26	Y	FacU
2. <i>Betula nealashana</i>	7	Y	Fac
3. <i>Larix laricina</i>	5		FacW
4.			

Total Cover: 32

50% of total cover: 16 20% of total cover: 6.2

Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendrum groenlandicum</i>	7	Y	Fac
2. <i>Betula glandulosa</i>	18	Y	Fac
3. <i>Betula nealashana</i>	1		Fac
4. <i>Picea glauca</i>	2		FacU
5. <i>Alnus viridis</i> sp. <i>fruticosa</i>	2		Fac
6. <i>Salix pulchra</i>	7	Y	FacW
7. <i>Chamaedaphne calyculata</i>	5		FacU
8.			
9.			

Total Cover: 42

50% of total cover: 21 20% of total cover: 8.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 6 (B)
 % Dominant Species that are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: — X 1 = —
 FACW species: 17 X 2 = 34
 FAC species: 73 X 3 = 219
 FACU species: 26 X 4 = 104
 UPL species: — X 5 = —
 Column Totals: 116 (A) 357 (B)
 PI = B/A = 3.08

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus arcticus</i>	8		Fac
2. <i>Cornus canadensis</i>	3		FacU
3. <i>Chamaenerion angustifolium</i>	1		FacU
4. <i>Calamagrostis canadensis</i>	30	Y	Fac
5. <i>Equisetum arvense</i>	1		Fac
6.			
7.			
8.			
9.			
10.			

Total Cover: 42

50% of total cover: 21 20% of total cover: 8.4

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.

1 % 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):

WETLAND DETERMINATION DATA FORM

8-1-15

W85LH056

Y

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		
0-3								Dry organics
3-11	2.5Y 4/1	40						repeated fluvial deposits of sediment + organics organics @ 60% mineral @ 40%
11-16	5Y 5/1	75	7.5YR 4/1	10	Con	M RC	Silt/loam	
	10YR 4/1	15						
16-21	10YR 4/1	75	7.5YR 4/1	10	con	M RC	Silt/loam	
	5Y 5/1	15						

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

HYDRIC SOIL INDICATORS

Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>Y</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		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: Frost Depth (inches): 22

Hydric Soil Present (Y/N): Y

Notes: Negative XX throughout, Soil horizon 21-24 is same as Bw1 just frozen.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):
Iron Deposits (B5) <u>N</u>	

SECONDARY INDICATORS (2 or more required)

Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>Y</u>
Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>marginal (see from page 22)</u>
Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>

Notes:

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>N</u> (Includes capillary fringe)	Depth (in): <u>—</u>	EC: <u>—</u>

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W85LH036

8.1.15

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>32</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) <u>2</u> Short shrub (0.5-2m) <u>37</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>30</u> Short herb (<1m) <u>12</u> Moss-Lichen <u>10</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%) _____ 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) _____ 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 <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 _____ 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 _____	
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 _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs <u>X</u>	
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 Geologic 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:

Jason Brown

GPS Technician QA/QC check:

Chris [Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH056

Field Target: 15/70

Date: 8/1/15

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)?
- ~~14~~ ☐ 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

WETLAND DETERMINATION DATA FORM

map 71

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>1581</u>	Map #: <u>None</u> Map Date: <u>6-18-15</u>
Date: <u>6/11/30</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W851H057</u>
Investigators: <u>Jessie Brownlee Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>444.0</u>	
Latitude: <u>64°54'50.18"N</u>	Longitude: <u>148°40'50.19"W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>02</u>	Logbook Page No.: <u>26</u>	Picture No.: <u>P-W851H057-VEG-UEG-UEG-RT-PLUG</u>	

SITE PARAMETERS	
Subregion: <u>Yukon Tanana Uplands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Foot slope</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <u>trails</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>PU</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2</u>

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

No map for this site. stunted Black spruce forest. Dry site. tree 3 ~ 15-20'
Frost @ 12". Marginal hydrology indicators. Large Spruce forest mapped as wet But I saw no indications on transect from LZ 444.0 that it was wet.



Reviewed upland call & soil profile w/ senior staff Dan LePlant who agreed with upland call. 6/7-30/15

605411057

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea glauca</i> 4+			
2.	<i>Picea mariana</i>	20	Y	FACW
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>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Rhododendrum grandifolium</i> 5			Fac
2.	<i>Rosa acicularis</i>	6		FacU
3.	<i>Vaccinium uliginosum</i>	2		Fac
4.	<i>Vaccinium vitis-idaea</i>	3		Fac
5.	<i>Picea glauca</i>	T		FACU
6.	<i>Picea mariana</i>	35	Y	FACW
7.				
8.				
9.				
Total Cover: <u>51</u>				
50% of total cover: <u>25.5</u>		20% of total cover: <u>10.2</u>		

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)	

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species: <u>0</u> X 1 = <u>0</u>	
FACW species: <u>56</u> X 2 = <u>112</u>	
FAC species: <u>33</u> X 3 = <u>99</u>	
FACU species: <u>8</u> X 4 = <u>32</u>	
UPL species: <u>0</u> X 5 = <u>0</u>	
Column Totals: <u>97</u> (A)	<u>243</u> (B)
PI = B/A = <u>2.5</u>	

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i> 3			FAC
2.	<i>Calamagrostis lapponica</i>	20	Y	FAC
3.	<i>Petasites frigidus</i>	1		FACW
4.	<i>Cornus canadensis</i>	2		FACU
5.	<i>Pyrola grandiflora</i>	T		Fac
6.	<i>Equisetum pratense</i>	T		FACU
7.				
8.				
9.				
10.				
Total Cover: <u>26</u>				
50% of total cover: <u>13</u>		20% of total cover: <u>5.2</u>		

Hydrophytic Vegetation Indicators:	
<u>Y</u> Dominance Test is > 50%	
<u>Y</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.	
<u>0</u> % Bare Ground	
<u>0</u> % Cover of Wetland Bryophytes	
<u>100</u> Total Cover of Bryophytes	
<u>0</u> % Cover of Water	
Hydrophytic Vegetation Present (Y/N): <u>Y</u>	
Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

8-1-15

W85LH057

Y

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					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-4								Dry feather moss
4-6								Dry organics & charcoal
6-7	10YR 7/2	100					silt/clay	
7-17	10YR 4/3	78	10YR 4/4	10	con	M	silt/clay	
	10YR 3/2	10	8.5Y 3/1	2	dep	M		
17-22	10YR 3/2	95	10YR 4/4	5	con	M	silt/clay	

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Root (very soft) Depth (inches): 17

Hydric Soil Present (Y/N): N

Notes: neg rx

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>—</u>	EC: <u>—</u>

Notes: Not applying D1 stunted or stressed plants b/c I believe the spruce are stunted due to the frost layer @ 17" and the thixotropic soils

AQUATIC SITE ASSESSMENT 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 Geologic 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: W8SLH057

Field Target: 15181

Date: 8/1/30

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

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15182</u>	Map #: <u>72</u> Map Date: <u>6-18-15</u>
Date: <u>8/1/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH058</u>
Investigators: <u>Jessie Browne, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>444.3</u>	
Latitude: <u>64°54'32.72"N</u>		Longitude: <u>148°40'53.74"W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>01</u>	Logbook Page No.: <u>26</u>	Picture No.: <u>P-W85LH058 -veg-veg-Pit-plug</u>	

SITE PARAMETERS	
Subregion: <u>Yukon-Tanana Uplands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <u>moose droppings</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>2</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/EM1C</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <u>11B2, 11A2</u>

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

Terrace shows often/frequent flooding events likely yearly
New soils is continually be deposited w/ organics through

This is second point on Flood plain/Terrace to show the complexity of the polygon which is a mosaic.
First point W85LH001 was U: 11B2

Creek

W85LH058

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Alnus viridis</i>	<u>2</u>		<u>FAC</u>
2.				
3.				
4.				
Total Cover: <u>2</u>				
50% of total cover: _____ 20% of total cover: _____				
Sapling/Shrub Stratum (<u>2 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Alnus viridis</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>
2.	<i>Spiraea stevenii</i>	<u>10</u>	<u>Y</u>	<u>FAC</u>
3.	<i>Salix pulchra</i>	<u>3</u>		<u>FACW</u>
4.	<i>Vaccinium uliginosum</i>	<u>1</u>		<u>FAC</u>
5.	<i>Betula microcarpa</i>	<u>2</u>		<u>FAC</u>
6.				
7.				
8.				
9.				
Total Cover: <u>43</u>				
50% of total cover: <u>21.5</u> 20% of total cover: <u>8.6</u>				

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 6 X 1 = 6

FACW species: 3 X 2 = 6

FAC species: 118 X 3 = 354

FACU species: 13 X 4 = 52

UPL species: 0 X 5 = 0

Column Totals: 140 (A) 418 (B)

PI = B/A = 2.98

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i>	<u>90</u>	<u>Y</u>	<u>FAC</u>
2.	<i>Camacho palustre</i>	<u>6</u>		<u>OBL</u>
3.	<i>Rubus arcticus</i>	<u>1</u>		<u>FACU</u>
4.	<i>Unknown</i>	<u>1</u>		<u>—</u>
5.	<i>Viola sp</i>	<u>1</u>		<u>—</u>
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>98</u>				
50% of total cover: <u>49</u> 20% of total cover: <u>19.6</u>				

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y 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.

4 % Bare Ground

0 % Cover of Wetland Bryophytes

5 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

8.15 WISLH058

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		Type ¹	Loc ²	Texture	Notes
	Color (moist)	%	Color (moist)	%				
0-7	10YR 4/1	80						repeated layers of deposited organic
	2.5Y 4/1	20						
7-9	5Y 3/1	85	2.5YR 3/6	5	con	M RL		
9-11			7.5YR 3/4	10	con	M RL		
11-21	5Y 3/1	90	7.5YR 4/4	10	con	M RL		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>Y</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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 Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: Soil shows signs of frequent repeated flooding soils

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

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

Notes: Creek floods frequently (yearly).

AQUATIC SITE ASSESSMENT DATA FORM

W85LH058

8/1/15

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>2</u> Sapling (<5 dbh, <6m tall) <u>2</u> Tall shrub (2-6m) <u>25</u> Short shrub (0.5-2m) <u>14</u> Dwarf shrub (<0.5m) _____ Tall herb (>1m) _____ Short herb (<1m) <u>92</u> Moss-Lichen <u>5</u> Floating <u>0</u> 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 _____			
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 _____ 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 <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 _____ 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 _____ Sediment Observed on Wetland Substrate <u>X</u> 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 _____ 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 Geologic 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:

Jessie Brownlee

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH058 Field Target: 15182 Date: 8/1/15

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? form

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)?

N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Abigail Fisher

Wetland Scientist (print)

X

[Signature]

Signature / Date

X

Jessie Brannlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15167	Map #: 91 Map Date: 278
Date: 8/2/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W851H059
Investigators: Jessie Brownlee, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 471.7	
Latitude: 64°35'40.67"N	Longitude: 141°06'50.63"W	Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 27	Picture No.: P-W851H059-UEG-VEG-PIT-PLUG	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace / Slight swale
Slope (%): 0-3	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PS4/EM1B	Evidence of Wildlife Use: none
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1 B 2, 1 B 2

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

~~AB~~ Pop Bal sapling & mature tall forest with understory of alder and willow. Lacks hydrology & soil indicators. Water table currently @ 28" and likely fluctuates to 24" after.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Populus balsamifera</u>	<u>40</u>	<u>Y</u>	<u>FacU</u>
2. <u>Salix glauca</u>	<u>1</u>		<u>Fac</u>
3.			
4.			

Total Cover: 31

50% of total cover: 15.5 20% of total cover: 6.2

Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Rosa acicularis</u>	<u>13</u>	<u>Y</u>	<u>FacU</u>
2. <u>Picea glauca</u>	<u>3</u>		<u>FacU</u>
3. <u>Alnus viridis ssp. fruticosa</u>	<u>15</u>	<u>Y</u>	<u>Fac</u>
4. <u>Viburnum edule</u>	<u>2</u>		<u>FacU</u>
5. <u>Salix richardsonii</u>	<u>1</u>		<u>Fac</u>
6. <u>Salix glauca</u>	<u>4</u>		<u>Fac</u>
7. <u>Salix alaxensis</u>	<u>4</u>		<u>Fac</u>
8. <u>Populus balsamifera</u>	<u>22</u>	<u>Y</u>	<u>FacU</u>
9.			

Total Cover: 64

50% of total cover: 32 20% of total cover: 12.8

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: 33.3 (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: 83 X 4 = 332

UPL species: _____ X 5 = _____

Column Totals: 131 (A) 476 (B)

PI = B/A = 3.63

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Rubus arcticus</u>	<u>2</u>		<u>FacU</u>
2. <u>Equisetum arvense</u>	<u>4</u>		<u>Fac</u>
3. <u>Cornus canadensis</u>	<u>4</u>		<u>FacU</u>
4. <u>Pyrola asarifolia</u>	<u>7</u>	<u>Y</u>	<u>FacU</u>
5. <u>Pyrola grandiflora</u>	<u>2</u>		<u>Fac</u>
6. <u>Calamagrostis canadensis</u>	<u>17</u>	<u>Y</u>	<u>Fac</u>
7. <u>Galium sp.</u>	<u>1</u>		<u>—</u>
8.			
9.			
10.			

Total Cover: 36

50% of total cover: 18 20% of total cover: 7.2

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

5 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

8-2-15 W85CH059

Y

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 Color (moist)	%	Redox Features Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-6								Dry organic SW/2
6-7								separate bands of sediment
7-11.5	10YR 4/2	30	5Y 3/4	5			Silt loam	Bands of organics add additional colors throughout ~ 5Y
			7.5YR 4/4	15				
11.5-24	10YR 4/2	54	10YR 4/4	25	Com	M	Silt loam	very platy structure
			5Y 5/1	18	Dep	M		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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 Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Negative ~~dx~~ throughout. Soil turns sandy @ 24 w/a depleted look to it. (2.5Y 3/1 or 3/2).

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

Notes: Water table @ 28". Water table probably fluctuates up to 24" where the washed out sand starts.

AQUATIC SITE ASSESSMENT 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 Geologic 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: W85LH059 Field Target: 15167 Date: 8/2/15

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)?

~~NA~~ ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Abigail Fisher

Wetland Scientist (print)

X



Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X



Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <input checked="" type="checkbox"/> Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: <u>1566</u>	Map #: <u>92</u> Map Date: <u>6-18-15</u>
Date: <u>8/2/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH060</u>
Investigators: <u>Jessie Brownlee, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>471.6</u>	
Latitude: <u>64°35'44.05"N</u>	Longitude: <u>149°06'46.02"W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>02</u>	Logbook Page No.: <u>27</u>	Picture No.:	

SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Swale</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating (micro)</u>
Pre-mapped Alaska LNG/NWI classification: <u>PFO4/13</u>	Evidence of Wildlife Use: <u>moose droppings</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>PFO1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>1B1 11B1</u>

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

*Between closed forest w/ trees about 30' High, many of which are saplings.
understory includes Pic Cola & Willows but with little fire community.
Water table @ ~ 21-22'.*

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>100ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A)	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
1. <i>Betula neoalaskana</i>	<u>40</u>	<u>Y</u>	<u>Fac</u>	% Dominant Species that are OBL, FACW, or FAC: <u>80%</u> (A/B)	
2. <i>Picea glauca</i>	<u>3</u>		<u>FacU</u>		
3.					
4.					
Total Cover: <u>43</u>				Prevalence Index worksheet:	
50% of total cover: <u>21.5</u> 20% of total cover: <u>8.6</u>				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>26ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: _____ X 1 = _____	
1. <i>Picea glauca</i>	<u>8</u>		<u>FacU</u>	FACW species: <u>11</u> X 2 = <u>22</u>	
2. <i>Betula neoalaskana</i>	<u>28</u>	<u>Y</u>	<u>Fac</u>	FAC species: <u>79</u> X 3 = <u>237</u>	
3. <i>Rosa acicularis</i>	<u>12</u>	<u>Y</u>	<u>FacU</u>	FACU species: <u>26</u> X 4 = <u>104</u>	
4. <i>Viburnum edule</i>	<u>1</u>		<u>FacU</u>	UPL species: _____ X 5 = _____	
5. <i>Salix pulchra</i>	<u>3</u>		<u>FacW</u>	Column Totals: <u>116</u> (A) <u>363</u> (B)	
6. <i>Vaccinium uliginosum</i>	<u>1</u>		<u>Fac</u>	PI = B/A = <u>3.12</u>	
7. <i>Alnus viridis</i>	<u>2</u>		<u>Fac</u>		
8. <i>Rubus idaeus</i>	<u>1</u>		<u>FACU</u>		
9.					
Total Cover: <u>54</u>					
50% of total cover: <u>27</u> 20% of total cover: <u>10.8</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>26ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50%	<input type="checkbox"/> Prevalence Index is ≤ 3.0
1. <i>Equisetum pratense</i>	<u>8</u>	<u>Y</u>	<u>FacW</u>	<input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes)	
2. <i>Calamagrostis canadensis</i>	<u>2</u>		<u>Fac</u>	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
3. <i>Galium</i> sp.	<u>1</u>		<u>—</u>	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
4. <i>Cornus canadensis</i>	<u>1</u>		<u>FacU</u>		
5. <i>Rubus arcticus</i>	<u>1</u>		<u>Fac</u>		
6. <i>Pyrola asarifolia</i>	<u>1</u>		<u>FacU</u>		
7. <i>Pyrola grandiflora</i>	<u>2</u>		<u>Fac</u>		
8. <i>Chamaenerion angustifolium</i>	<u>1</u>		<u>FacU</u>		
9. <i>Iris setosa</i>	<u>4</u>	<u>Y</u>	<u>Fac</u>		
10.					
Total Cover: <u>19</u>				% Bare Ground: <u>5</u>	
50% of total cover: <u>9.5</u> 20% of total cover: <u>3.8</u>				% Cover of Wetland Bryophytes: <u>—</u>	
				Total Cover of Bryophytes: <u>—</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

8.2.15

W85LH060

Y

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		
0-6								1" Band of sediment in middle of organic
6-8	10YR 3/2	100					Silt loam	
8-24	2.5Y 5/1	70	10YR 4/4	30	Com	M + BC	Silt loam	consistent horizon to depth

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>Y</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: negative XX throughout, slightly thixotropic soils

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>Y</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>M (see note)</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>M (see note)</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
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 N</u>	Depth (in): <u>21-22</u>		
Saturation Present (Y/N): <u>Y</u>	Depth (in): <u>19</u>	EC: <u>317</u> <u>6.15 pH</u>	
Notes: <u>Ground is undulating for microtopography with few plants growing in low spots. Trees & willows seem to prefer slightly higher mounds. Saturation @ 19</u>			

AQUATIC SITE ASSESSMENT DATA FORM

8-2-15

W85LH060

Y

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>43</u> Sapling (<5 dbh, <6m tall) <u>36</u> Tall shrub (2-6m) <u>2</u> Short shrub (0.5-2m) <u>16</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>2</u> Short herb (<1m) <u>17</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>8</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%) <u>43</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 <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 <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 _____ 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>6.15</u>	
Surficial Geologic 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:

Jessie Brownell 8-2-15

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W89LH060

Field Target: 15166

Date: 8/2/16

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

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

X

Abigail Fisher

Wetland Scientist (print)

X

8/2/15

Signature / Date

X

Jessie Browlee

Field Crew Chief (print)

X

8.2.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>BIGS</u>	Map #: <u>92</u> Map Date: <u>6.18.15</u>
Date: <u>8/2/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH061</u>
Investigators: <u>Jessie Browne, Morgan Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>471.9</u>	
Latitude: <u>64° 35' 28.50"</u>		Longitude: <u>149° 07' 0.251"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>02</u>	Logbook Page No.: <u>27</u>	Picture No.: <u>P-W85LH061-VEG-VEG-PIT-PLUG</u>	

SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U, 1B2, 1B3</u>	Evidence of Wildlife Use: <u>none</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>1B2, 1B3</u>

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

But Neo open forest w/ trees 30-40' tall. Dense understory of ^{Alder} Willow ~20' tall with a few pc gla in understory. Vib Ed, ros aci, & horse tail in understory. No signs of hydrology with dry soil.

[Signature]

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neolashana</i>	8	Y	FAC
2.	<i>Picea glauca</i>	4	Y	FAC
3.	<i>Alnus viridis ssp. fruticosa</i>	4	Y	FAC
4.	<i>Salix bebbiana</i>	4	Y	FAC
Total Cover: <u>20</u>				
50% of total cover: <u>10</u>		20% of total cover: <u>4</u>		
Sapling/Shrub Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Vaccinium vitis-idaea</i>	65	Y	FAC
2.	<i>Rosa acicularis</i>	38	Y	FACU
3.	<i>Viburnum edule</i>	15		FACU
4.	<i>Alnus viridis ssp. fruticosa</i>	2		FAC
5.	<i>Betula neolashana</i>	8		FAC
6.	<i>Picea glauca</i>	2		FACU
7.	<i>Salix glauca bebbiana</i>	25		FAC
8.	<i>Shepherdia canadensis</i>	T		OBL
9.				
Total Cover: <u>155</u>				
50% of total cover: <u>77.5</u>		20% of total cover: <u>31</u>		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 57% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 3 X 2 = 6

FAC species: 131 X 3 = 393

FACU species: 82 X 4 = 328

UPL species: _____ X 5 = _____

Column Totals: 216 (A) 727 (B)

PI = B/A = 3.37

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Cornus canadensis</i>	22	Y	FACU
2.	<i>Chamaenerion angustifolium</i>	1		FACU
3.	<i>Mertensia paniculata</i>	T		FACU
4.	<i>Polemonium acutiflorum</i>	T		FAC
5.	<i>Legume sp</i>	T		
6.	<i>Equisetum arvense</i>	15		FAC
7.	<i>Equisetum pratense</i>	3		FACW
8.	<i>Pyrola grandiflora</i>	T		FAC
9.				
10.				
Total Cover: <u>41</u>				
50% of total cover: <u>20.5</u>		20% of total cover: <u>8.2</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

10 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

8.2.15 W85LH061

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			
0-5								Dry organics	
5-6								" "	
6-8	10YR 4/2	90	7.5YR 3/3	10	con	M	Silt loam		
8-10								Dry organics	
10-12	10YR 4/2	90	10YR 3/6	10	con	M	very fine sandy loam		
12-22	10YR 5/2	100					very fine sandy loam		
22-24	10YR 5/2	100					loamy 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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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 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>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</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>	EC: <u>—</u>

Notes:

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brumlee 8-2-15

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8SLH061

Field Target: 15765

Date: 8/2/16

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)?

N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X

Hogayle Fisher

Wetland Scientist (print)

X

[Signature] 8/2/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

8-2-15

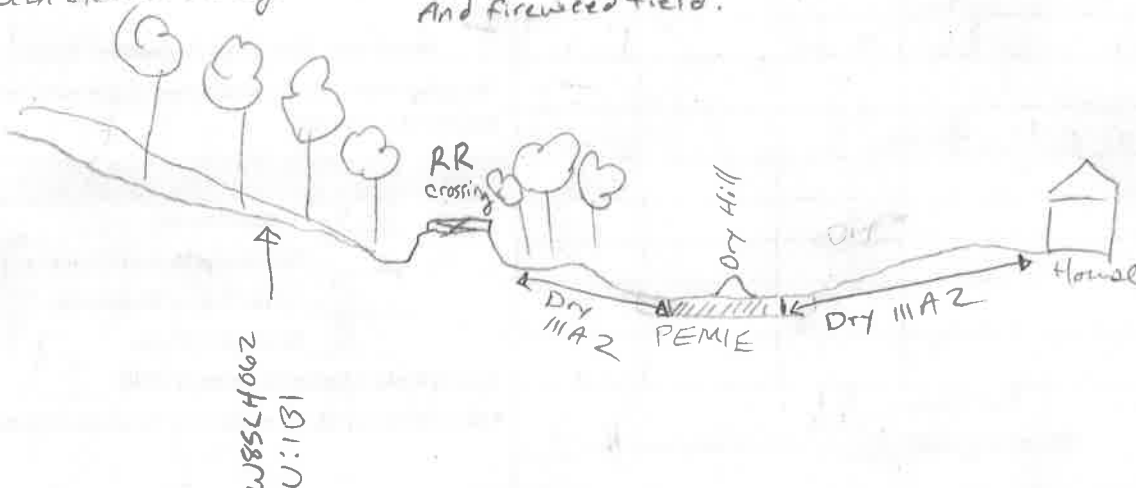
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____	Field Target: 15258	Map #: 93	Map Date: 6/18/15
Date: 8/2/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W85LH062	
Investigators: Jessie Brownlee, Abigail Fisher	Team No.: W85		
State: Alaska	Region: Alaska	Milepost: 472.5	
Latitude: 64°35'04.35"N	Longitude: 149°06'42.52"W	Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 27	Picture No.: P_W85LH062-VEG-VEG PIT-FLUG	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim lowlands	Landform (hillslope, terrace, hummocks, etc.): Toeslope
Slope (%): 0-3.	Local relief (concave, convex, none): slightly convex
Pre-mapped Alaska LNG/NWI classification: V	Evidence of Wildlife Use: Moose droppings
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1B1

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

Tall Mature Bet Neo Forest w/ trees ~ 60' tall. understory of ros ACIC
Vib Edu + Ego Sylu. No signs of hydrology. Dry silty soil.
on map 93 the polygon PEM1/SSI Polygon surrounding the PEM1 is not wet but
likely been cleared for agricultural purposes in the past & is now a massive ~~CA~~ CAN
And fireweed field.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neobabingtoniana</i>	90	Y	Fac
2.	<i>Picea glauca</i>	2		FacV
3.				
4.				
Total Cover: <u>92</u> 50% of total cover: <u>46</u> 20% of total cover: <u>18.4</u>				
Sapling/Shrub Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Viburnum edule</i>	15	Y	FacV
2.	<i>Rosa acicularis</i>	35	Y	FacV
3.	<i>Alnus</i>			Fac
4.	<i>Betula neobabingtoniana</i>	40		Fac
5.	<i>Picea glauca</i>	7		FacV
6.				
7.				
8.				
9.				
Total Cover: <u>54</u> 50% of total cover: <u>27</u> 20% of total cover: <u>10.8</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: ~~1~~ X 1 = ~~1~~
 FACW species: ~~1~~ X 2 = ~~2~~
 FAC species: 174 X 3 = 522
 FACU species: 53 X 4 = 212
 UPL species: ~~1~~ X 5 = ~~5~~
 Column Totals: 227 (A) 734 (B)
 PI = B/A = 3.23

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Equisetum sylvaticum</i>	75	Y	Fac
2.	<i>Calamagrostis canadensis</i>	5		Fac
3.	<i>Chamerion angustifolium</i>	1		FacV
4.	Herb sp.	7		FacV
5.	<i>Geranium erianthum</i>	7		FacV
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>81</u> 50% of total cover: <u>40.5</u> 20% of total cover: <u>16.2</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.

5 % Bare Ground
1 % Cover of Wetland Bryophytes
0 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

8.2.15

15852H062

Y

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		
0-7								Dry organics
7-8.5	10YR 3/2	100	7.5YR 5/6				silt loam	
8.5-24	10YR 7/3	90	10YR 5/6	10	Con	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)	<u>N</u>	Alaska Gleyed (A13)	<u>N</u>	Alaska Color Change (TA4) ⁴	<u>N</u>
Histic Epipedon (A2)	<u>N</u>	Alaska Redox (A14)	<u>N</u>	Alaska Alpine Swales (TA5)	<u>N</u>
Black Histic (A3)	<u>N</u>	Alaska Gleyed Pores (A15)	<u>N</u>	Alaska Redox with 2.5Y Hue	<u>N</u>
Hydrogen Sulfide (A4)	<u>N</u>			Alaska Gleyed without 5Y Hue or Redder Underlying Layer	<u>N</u>
Thick Dark Surface (A12)	<u>N</u>			Other (Explain in Notes)	<u>N</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: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: All colors taken dry. Dry platy soil. Color is Parent Material related. Consistent horizon all the way to Depth

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	<u>N</u>	Surface Soil Cracks (B6)	<u>N</u>
High Water Table (A2)	<u>N</u>	Water-stained Leaves (B9)	<u>N</u>
Saturation (A3)	<u>N</u>	Inundation Visible on Aerial Imagery (B7)	<u>N</u>
Water Marks (B1)	<u>N</u>	Drainage Patterns (B10)	<u>N</u>
Sediment Deposits (B2)	<u>N</u>	Oxidized Rhizospheres along Living Roots (C3)	<u>N</u>
Drift Deposits (B3)	<u>N</u>	Presence of Reduced Iron (C4)	<u>N</u>
Algal Mat or Crust (B4)	<u>N</u>	Salt Deposits (C5)	<u>N</u>
Iron Deposits (B5)	<u>N</u>	Notes:	

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>	
EC: <u>—</u>		

Notes: No signs of hydrology.

AQUATIC SITE ASSESSMENT 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 _____ 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 Geologic 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:

Stephen R. [Signature]

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH062

Field Target: 15258

Date: 8/2/15

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?
form

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

Abigail Fisher

Wetland Scientist (print)

X

[Signature]

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: 15296	Map #: 126 Map Date: 6.18.15
Date: 8.13.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH063
Investigators: Jesse Brownlee, Jennifer Anderson			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 506.5	
Latitude: 64° 07' 07.88"	Longitude: 149° 14' 33.47"	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 34	Picture No.: P-pit plug. veg. veg. N.S	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Flood plain
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIF 11C2, 11A3	Evidence of Wildlife Use: none mouse droppings
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/EMIC
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11C1 11A2

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

Myr coal & Salix shrub community w/ cal can and few other forbs surrounding a small stream R3UBH. Drainage patterns indicate flow through site to creek. Thick organic build up w/ sediment deposited in repeated bands indicate creek floods regularly. On walk back to truck it was obvious that this polygon becomes much wetter and creek floods a large area. This spot is not representative of signature to the south. Image on map is very bad and map boundaries should be compared to better imagery. Draw/split polygon in question something like this. See map 126

The sketch shows a stream flowing from the top left towards the bottom right. A road, labeled 'Parks Highway', runs parallel to the stream. Several polygons are drawn to represent different vegetation types, with labels such as 'W85LH063', 'PSS1/EMIC', '11C1', '11A2', and 'PFOH/SSIB 11A2'. A north arrow is located in the upper left corner of the sketch area.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100</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>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Canadensis</i>	15	Y	FACU
2. <i>Salix Pulchra</i>	19		FACW
3. <i>Myrica gale</i>	30	Y	OBL
4. <i>Betula nana glandulosa</i>	15	Y	FAC
5. <i>Desiphora fruticosa</i>	12		FAC
6. <i>Salix richardsonii</i>	17	Y	FACW
7. <i>Vaccinium uliginosum</i>	10		FAC
8.			
9.			
Total Cover: <u>112</u> 50% of total cover: <u>56</u> 20% of total cover: <u>22.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 37 X 1 = 37
 FACW species: 31 X 2 = 62
 FAC species: 68 X 3 = 204
 FACU species: 17 X 4 = 68
 UPL species: _____ X 5 = _____
 Column Totals: 153 (A) 371 (B)
 PI = B/A = 2.42

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	7		OBL
2. <i>Rubus arcticus</i>	6		FAC
3. <i>Calamagrostis canadensis</i>	25	Y	FAC
4. Forb -	T		
5. <i>Parnassia palustris</i>	1		FACU
6. <i>Equisetum scirpoides</i>	2		FACU
7.			
8.			
9.			
10.			
Total Cover: <u>41</u> 50% of total cover: <u>20.5</u> 20% of total cover: <u>8.2</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
20 % Cover of Wetland Bryophytes
80 Total Cover of Bryophytes
 _____ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.13.15

W85LH063

y

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		
0-4	10YR 2/1	20	7.5YR 2.5/2	8.0				Thick band of Conc throughout roots
4-14	2.5Y 3/4 mineral component						Fine sandy loam	Repeated bands of mineral & organics
14-20	2.5Y 3/4							repeated bands

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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>Y</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>Y</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		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: frost Depth (inches): 14

Hydric Soil Present (Y/N): Y

Notes: Positive X in mineral & organics. Did not sample below 14" into frost, given water and difficulty to chip away & find chips, enough organics in 0e/A to comprise 8" for A2 indicator.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

SECONDARY INDICATORS (2 or more required)

Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>Y</u>	Geomorphic Position (D2) <u>Y</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>Y</u>	Microtopographic Relief (D4) <u>Y</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>Y</u> 0-4-6"	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			

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>14</u> and rising	
Saturation Present (Y/N): <u>Y</u>	Depth (in): <u>8</u>	EC: <u>56.5</u> 36°F pH <u>5.3</u>

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W85LH063

8.13.15

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>15</u> Tall shrub (2-6m) <u>45</u> Short shrub (0.5-2m) <u>52</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) <u>25</u> Short herb (<1m) <u>16</u> Moss-Lichen <u>80</u> Floating _____ Submerged _____		
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%) _____ 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) _____ 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 <u>X</u> Flat _____ 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 _____ 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 _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.3</u>	
Surficial Geologic 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:

Jessie Brownlee

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH063

Field Target: 15296

Date: 8/13/15

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

J. Anderson

Signature / Date

8/13/15

X

Jessie Brawley

Field Crew Chief (print)

X

Jessie Brawley

Signature / Date

8/13/15

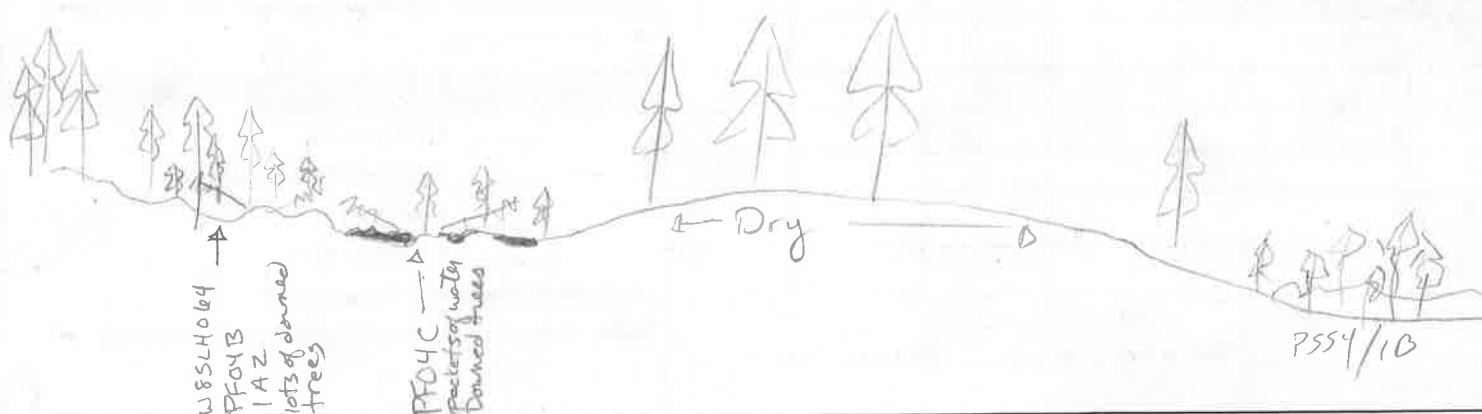
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15/25</u>	Map #: <u>127</u> Map Date: <u>6.18.15</u>
Date: <u>8/13/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85 LH064</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>507.8</u>	
Latitude: <u>64°06'07.70</u>		Longitude: <u>149°13'06.68</u>	Datum: <u>WGS84</u>
Logbook No.: <u>02</u>	Logbook Page No.: <u>34</u>	Picture No.: <u>P. pit. plug. veg. veg. N.S.</u>	

SITE PARAMETERS	
Subregion: <u>Tanana-Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating / slightly concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>U: 1A2</u>	Evidence of Wildlife Use: <u>None</u>
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 <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>PF04B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>1A2</u>

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

Burned Pic Mar forest w/ thick Pic Mar sopping regen. Thick moss covering area & low diversity in understory. Landscape is undulating possibly due to thermokarst or tree throw. Surround area has many downed trees & pockets of standing water and large hummocks directly to the south. Elevation may dictate wet/dry line so use lidar when teasing out wet/dry. Map 127 is just a guessimation of shape of this polygon due to lack of contours.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</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. <u>Picea Mariana</u>	<u>35</u>	<u>Y</u>	<u>FACW</u>	
2.				
3.				
4.				
Total Cover: <u>35</u> 50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: _____ X 1 = _____ FACW species: <u>77</u> X 2 = <u>154</u> FAC species: <u>84</u> X 3 = <u>252</u> FACU species: <u>2</u> X 4 = <u>8</u> UPL species: _____ X 5 = _____ Column Totals: <u>1163</u> (A) <u>414</u> (B) PI = B/A = <u>2.5</u>
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Picea Mariana</u>	<u>40</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Empetrum nigrum</u>	<u>45</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Vaccinium uliginosum</u>	<u>T</u>		<u>FAC</u>	
4. <u>Vaccinium vitis-idaea</u>	<u>15</u>		<u>FAC</u>	
5. <u>Rhododendrum groenlandicum</u>	<u>10</u>		<u>FAC</u>	
6. <u>Arctostaphylos rubra</u>	<u>T</u>		<u>FAC</u>	
7.				
8.				
9.				
Total Cover: <u>110</u> 50% of total cover: <u>55</u> 20% of total cover: <u>22</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>Y</u> Dominance Test is > 50% <u>Y</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>Geocaulon lividum</u>	<u>2</u>		<u>FACU</u>	
2. <u>Pyrola grandiflora</u>	<u>4</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Calamagrostis lapponica</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Rubus chamaemorus</u>	<u>2</u>		<u>FACW</u>	
5. <u>Pedicularis sp</u>	<u>T</u>			_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>45</u> Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <u>Saxifraga sp</u>	<u>T</u>			
7.				
8.				
9.				
10.				
Total Cover: <u>18</u> 50% of total cover: <u>9</u> 20% of total cover: <u>3.6</u>				

WETLAND DETERMINATION DATA FORM

8.13.15

W85LH064

Y

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		
0-4	10YR 2/2	100						Damp organics
4-8	10YR 2/1	100						Damp organics
8-10	5Y 4/1	15	7.5YR 3/3 5YR 3/4	10 10	C C	RC M RC M	Silt/loam	
	10YR 3/2	65						
10-12	5Y 4/1	90	7.5YR 3/3	10	C	M RC	Silt/loam	
12-18	10YR 4/3	90	10YR 4/6	10	C	M	loamy 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

Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>M/Y</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>M/Y</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		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: Y Depth (inches): 25

Hydric Soil Present (Y/N): Y

Notes: Soil sluffing in all around pit starting at 8". Large rocks @ 18". Positive ~~dx~~ in Bw1 & Bg. Does not meet exact indicators but A14 is close but lacks value of 4 for concentrations. Using BPT to assume soils.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

Surface Water (A1) <u>N (on edge of pit)</u>	Surface Soil Cracks (B6) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>-</u>
Iron Deposits (B5) <u>N</u>	

SECONDARY INDICATORS (2 or more required)

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

Notes:

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>12 and rising likely to 10</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>8</u>	EC: <u>54</u> pH <u>5.1</u> <u>38.8°F</u>

Notes:

8.13.15

W85LH/64

AQUATIC SITE ASSESSMENT 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>35</u> Sapling (<5 dbh, <6m tall) <u>40</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>25</u> Dwarf shrub (<0.5m) <u>45</u> Tall herb (≥1m) _____ Short herb (<1m) <u>19</u> Moss-Lichen <u>45</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%) <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) _____ Moderately Abundant (25-50% of surface) <u>X</u> <i>some standing</i> 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) <u>(difference in saplings & Forest height)</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 _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy <u>X</u> 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>5.1</u>	
Surficial Geologic 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:

GPS Technician QA/QC check:

Jessie Browne

Jef

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85 LH064

Field Target: 15125

Date: 8/13/15

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 8/13/15
Signature / Date

X Jessie Browalee
Field Crew Chief (print)

X Jessie Browalee 8/18/15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15123	Map #: 129 Map Date: 6-18-15
Date: 8/13/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH065
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 512.8	
Latitude: 64°02'15.97		Longitude: 149°09'07.17	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 34	Picture No.: P. Veg. Veg. Pil - Plug N, S.	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowland	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 3-5	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: Caribou droppings
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: U
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1A2, 11C2

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

Pic Glauca open forest w/ salix & Betula shrub layer. Thick ^{Feather} moss covers area. Frost @ 18"
Soil shows signs of saturation w/ a 2" Bgt 1" band of concentrations around 14" depth.
Soils do not make indicator & have neg. & &.
Surrounding veg to the south & south west is much taller w/ Betneo much higher percent.
See map for boundary updates.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea Canadensis</i>	26	Y	FACU
2.	<i>Betula Neolascana</i>	4		FACU
3.				
4.				
Total Cover: <u>30</u>				
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neolascana</i>	4		FACU
2.	<i>Picea Canadensis</i>	15		FACU
3.	<i>Salix pulchra</i>	2		FACW
4.	<i>Rhododendron groenlandicum</i>	25	Y	FAC
5.	<i>Vaccinium vitis-idaea</i>	30	Y	FAC
6.	<i>Vaccinium uliginosum</i>	7		FAC
7.	<i>Betula nana</i>	7		FAC
8.	<i>Salix glauca</i>	8		FAC
9.	<i>Rosa acicularis</i>	T		FACU
Total Cover: <u>101</u>				
50% of total cover: <u>50.5</u> 20% of total cover: <u>20.2</u>				

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: _____ X 1 = _____

FACW species: 7 X 2 = 14

FAC species: 110 X 3 = 330

FACU species: 49 X 4 = 196

UPL species: _____ X 5 = _____

Column Totals: 166 (A) 540 (B)

PI = B/A = 3.25

<i>Betula glandulosa</i>	S	3		FAC
<i>Mertensia paniculata</i>	H	T	—	FACU

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i>	10	Y	FAC
2.	<i>Petasites frigidus</i>	5		FACW
3.	<i>Calamagrostis hypnoides</i>	15		FAC
4.	<i>Carex Bigelowii</i>	20	Y	FAC
5.	<i>Equisetum Arvense</i>	T		FAC
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>35</u>				
50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>				

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N 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

8-13-15

W85LH065

Y

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	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-7								Dry organics
7-9	10YR 3/2	100					silt loam	
9-11	10YR 3/2	100					fine sandy loam	
11-16	10YR 3/2	40	7.5YR 2.5/3	10	C	M	silt loam	Charcoal & Buried A/O mixed in zone one in band
	10YR 3/2	30	10YR 4/2	20	Additional matrix color			
16-18	2.5Y 4/1	100	7.5YR 3/4	4	C	RC M	silt loam	
18-22	2.5Y 4/1	100					silt loam	Some organics mixed in

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</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: Y Depth (inches): 18

Hydric Soil Present (Y/N): N

Notes: Negative dx throughout

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</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): <u>Y</u> (includes capillary fringe)	Depth (in): <u>15</u>	EC: <u>-</u>

Notes: slight seeping @ 15

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brannell

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85L14065

Field Target: 15123

Date: 8/13/15

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

 8/13/15

Signature / Date

X

Jessie Browlee

Field Crew Chief (print)

X

 8-18-15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15120	Map #: 133 Map Date: 6.18.15
Date: 8/14/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH066
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 52.4	
Latitude: 63°55'16.27		Longitude: 149°04'49.21	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 35	Picture No.: P-Veg, Veg, Pit, Plug N.S	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 3-5	Local relief (concave, convex, none): flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: U: 1A2, 11B2	Evidence of Wildlife Use: Moose dropping & browse, squirrel
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: U
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1A2 11C2

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

Mature open Pic Cola Forest, trees ~25' tall. Understory of VACUIT, VACULI, and Salix. Thick feather moss mat covers ground. Site burned in past w/ charcoal & Ash, brick red cohrs in the soil. Sandy soil w/ no frost. Mapped as U: 1A2, 11B2 but should be 1A2, 11C2 due to lack of tall shrub community.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)																
Tree Stratum (Plot sizes: <u>100'</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>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>75</u> (A/B)												
1. <i>Picea Canadensis</i>	40	Y	FACU													
2.																
3.																
4.																
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: _____ X 1 = _____ FACW species: <u>3</u> X 2 = <u>6</u> FAC species: <u>60</u> X 3 = <u>228</u> FACU species: <u>65</u> X 4 = <u>260</u> UPL species: _____ X 5 = _____ Column Totals: <u>154</u> (A) <u>494</u> (B) PI = B/A = <u>3.2</u>												
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status													
1. <i>Picea Canadensis</i>	15		FACU													
2. <i>Vaccinium uliginosum</i>	20	Y	FAC													
3. <i>Vaccinium vitis-idaea</i>	25	Y	FAC													
4. <i>Empetrum nigrum</i>	3		FAC	<table border="1"> <tr> <td><i>Rhododendrum groenlandicum</i></td> <td>S</td> <td>2</td> <td>FAC</td> </tr> <tr> <td><i>Rhododendrum tomentosum</i></td> <td>S</td> <td>T</td> <td>FACW</td> </tr> <tr> <td><i>Salix Bobbiana</i></td> <td>S</td> <td>1</td> <td>FAC</td> </tr> </table>	<i>Rhododendrum groenlandicum</i>	S	2	FAC	<i>Rhododendrum tomentosum</i>	S	T	FACW	<i>Salix Bobbiana</i>	S	1	FAC
<i>Rhododendrum groenlandicum</i>	S	2	FAC													
<i>Rhododendrum tomentosum</i>	S	T	FACW													
<i>Salix Bobbiana</i>	S	1	FAC													
5. <i>Betula glandulosa</i>	10		FAC													
6. <i>Rosa acicularis</i>	1		FACU													
7. <i>Linnaea borealis</i>	5		FACU													
8. <i>Salix pulchra</i>	3		FACU													
9. <i>Salix glauca</i>	T		FAC													
Total Cover: <u>85</u> 50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>																

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>Y</u> Dominance Test is > 50% <u>N</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. <i>Carex lasiocarpa</i>	4		FACU	
2. <i>Calamagrostis leppii</i>	20	Y	FAC	
3. <i>Pyrola grandiflora</i>	T		FAC	
4. <i>Equisetum sylvaticum</i>	T		FAC	
5. <i>Maehringia lateriflora</i>	T		FACU	_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>90</u> Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <i>Calamagrostis canadensis</i>	5		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>				

WETLAND DETERMINATION DATA FORM

8.14.15

W851H066

Y

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		
0-6								
6-8	7.5YR 2.5/2	90	5YR 3/3	10	C	M	loam	none are in band between A & Bw1 charcoal present
8-13	10YR 4/2	70						
	10YR 2/1	30	Charcoal & organics				loamy sand	
13-16	10YR 4/6	100					loamy sand	
16-24	10YR 4/3	100					loamy 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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						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>N</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes:								

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

AQUATIC SITE ASSESSMENT 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 _____ 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 Geologic 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:

Jessie Brownlee

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH066

Field Target: 15120

Date: 8/14/15

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 [Signature] 8/14/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X [Signature] 8/18/11
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15124	Map #: 128 Map Date: 18-15
Date: 8/14/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH0167
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 510.5	
Latitude: 64°03'59.40		Longitude: 149°11'03.40	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 35	Picture No.: P-veg-veg-Pt, Plug N-S	

SITE PARAMETERS	
Subregion: Tanana Kuskokwim lowlands.	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat/Tussocky
Pre-mapped Alaska LNG/NWI classification: PSS4/13	Evidence of Wildlife Use: None
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: PSS1/4E
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11C2.11A3

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

Betula Nana shrub community with few spruce in this plot but much more in the surrounding area.
Area is much wetter than it is mapped with Tussocks + 3" of standing water in between.
PSS1/4E is better suited for polygon despite low spruce in our 26'x26' plot.
Entire area is wetter than mapped w/ 3" of water in between the dense tall tussocks.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</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. <u>Picea glauca</u>	<u>16</u>		<u>FACW</u>	
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: <u>40</u> X 2 = <u>80</u> FAC species: <u>58</u> X 3 = <u>174</u> FACU species: <u>7</u> X 4 = <u>28</u> UPL species: _____ X 5 = _____ Column Totals: <u>105</u> (A) <u>282</u> (B) PI = B/A = <u>2.68</u> <u>Picea gl.</u>
Sapling/Shrub Stratum (<u>416'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Vaccinium uliginosum</u>	<u>7</u>		<u>FAC</u>	
2. <u>Vaccinium vitis-idaea</u>	<u>3</u>		<u>FAC</u>	
3. <u>Betula nana</u>	<u>35</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Betula nana</u> <u>glandulosa</u> hybrid	<u>5</u>		<u>FAC</u>	
5. <u>Salix pulchra</u>	<u>6</u>		<u>FACW</u>	
6. <u>Rhododendrum groenlandicum</u>	<u>1</u>		<u>FAC</u>	
7. <u>Salix glauca</u>	<u>1</u>		<u>FAC</u>	
8. <u>Picea mariana</u> <u>S</u>	<u>1</u>		<u>FACW</u>	
9. <u>Picea glauca</u> <u>S</u>	<u>6</u>		<u>FACU</u>	
Total Cover: <u>64</u> 50% of total cover: <u>32</u> 20% of total cover: <u>12.8</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>Y</u> Dominance Test is > 50% <u>Y</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>Rubus chamaemorus</u>	<u>3</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Calamagrostis canadensis</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Eriophorum vaginatum</u>	<u>30</u>	<u>Y</u>	<u>FACW</u>	
4. <u>Carex Bigelowii</u>	<u>3</u>	<u>Y</u>	<u>FAC</u>	
5.				_____ % 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):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>41</u> 50% of total cover: <u>20.5</u> 20% of total cover: <u>8.2</u>				

WETLAND DETERMINATION DATA FORM

8-14-15

W85T1067

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes	
0-5								Saturated organics	
5-9								Saturated organics	
9-12	10YR 2/2	100					Silt/loam		
12-17	2.5Y 4/1	100					Silt/loam	thixotropic	
17-	2.5Y 4/1	100					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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>			
Histic Epipedon (A2) <u>Y</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>			
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>			
Thick Dark Surface (A12) <u>N</u>						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>Y</u> Depth (inches): <u>17</u>									
Hydric Soil Present (Y/N): <u>Y</u>									
Notes: Negative & X in mineral.									

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>Y</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>Y</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>3 (in between tussocks)</u>	Wetland Hydrology Present (Y/N): <u>Y</u>	
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>8</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>4</u>	EC: <u>167</u> pH <u>5.3</u> <u>42°F</u>	
Notes: Large tussocks w/ 3+ " water in between			

AQUATIC SITE ASSESSMENT DATA FORM

U85T1067

8-14-15

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>7</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>53</u> Dwarf shrub (<0.5m) <u>3</u> Tall herb (>1m) <u>5</u> Short herb (<1m) <u>30</u> Moss-Lichen <u>50</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 _____ <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) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope <u>X</u> Flat <u>8</u> 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 <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/Quaternary Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) <u>X</u>	
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>5.3</u>	
Surficial Geologic 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) _____ Large (>100 acres) <u>X</u>	

Crew Chief QA/QC check:

Jessie B. Brouwer

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH067

Field Target: 15124

Date: 8/14/15

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  8/14/15

Signature / Date

X Jessie Brownlee

Field Crew Chief (print)

X  8.18.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15121	Map #: 131 Map Date: 6.18.15
Date: 8.14.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH068
Investigators: EB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 514.1	
Latitude: 64° 01' 13.27		Longitude: 149° 08' 18.02	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 37	Picture No.: P-veg - veg - pit - plug N, S	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Mound/small hill
Slope (%): 4-10-3 3-5	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: moose browse (caribou?)
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1A2

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

*See map 131 for detailed remapping of transect from road.

This site is a mound/small hill above the wet signatures on either side. 20ft' Tall Pic Mar with Rho Gro, Salix, Bet Nana understory. Thick Feather moss covers ground. Soil is sandy. No signs of hydrology.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)														
Tree Stratum (Plot sizes: <u>100</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>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>75</u> (A/B)										
1. <i>Picea Mariana</i>	30	Y	FACU											
2.														
3.														
4.														
Total Cover: <u>30</u> 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species: _____ X 1 = _____ FACW species: <u>10</u> X 2 = <u>20</u> FAC species: <u>62</u> X 3 = <u>186</u> FACU species: <u>30</u> X 4 = <u>120</u> UPL species: _____ X 5 = _____ Column Totals: <u>102</u> (A) <u>326</u> (B) PI = B/A = <u>3.19</u> <table border="1"> <tr> <td><i>Arctostaphylos rubra</i></td> <td>S</td> <td>T</td> <td></td> <td>FAC</td> </tr> <tr> <td><i>Salix boreobiana</i></td> <td>S</td> <td>T</td> <td></td> <td></td> </tr> </table>	<i>Arctostaphylos rubra</i>	S	T		FAC	<i>Salix boreobiana</i>	S	T		
<i>Arctostaphylos rubra</i>	S	T			FAC									
<i>Salix boreobiana</i>	S	T												
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status											
1. <i>Vaccinium uliginosum</i>	20	Y	FAC											
2. <i>Vaccinium vitis-idaea</i>	20	Y	FAC											
3. <i>Rhododendrum groenlandicum</i>	10		FAC											
4. <i>Betula nana</i>	2		FAC											
5. <i>Salix glauca</i>	6		FAC											
6. <i>Salix arbusculoides</i>	T		FACW											
7. <i>Picea mariana</i>	10		FACW											
8. <i>Rosa acicularis</i>	T		FACU											
9. <i>Dasiphora fruticosa</i>	T													
Total Cover: <u>68</u> 50% of total cover: <u>34</u> 20% of total cover: <u>13.6</u>														

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>Y</u> Dominance Test is > 50% <u>N</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. <i>Equisetum pratense</i>	T		FACW	
2. <i>Calamagrostis lapponica</i>	4	Y	FAC	
3. <i>Saussurea angustifolia</i>	T		FAC	
4. <i>Mertensia paniculata</i>	T		FACU	
5. <i>grass sp</i>	T			
6. <i>Geocaulon lividum</i>	T		FACU	
7. <i>Petasites fragilis</i>	T			
8.				
9.				
10.				
Total Cover: <u>4</u> 50% of total cover: <u>2</u> 20% of total cover: <u>0.8</u>				_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>80</u> Total Cover of Bryophytes Feather moss _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8/14/15

W85LH068

Y

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					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-5								Dry feather moss
5-7	7.5YR 3/2	40					loam	charcoal present
	10YR 2/2	60						
7-8.5	10YR 4/3	80	10YR 4/4	20	com	M	very fine sandy loam	
8.5-21	10YR 4/3	100					fine 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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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 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>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</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>	EC: <u>—</u>
Notes:		

AQUATIC SITE ASSESSMENT 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 Geologic 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: W85LH068

Field Target: 15121

Date: 8/14/15

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

J. Anderson 8/14/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8.18.15

Signature / Date

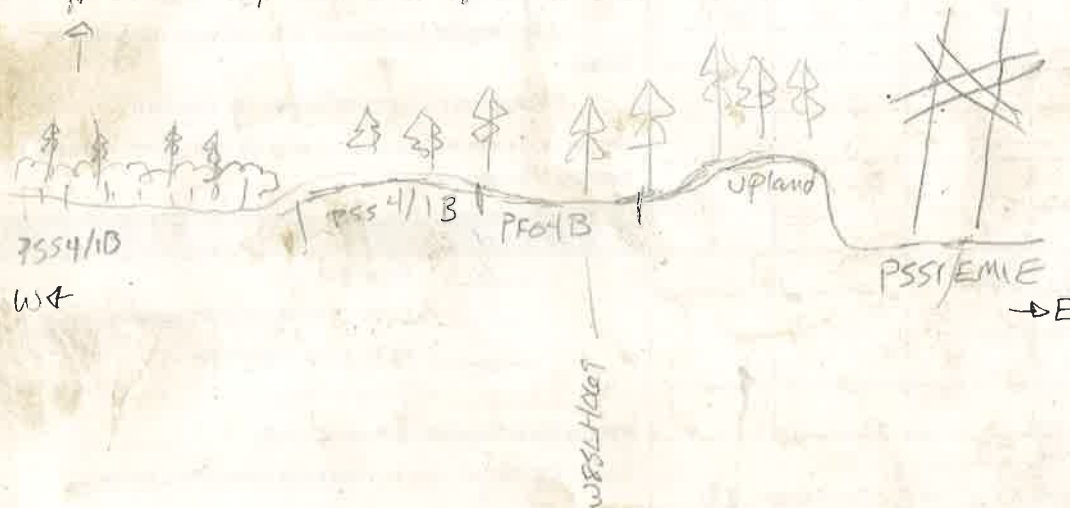
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>522</u>	Map #: <u>130</u> Map Date: <u>6-18-15</u>
Date: <u>8/14/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH069</u>
Investigators: <u>JBNA</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>514.0</u>	
Latitude: <u>64° 01' 19.89"</u>		Longitude: <u>149° 08' 23.83"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>37</u>	Picture No.: <u>P-PH, Plug, veg-veg</u>	

SITE PARAMETERS	
Subregion: <u>Tanana Kuskokwim lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>terrace/terrace?</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>slightly concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</u>	Evidence of Wildlife Use: <u>caribou fecal matter</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>PF04B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2, 11C2</u>

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

Pic Mar open forest ~ 10-25' tall w/ understory of Salix, Rho gro, Thick moss
of mainly Feather but some small patches of sphagnum. This spot
Moved RT from original location which was exactly the same veg, soil, hydrology @ W85LH068 FT 15121
N Instead we put plot in wet spot that was mapped as up.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <i>Picea Mariana</i>	30	Y	FACW	
2.				
3.				
4.				
Total Cover: <u>30</u> 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: _____ X 1 = _____ FACW species: <u>62</u> X 2 = <u>124</u> FAC species: <u>66</u> X 3 = <u>198</u> FACU species: _____ X 4 = _____ UPL species: _____ X 5 = _____ Column Totals: <u>128</u> (A) <u>322</u> (B) PI = B/A = <u>2.51</u>
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Salix Pulchra</i>	7		FACW	
2. <i>Salix glauca</i>	T		FAC	
3. <i>Picea Mariana</i>	10		FACW	
4. <i>Vaccinium uliginosum</i>	15	Y	FAC	
5. <i>Vaccinium vitis-idaea</i>	25	Y	FAC	
6. <i>Rhododendrum groenlandicum</i>	10		FAC	
7. <i>Betula nana</i>	6		FAC	
8. <i>Empetrum nigrum</i>	3		FAC	
9.				
Total Cover: <u>76</u> 50% of total cover: <u>38</u> 20% of total cover: <u>15.2</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 sp</i>	3		N/A	
2. <i>Pyrola grandiflora</i>	T		FAC	
3. <i>Geocaulon lividum</i>	T		FACU	
4. <i>Equisetum pratense</i>	T		FACU	
5. <i>Arctophila latifolia</i>	15	Y	FACW	
6. <i>Saussurea angustifolia</i>	T		FAC	
7. <i>Calamagrostis canadensis</i>	7		FAC	
8.				
9.				
Total Cover: <u>22</u> 50% of total cover: <u>11</u> 20% of total cover: <u>4.4</u>				_____ % Bare Ground <u>10</u> % Cover of Wetland Bryophytes <u>75</u> 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

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1

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		
0-5								Saturated organics
5-8								Saturated organics
8-10	10YR 2/2	100					loam	
10-18	10YR 4/3	85	2.5Y 4/1	5	D	m RC	loamy fine sand	
			7.5YR 4/4	10	C	m RC		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>Y</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Y Depth (inches): 18

Hydric Soil Present (Y/N): Y

Notes: Positive XX but spotty.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y-M secondary</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>M</u>	Microtopographic Relief (D4) <u>Y</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
Surface Water Present (Y/N): <u>Y</u> Depth (in): <u>3"</u>		Wetland Hydrology Present (Y/N): _____	
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>3</u>			
Notes: <u>Surface water in only a few spots in depressions.</u>		EC: <u>66</u> pH <u>5.3</u>	

AQUATIC SITE ASSESSMENT 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 <input checked="" type="checkbox"/> 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>20</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>39</u> Dwarf shrub (<0.5m) <u>28</u> Tall herb (≥1m) <u>15</u> Short herb (<1m) <u>10</u> Moss-Lichen <u>75</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 <input checked="" type="checkbox"/>		
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) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <input checked="" type="checkbox"/>		
HGM Class (P): Slope <input checked="" type="checkbox"/> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy <input checked="" type="checkbox"/> 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 _____ Fluvuquent 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>5.3</u>	
Surficial Geologic 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:

James Brantley

Jeff

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: N85LH069 Field Target: 15122 Date: 8/14/15

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

JFA 8/14/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

JFB 8/14/15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>1519</u>	Map #: <u>132</u> Map Date: <u>6-18</u>
Date: <u>8/14/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85LH070</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>522.2</u>	
Latitude: <u>63°54'41.33</u>		Longitude: <u>149°04'33.72</u>	Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>39</u>	Picture No.: <u>P-pit-plug, veg-veg N, S</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside / Foot slope</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U: 11C2, 11A2</u>	Evidence of Wildlife Use: <u>None</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>11C1, 1A3</u>

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

Bet Nan & tall Salix Gla shrub community with a few (8%) Pic Gla trees 15-25' tall
 Dry site, with no signs of hydrology. Dry sandy soils w/ a small E/Bs processes.
 All logs from site

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Glauca</i>		7	Y	FACU
2. <i>Populus tremuloides</i>		1		FACU
3.				
4.				
Total Cover: <u>8</u> 50% of total cover: <u>4</u> 20% of total cover: <u>1.6</u>				
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Nana</i>		55	Y	FAC
2. <i>Picea Glauca</i>		2		FACU
3. <i>Rhododendrum groenlandicum</i>		15		FAC
4. <i>Vaccinium uliginosum</i>		10		FAC
5. <i>Vaccinium vitis-idaea</i>		15		FAC
6. <i>Salix glauca</i>		20	Y	FAC
7. <i>Salix pulchra</i>		7		
8. <i>Rosa acicularis</i>		1		FACU
9.				
Total Cover: <u>104</u> 50% of total cover: <u>52</u> 20% of total cover: <u>20.8</u>				

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: _____ X 2 = _____
 FAC species: 105 X 3 = 315
 FACU species: 11 X 4 = 44
 UPL species: _____ X 5 = _____
 Column Totals: 116 (A) 359 (B)
 PI = B/A = 3.09

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Mertensia paniculata</i>		7		FACU
2. <i>Chamerion angustifolium</i>		7		FACU
3. <i>Calamagrostis lapponica</i>		1	Y	FAC
4. <i>Equisetum pratense</i>		7		FAC
5. <i>Galium trifidum</i>		7		FACW
6. <i>Festuca altaica</i>		3	Y	FAC
7. <i>Calamagrostis canadensis</i>		7		FAC
8.				
9.				
10.				
Total Cover: <u>4</u> 50% of total cover: <u>2</u> 20% of total cover: <u>0.8</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
40 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

8.15.15 W85LH070

Y

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			
Oi 0-3									
A 3-4	10YR 3/2	100					loam	charcoal present	
E 4-5	10YR 5/2	100					very fine sandy loam		
Bs 5-7	7.5YR 4/6	100					fine sandy loam		
Bwl 7-24	10YR 4/4	100					fine 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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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 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>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</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>	EC: <u>—</u>

Notes:

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Justin Brown

JB

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85LH070

Field Target: 1519

Date: 8/14/15

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 Jenifer Arden 8/14/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X [Signature] 8-18-15
Signature / Date

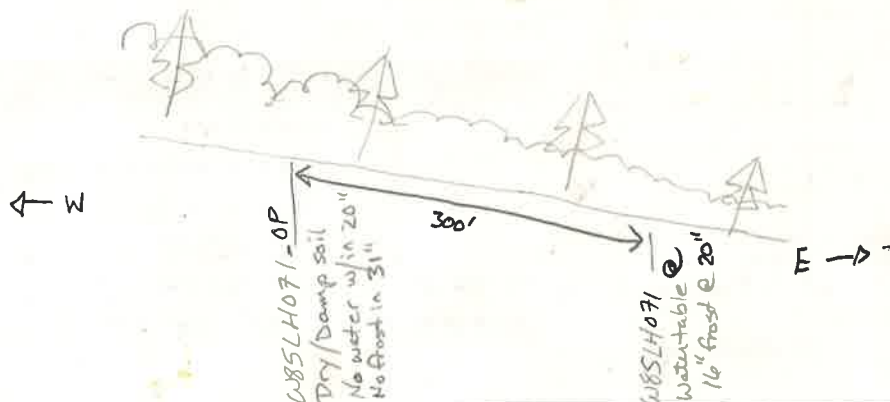
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain) <input checked="" type="checkbox"/> Other (explain)	Field Target: 15295
Map #: 132 Map Date: June 18			
Date: 8/15/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85LH071
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 522.1	
Latitude: 63°54'37.98	Longitude: 149°04'20.16	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 41	Picture No.: P, Veg, Veg, Pit, Plug	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Foot of slope
Slope (%): 0-3%	Local relief (concave, convex, none): flat
Pre-mapped Alaska LNG/NWI classification: PSS1B	Evidence of Wildlife Use: none
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): 11C1

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

Closed Bet Nan shrub community w/ ~8% Pic Gla and little diversity otherwise.
 Moved field target 15295. Did OP at 15295 original location and found same
 Veg (taller Bet), similar thixo soils but it lacked Hydrology. FT was moved
 to confirm landscape does indeed get wet.
 The only distinguishing feature was shorter Bet. Coastal slope between OP and
 this WDF.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</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>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>75</u> (A/B)
1. <i>Picea Glauca</i>	5	Y	FACU	
2.				
3.				
4.				
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1.0</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: _____ X 1 = _____ FACW species: <u>5</u> X 2 = <u>10</u> FAC species: <u>117</u> X 3 = <u>351</u> FACU species: <u>8</u> X 4 = <u>32</u> UPL species: _____ X 5 = _____ Column Totals: <u>130</u> (A) <u>393</u> (B) PI = B/A = <u>3.02</u>
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Betula nana</i>	70	Y	FAC	
2. <i>Vaccinium uliginosum</i>	3		FAC	
3. <i>Vaccinium vitis-idaea</i>	7		FAC	
4. <i>Picea Glauca</i>	3		FACU	
5. <i>Salix Pulchra</i>	2		FAC	
6.				
7.				
8.				
9.				
Total Cover: <u>85</u> 50% of total cover: <u>42.5</u> 20% of total cover: <u>17</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>Calamagrostis Canadensis</i>	20	Y	FAC	
2. <i>Carex bigelowii</i>	5		FAC	
3. <i>Petasites-Frigidus</i>	5		FACU	
4. <i>Pyrola grandiflora</i>	T		FAC	
5. <i>Stellaria sp</i>	T			_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>95</u> Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <i>Calamagrostis lapponica</i>	10	Y	FAC	
7. <i>Sonchus</i>				
8.				
9.				
10.				
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>				

WETLAND DETERMINATION DATA FORM

8.15.15

U8SLH071

Y

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					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-5								Damp organics
5-7	10YR 3/3	90	7.5YR 2.5/3	10	C	m RC	silt loam	
7-15	2.5Y 4/1	30	5Y 5/1	5	D	m	silt loam	
	2.5Y 3/1	30	7.5YR 4/4	25	C	m		
	10YR 3/2	10						
15-20	10YR 5/3	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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>Y</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Frost Depth (inches): 20

Hydric Soil Present (Y/N): Y

Notes: Neg XX throughout Soil collapsing and seeping @ 15" in sandy horizon

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

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>16</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>12</u>	
Notes: <u>seeping @ 15. Soil Sluffing</u>		EC: <u>46</u> pH <u>5.95</u> <u>38°F</u>

AQUATIC SITE ASSESSMENT DATA FORM

W8524071

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>5</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) <u>7</u> Short shrub (0.5-2m) <u>75</u> Dwarf shrub (<0.5m) <u>7</u> Tall herb (≥1m) <u>20</u> Short herb (<1m) <u>20</u> Moss-Lichen <u>95</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 _____		
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 <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 _____ 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>5.95</u>	
Surficial Geologic 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 <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:

Jessie Brumlee

J. Brumlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8544071

Field Target: 15295

Date: 8/15/15

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

8/14/15
Signature / Date

X

Jessie Brownee
Field Crew Chief (print)

X

8.15.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15050	Map #: 213 Map Date: 6-4-15
Date: 6-5-2015	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1001
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 724.3	
Latitude:		Longitude:	Datum: WGS84
Logbook No.: 151	Logbook Page No.: 1	Picture No.:	

SITE PARAMETERS			
Subregion: South Central		Landform (hillslope, terrace, hummocks, etc.): Lowland	
Slope (%): 0-3		Local relief (concave, convex, none): Flat to Slightly Concave	
Pre-mapped Alaska LNG/NWI classification: U:1C2,11B2		Evidence of Wildlife Use: Browse - Moose	
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: ^{"P"} PEM1/SS1B ^{"M"} PEM1/EM1B ^{JB} PEM1B	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____		Alaska Vegetation Classification (Vioreck): III A 2	

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

Bryan Strong took Map Notes, mapping edits and other descriptive Notes for this wetland and surrounding site. No supporting info for this area comes from me.

EJC
Page 1 of 4

WETLAND DETERMINATION DATA FORM

557

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula NeoAlaskana</i>	T	N	FACU
2. <i>Alnus Viridis ssp. fruticosa</i>	5	Y	FAC
3. <i>Picea Glauca</i>	T	N	FACU
4.			
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>			
Sapling/Shrub Stratum (<u>26' Diam</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum Edule</i>	T	N	FACU
2. <i>Rosa Acicularis</i>	3	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>3</u> 50% of total cover: <u>1.5</u> 20% of total cover: <u>.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: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80.0 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 120 X 3 = 360
 FACU species: 3 X 4 = 12
 UPL species: 0 X 5 = 0
 Column Totals: 123 (A) 372 (B)
 PI = B/A = 3.02

→ As per Alaska Subregion Final Draft Rating
 US Army Corp of Engineers
 CRREL
Betula NeoAlaskana (formally *Betula Papyrifera*) is FAC in Cook Inlet (land)

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26' Diam</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Athyrium cylodorum</i>	40	Y	FAC
2. <i>Equisetum Arvense</i>	40	Y	FAC
3. <i>Urtica sp</i>	T	N	NA
4. <i>Streptopus amplexifolius</i>	T	N	NA
5. <i>Trientalis Europaea</i>	T	N	FU
6. <i>Mertensia paniculata</i>	T	N	FU
7. <i>Chamerion Angustifolium</i>	T	N	FU
8. <i>Viola sp</i>	T	N	NA
9. <i>Cornus Canadensis</i>	T	N	FACU
10. <i>Calamagrostis Canadensis</i>	35	Y	FAC
<i>Sungasorba spp</i>	Total Cover: <u>115</u> 50% of total cover: <u>57.5</u> 20% of total cover: <u>23</u>		

Hydrophytic Vegetation Indicators:
Yes Dominance Test is > 50%
No 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): Yes
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6.5.15</u> Feature ID <u>W85T1001</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>0-3.5</u>	<u>organics 0e</u>							
<u>3.5-5.0</u>	<u>7.5YR 2.5/1</u>	<u>100</u>					<u>SiL</u>	
<u>5.0-10.0</u>	<u>5Y 4/1</u>	<u>85</u>	<u>10YR 4/6</u>	<u>15</u>	<u>C</u>	<u>PL/M</u>	<u>SiL</u>	
<u>18-+</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) <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: Dense Clay Pan 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) <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>No</u>
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: <u>Negative XX reaction</u>	
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>5.5</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>3.5</u>	EC: <u>165</u>

Notes: Small pocket of standing water on Edge of plot. Not enough to fill surface water

AQUATIC SITE ASSESSMENT 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>8</u> Sapling (<5 dbh, <6m tall) <u>1</u> Tall shrub (2-6m) <u>15</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>20</u> Short herb (<1m) <u>18</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 _____ Highly Uneven _____ Moderately even <input checked="" type="checkbox"/>	
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 <input checked="" type="checkbox"/> 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 <input checked="" type="checkbox"/> & clayey Pan Acting as Restrictive layer	

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 _____	
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 _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.6</u>	
Surficial Geologic 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) <input checked="" type="checkbox"/> 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:

Jessie Brownlee

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ST1001

Field Target: 15050

Date: 6.5.15

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 5/5/15
Signature / Date

X

Jessie Brennlee
Field Crew Chief (print)

X

6.5.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15021</u>	Map #: <u>238</u> Map Date: <u>6-4-15</u>
Date: <u>6-6-15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W8STI002</u>
Investigators: <u>JB JA</u>			Team No.: <u>W85</u>
State: Alaska	Region: Alaska	Milepost: <u>750.1</u>	
Latitude: _____		Longitude: _____	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>2</u>	Picture No.: <u>p1001-004</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat to slightly concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSSI/EMIB</u>	Evidence of Wildlife Use: <u>wolf scat</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>PSS4/1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11A.2, 11C1</u>

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

Plot pre-mapped as PSSI/EMIB. Should be PSS4/1B. ^{after circle of}
 Lowland, Depressional wetland transitioning from ~~PEO4B~~ to PSS4/1B to PEMYSSIE in the center. Map Lines are accurately drawn except the center most Polygon should be extended to the North (see map). And upper portion of PSS4/1B is very wet and should be mapped as a PSS4/1C (see map)

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>15 x 35</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>15 x 35</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Picea Mariana</u>	<u>35</u>	<u>Y</u>	<u>FACW</u>
2. <u>Rhododendron Tomentosum</u>	<u>7</u>		<u>FACW</u>
3. <u>Betula nana</u>	<u>3</u>		<u>FAC</u>
4. <u>Empetrum nigrum</u>	<u>60</u>	<u>Y</u>	<u>FAC</u>
5. <u>Vaccinium uliginosum</u>	<u>6</u>		<u>FAC</u>
6. <u>Vaccinium oxycoccos</u>	<u>1</u>		<u>OBL</u>
7. <u>Chamaedaphne calyculata</u>	<u>5</u>		<u>FACW</u>
8. <u>Rubus Chamaemorus</u>	<u>20</u>	<u>Y</u>	<u>FACW</u>
9. <u>Vaccinium vitis-idaea</u>	<u>6</u>		<u>FAC</u>
Total Cover: <u>143</u> 50% of total cover: <u>71.5</u> 20% of total cover: <u>28.6</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: 1 X 1 = 1
 FACW species: 67 X 2 = 134
 FAC species: 75 X 3 = 225
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 143 (A) 390 (B)
 PI = B/A = 2.7

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>15 x 35</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Drosera rotundifolia</u>	<u>T</u>	<u>+</u>	<u>OBL</u>
2. <u>Pedicularis Langsdorfii</u>	<u>T</u>		<u>FACW</u>
3. <u>Eriophorum vaginatum</u>	<u>T</u>		<u>FACW</u>
4. <u>Carex spp</u>	<u>2</u>	<u>+</u>	<u>NA</u>
5. <u>Equisetum sylvaticum</u>	<u>T</u>		<u>FAC</u>
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>2</u> 50% of total cover: <u>1</u> 20% of total cover: <u>0.2</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
 (sphagnum) 100 % 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>6-6-15</u> Feature ID <u>WSTI 002</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		
<u>0 - 32</u>	<u>organics</u>						<u>see notes below</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: No Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: 32" of organics, ~ 7" of Oi with a sand lens @ 8". Transitioning to Oc until 20" where organics turn sapric.

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:	
Algal Mat or Crust (B4) <u>✓</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>✓</u>			
Surface Water Present (Y/N): <u>✓</u>	Depth (in): <u>—</u>	Wetland Hydrology Present (Y/N): <u>✓</u>	
Water Table Present (Y/N): <u>✓</u>	Depth (in): <u>7</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>✓</u>	Depth (in): <u>4.0</u>	EC: <u>23</u>	
Notes:			

AQUATIC SITE ASSESSMENT 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>35</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>15</u> Dwarf shrub (<0.5m) <u>73</u> Tall herb (≥1m) _____ Short herb (<1m) <u>23</u> Moss-Lichen _____ Floating _____ Submerged _____	
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%) _____ 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) _____ 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 _____ 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 _____	
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 <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 _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.8</u>	
Surficial Geologic 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:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1002
15021 Field Target: 15021 Date: 6.6.15

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 6/6/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 6.6.15

Signature / Date

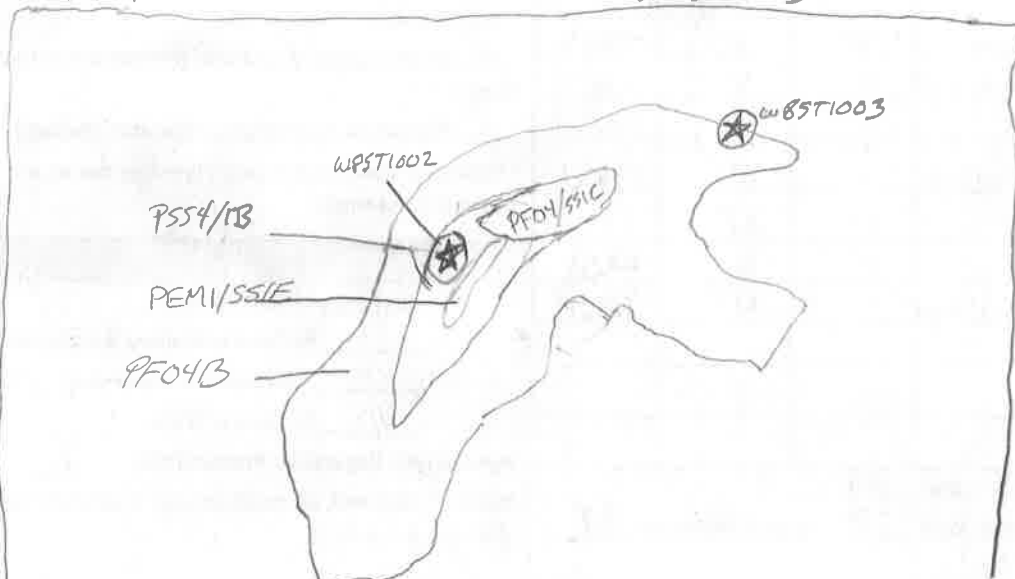
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15022	Map #: 238 Map Date: 6.4.15
Date: 6.6.2015	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1003
Investigators: JB JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 750	
Latitude: 61° 18' 07"		Longitude: -151° 01' 52"	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 3	Picture No.:	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use:
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 <input checked="" type="checkbox"/> , or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.) Positive dx reaction in 24" of soil: see soil section
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: PFO4/SS1 ^{4B}
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1A2, 11B ²

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

Polygon mapped as upland but plot is an extension of PFO4B to the S.W. Plot was on boundary of PFO4B and PFO4/1B. A small stream was to the NE of FID W85T1003. Area to stream and beyond is all wet. Transect from W85T1002 to W85T1003 was all wet,



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>20' Dia</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	35	Y	FACW
2. <i>Betula Neolaskana</i>	15	Y	FAC
3. <i>Picea Canadensis</i>			
4.			
Total Cover: <u>50</u>			
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			
Sapling/Shrub Stratum (<u>20' Dia</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Menziesia Ferruginea</i>	40	Y	FACU
2. <i>Spiraea Stevenii</i>	5	N	FACU
3. <i>Vaccinium Ovalifolium</i>	T	N	FAC
4. <i>Oplopanax Horridus</i>	T	N	FACU
5. <i>Linnaea borealis</i>	2	N	FACU
6. <i>Picea Glauca</i> (SAPPING)	1	N	FACU
7.			
8.			
9.			
Total Cover: <u>48</u>			
50% of total cover: <u>24</u> 20% of total cover: <u>9.6</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 35 X 2 = 70
 FAC species: 85 X 3 = 255
 FACU species: 52 X 4 = 208
 UPL species: 0 X 5 = 0
 Column Totals: 172 (A) 533 (B)
 PI = B/A = 3.098

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20' Dia</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	25	Y	FAC
2. <i>Calamagrostis Canadensis</i>	35	Y	FAC
3. <i>Cornus Canadensis</i>	2	N	FACU
4. <i>Streptopus Amplexifolius</i>	T	N	FACU
5. <i>Equisetum Arvense</i>	10	N	FAC
6. <i>Trientalis Europaea</i>	T	N	FACU
7. <i>Caymanocarpium Dryopteris</i>	2	N	FACU
8.			
9.			
10.			
Total Cover: <u>74</u>			
50% of total cover: <u>37</u> 20% of total cover: <u>14.8</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 (*sphagnum*)
☒ % Total Cover of Bryophytes
☒ % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):
Sphagnum MOSS

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6/2/15</u> Feature ID <u>W85T1003</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	
0-2.5"	10YR 2/1	100				Sandy loam ← sand lens distinct
2.5-12.5"	10YR 2/2	100				Silt loam
12.5-19.5"	7.5YR 2.5/3	75				loam
	Black	10				loam
	10YR 3/2	15				

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>N</u>	Alaska Gleyed (A13) <u>—</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>—</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>—</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>—</u>
Thick Dark Surface (A12) <u>N</u>	Other (Explain in Notes) <u>Yes Reduced Matrix</u>

³One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. Have veg, Have landform, Have positive OR

⁴Give details of color change in Notes.

Restrictive Layer (if present): Type: unknown Depth (inches): 26"

Hydric Soil Present (Y/N): Yes

Notes: evidence of depositional events vary through the last 12.5-19.5" Buried Positive OR starting @ 6" & continued/tested to 10". Instant reaction @ 100%.

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

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>2.5</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>7</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>3</u>	
		EC: <u>26</u>

Notes: ~10% water in small & large depressions, sphagnum in pockets throughout

AQUATIC SITE ASSESSMENT 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 _____ 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>1</u> Tall shrub (2-6m) <u>40</u> Short shrub (0.5-2m) <u>5</u> Dwarf shrub (<0.5m) <u>2</u> Tall herb (≥1m) _____ Short herb (<1m) <u>74</u> Moss-Lichen _____ Floating _____ Submerged _____			
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even <u>0</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>0</u> Very High Density (80-100%) _____			
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 _____ N/A _____			
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>0</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>0</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) <u>X</u> 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 _____ 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 _____ 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) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.0</u>	
Surficial Geologic 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 <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: WRST1003

Field Target: 15022

Date: 6.6.15

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 [Signature] 6/6/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X [Signature] 6.6.15
Signature / Date

Vegetation Classification Data Form

map 249

Site Description		
Date: 6.14.15	Project Name & #: Alaska LNG 26221306	Field Target: W85T1004
Investigators: JB, KV		Feature ID: 15008
Latitude: 61° 10.010663	Longitude: -151° 8.957677	Datum: WGS84
Logbook #: 1	Logbook Page #: 17	Picture #: W85T1004 1-3
Location Description:		
Due E of LZ 760.5. Gained in Elevation Right at start of Forest on transect.		
Common Species Observed (Scientific Name)		
Populus tremuloides	Corynocarpium dryopteris	
Betula neoalaskana	Calamagrostis canadensis	
Viburnum edule		
Menziesia ferruginea		
Percent Cover of Dominant Structure Level: Trees 25% Shrubs 60%		
Habitat Description:		
From LZ 760.5 we gained elevation. Mature Cottonwoods & Paper birch woodland with thick understory of Birch saplings and Viburnum edule.		
Alaska Vegetation Classification: Level I, Level II, Level III		
1B3, 11B2		
Notes:		
See Notebook 1 pg 12 & map pg. 249		

Field Crew Chief: Jessie Brownlee

Field Scientist/Technician: Haley Volper

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>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: W85T1004 Field Target: 15008 Date: 6.14.15

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 Naley Volper
Field Technician (print)

X Naley Volper 6-14-15
Signature

X Jessie Browne
Field Crew Chief (print)

X [Signature] 6.14.15
Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15042	Map #: 219 Map Date: 6/4/15
Date: 6.7.2015	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T100S
Investigators: JB JA			Team No.: 1285
State: Alaska	Region: Alaska	Milepost: 737.2	
Latitude: 61° 24' 35.6	Longitude: -150° 44' 03.1	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 4	Picture No.: P, 001-004	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Toe Slope/Hillside
Slope (%): 3-5	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: NO
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input checked="" 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 _____	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/SSIA
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): III A 2, II B 3

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

Plot is on ~4% slope at toe slope of the Mt. Susitna. Much ground water flowing off Mt. Susitna. Water table likely drops later in the summer but the soils show evidence of a consistent water table @ ~14"

See Log book and map for additional Area

Plot is in PEM1/SSIA while larger community is IB 3, IB 2.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>26' Diam</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' Diam</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Alnus fruticosa</u>	<u>10%</u>	<u>Y</u>	<u>Fac</u>
2.	<u>Ribes triste</u>	<u>5%</u>	<u>Y</u>	<u>Fac</u>
3.				
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>				

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: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 5 X 3 = 15
 FACU species: 3 X 4 = 12
 UPL species: 0 X 5 = 0
 Column Totals: 8 (A) 28 (B)
 PI = B/A = 3.5

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26' Diam</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Calamagrostis canadensis</u>	<u>20%</u>	<u>Y</u>	<u>Fac</u>
2.	<u>Althya rosea</u>	<u>10%</u>	<u>Y</u>	<u>Fac</u>
3.	<u>Equisetum arvense</u>	<u>15</u>	<u>Y</u>	<u>Fac</u>
4.	<u>Oplopanax horridus</u>	<u>1%</u>	<u>N</u>	<u>Fac II</u>
5.	<u>Streptopus amplexifolius</u>	<u>1%</u>	<u>N</u>	<u>Fac II</u>
6.	<u>Mertensia periculata</u>	<u>1%</u>	<u>N</u>	<u>Fac II</u>
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:
☒ 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>10-7-15</u> Feature ID <u>W85T1005</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		
0-8	ORGANICS	100					Not Saturated
8-14	Black	100				SIL	High organic content Not saturated
14-15.5	Black	100	10YR 2/1	10		Muck	
15.5-19.5	10YR 4/2	85	2.5Y 4/1	5	D	M	VF Sil
19.5-26.5	7.5YR 4/10	87	5Y 4/1	3	D	RC	SIL
			5YR 4/6	10	C	M+RC	

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>	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>Yes</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>A3 A10</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: N 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>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes: <u>Negative XX</u>	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			

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>14</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>11</u>	EC: <u>82</u>

Notes: In normal snow & rain years water table would be expected to be higher.

AQUATIC SITE ASSESSMENT 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) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) <u>10</u> Short shrub (0.5-2m) <u>5</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>48</u> Moss-Lichen _____ Floating _____ Submerged _____	
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%) _____ 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 <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) _____ Moderate (broken irregular rings) <input checked="" type="checkbox"/> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <input checked="" type="checkbox"/> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <input checked="" type="checkbox"/> 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 _____ 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 <input checked="" type="checkbox"/>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.67</u>	
Surficial Geologic 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 _____ Wetlands within 400m, Not Connected _____ Only Connected Below <input checked="" type="checkbox"/> 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: W85T1005 Field Target: 15042 Date: 6.7.15

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?
map

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 6/7/15
Signature / Date

X

Jessie Brownlee
Field Crew Chief (print)

X

6.7.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15023</u>	Map #: <u>236</u> Map Date: <u>6/4</u>
Date: <u>6-14-15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1006</u>
Investigators: <u>JB, KV</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>749.5</u>	
Latitude: <u>61° 18.486483' N</u>	Longitude: <u>151° 1.453551 W</u>		Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>19</u>	Picture No.: <u>W85T1006-001 thru -004</u>	

SITE PARAMETERS	
Subregion: <u>Southcentral</u>	Landform (hillslope, terrace, hummocks, etc.): <u>lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat to concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1/EM1B</u>	Evidence of Wildlife Use: <u>no</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: PSS1/AC <u>PSS1C</u> <u>off.</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11C2, 11A2</u>

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

See map & notebook 1 page 19

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 (<u>20 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	25	Y	FAC
2. <i>Myrica gale</i>	35	Y	OBL
3. <i>Andromeda polifolia</i>	3	N	FACW
4. <i>Vaccinium oxycoccus</i>	3	N	OBL
5. <i>Rhododendrum tomentosum</i>	T	N	FACW
6. <i>Desiphora fruticosa</i>	30	Y	FAC
7. <i>Empetrum nigrum</i>	T	N	FAC
8. <i>Picea Mariana</i>	1	N	FACW
9. <i>RUBUS</i> sp	T	N	
Total Cover: <u>97</u> 50% of total cover: <u>48.5</u> 20% of total cover: <u>19.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)
 Total Number of Dominant Species Across All Strata: 6 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 55 X 1 = 55
 FACW species: 9 X 2 = 18
 FAC species: 55 X 3 = 165
 FACU species: 2 X 4 = 8
 UPL species: 0 X 5 = 0
 Column Totals: 121 (A) 246 (B)
 PI = B/A = 2.0

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Menyanthes trifoliata</i>	5	Y	OBL
2. <i>Drosera rotundifolia</i>	1	N	OBL
3. <i>Juncus Castaneus</i>	1	N	—
4. <i>Trientalis europaea</i>	2	N	FACU
5. <i>Equisetum fluviatile</i>	1	N	OBL
6. <i>Drosera Anglica</i>	T	N	OBL
7. <i>Siccas Cespitosus</i>	10	Y	OBL
8. <i>Calamagrostis stricta</i>	5	Y	FACW
9. <i>Carex</i> sp (2)	1	N	—
10.			
Total Cover: <u>26</u> 50% of total cover: <u>13</u> 20% of total cover: <u>5.2</u>			

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

0 % Bare Ground
50 % Cover of Wetland Bryophytes
60 Total Cover of Bryophytes
20 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

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		
0-10 ⁺								
10-16 ⁺								
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) <u>Y</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>		
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>NO</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>Histosol saturated to surface.</u>								

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

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>~ 4"</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>Y</u>	Depth (in): <u>φ</u>	EC: <u>60</u> pH <u>5.6</u>
Notes: <u>standing water ~ 20%, Depth varies. Iron sheen throughout. Large hummocks of sphagnum</u>		

AQUATIC SITE ASSESSMENT 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) _____ Sapling (<5 dbh, <6m tall) <u>1</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>90</u> Dwarf shrub (<0.5m) <u>7</u> Tall herb (≥1m) _____ Short herb (<1m) <u>26</u> Moss-Lichen <u>10</u> Floating _____ Submerged _____		
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%) _____ 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 _____ 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 <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 _____ 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 <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 _____ 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 <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>5.6</u>	
Surficial Geologic 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: W85T1006

Field Target: 15023

Date: 6-14-15

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~~ map?

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 Jessie Brownlee

Wetland Scientist (print)

X *[Signature]*

Signature / Date

6-14-15

X Haley Volper

Field Crew Chief (print)

X Haley Volper

Signature / Date

6-14-15

Vegetation Classification Data Form

Site Description		
Date: 6/7/15	Project Name & #: Alaska LNG 26221306	Field Target: 15043
Investigators: JB, JA		Feature ID: W85T1007
Latitude: 61°24'40.3	Longitude: 150°43'47.8	Datum: WGS84
Logbook #: 219 1	Logbook Page #: 5	Picture #: P, veg 001, veg 002
Location Description:		
Common Species Observed (Scientific Name)		
<i>Alnus fruticosa</i>	<i>calamagrostis canadensis</i>	
<i>Equisetum sylvaticum</i>	<i>Dryopteris expansa</i>	
<i>Equisetum arvense</i>		
<i>Alnus fruticosa</i>		
Percent Cover of Dominant Structure Level: 90% Fern cover		
Habitat Description:		
Dry site. Toe slope of Mt. Susitna. Nearly 100 fern cover. Surrounded by Woodland Canopy of cottonwood, Birch & Alder. Dry soil. Dig to ~15" w/ no signs of hydrology.		
Alaska Vegetation Classification: Level I, Level II, Level III		
11B2, 11A2	Larger landscape 1B3, 11B2	
Notes:		
Dry site. See Notebook.		

Field Crew Chief:

Frank Brown

Field Scientist/Technician

Jennifer Ann

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.

Ia. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest	2
Ib. 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	

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

veg form

Feature ID: W8ST1007

Field Target: 15043

Date: 6.7.15

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?~~
map

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?
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8. Photos

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

X

Jennifer Anderson

Wetland Scientist (print)

X

Signature Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Signature Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15046</u>	Map #: <u>217</u> Map Date: <u>6.4.15</u>
Date: <u>6.7.15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W8ST1008</u>
Investigators: <u>JB JA</u>			Team No.: <u>W85</u>
State: Alaska	Region: Alaska	Milepost: <u>733.8</u>	
Latitude: 61.442115		Longitude: -150.661168	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>6</u>	Picture No.:	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat to slightly concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>U 1C2</u>	Evidence of Wildlife Use: <u>Moose Browse</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>PFO4/1A</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1C2, 11C2</u>

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

See map pag 217 & notebook page 6

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	<u>7.1</u>	<u>Y</u>	<u>FACW</u>
2. <i>Betula Neonastana</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
3. <i>Picea Canadensis</i>	<u>9</u>	<u>Y</u>	<u>FACU</u>
4.			
Total Cover: <u>30</u>			
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>			
Sapling/Shrub Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa Acicularis</i>	<u>15%</u>	<u>Y</u>	<u>FACU</u>
2. <i>Alnus edule</i>	<u>10%</u>	<u>Y</u>	<u>FACU</u>
3. <i>Myrica ferruginea</i>	<u>10%</u>	<u>Y</u>	<u>FACU</u>
4. <i>Vaccinium vitis-idaea</i>	<u>8%</u>	<u>N</u>	<u>FAC</u>
5. <i>Ribes tristis</i>			<u>FAC</u>
6. <i>Alnus fruticosa</i>	<u>3%</u>	<u>N</u>	<u>FAC</u>
7.			
8.			
9.			
Total Cover: <u>46</u>			
50% of total cover: <u>23</u> 20% of total cover: <u>9.2</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 28 (B)
 % Dominant Species that are OBL, FACW, or FAC: 7.1 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species: 0 X 1 = 0
 FACW species: 8 X 2 = 16
 FAC species: 12 X 3 = 36
 FACU species: 114 X 4 = 456
 UPL species: _____ X 5 = _____
 Column Totals: 487 (A) 674 (B)
 PI = B/A = 3.62

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum Arvense</i>	<u>35%</u>	<u>Y</u>	<u>FAC</u>
2. <i>Gymnocarpium dryopteris</i>	<u>10%</u>		<u>FACU</u>
3. <i>Chamerion Angustifolium</i>	<u>3%</u>	<u>N</u>	<u>FACU</u>
4. <i>Calamagrostis Canadensis</i>	<u>3%</u>	<u>N</u>	<u>FAC</u>
5. <i>Cornus Canadensis</i>	<u>30%</u>	<u>Y</u>	<u>FACU</u>
6. <i>Cheilanthes lilioides</i>	<u>8%</u>	<u>N</u>	<u>FACU</u>
7. <i>Dryopteris expansa</i>	<u>15%</u>	<u>Y</u>	<u>FACU</u>
8. <i>Rubus arcticus</i>	<u>3%</u>	<u>N</u>	<u>FAC</u>
9. <i>Trifolium europaeum</i>	<u>3%</u>	<u>N</u>	<u>FACU</u>
10. <i>Heracleum maximum</i>	<u>1%</u>	<u>N</u>	<u>FACU</u>
Total Cover: <u>110</u> <u>138</u>			
50% of total cover: <u>55</u> 20% of total cover: <u>22</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
7 % Cover of Wetland Bryophytes
7 Total Cover of Bryophytes
5 % Cover of Water
Hydrophytic Vegetation Present (Y/N): _____
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date	Feature ID	Soil Pit Required (Y/N)			
Date: <u>6-7-15</u> Feature ID: <u>W85T1003</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	—						unsaturated
4-5	—						muck
5-8.5	2.5YR 4/4	100					Sil
8.5-10	5YR 3/3	100					Coarse Sand and fine sand
10-15	10YR 2/1	100					mk sil
15-16.5	7.5YR 4/4	100					Coarse Sand
16.5-24	5G 4/1	100					Fine Sandy 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) <u>N</u>		Alaska Gleyed (A13) <u>—</u>		Alaska Color Change (TA4) ⁴ <u>N</u>			
Histic Epipedon (A2) <u>N</u>		Alaska Redox (A14) <u>N</u>		Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>N</u>		Alaska Gleyed Pores (A15) <u>N</u>		Alaska Redox with 2.5Y Hue <u>N</u>			
Hydrogen Sulfide (A4) <u>N</u>				Alaska Gleyed without 5Y Hue or Redder Underlying Layer			
Thick Dark Surface (A12) <u>N</u>				Other (Explain in Notes) <u>A10</u>			
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>N</u> Depth (inches): <u>—</u>							
Hydric Soil Present (Y/N): <u>Y</u>							
Notes: <u>Organics buried throughout all horizons. 100 positive x in 5G 4/1 horizon</u>							

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>Y</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>NO</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>	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>11</u>		
Notes: <u>EC: 570 pit water. Standing water about 10' away had EC of 515</u>			
Notes: <u>pockets of standing surface water throughout plot & surroundings & along entire creek from LZ. Corund highly uneven w/ undulations & pockets to hold water.</u>			

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved <input checked="" type="checkbox"/> Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> 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>30</u> Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) <u>3</u> Short shrub (0.5-2m) <u>43</u> Dwarf shrub (<0.5m) <u>54</u> Tall herb (≥1m) _____ Short herb (<1m) <u>138</u> Moss-Lichen _____ Floating _____ Submerged _____		
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%) _____ 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 <input checked="" type="checkbox"/> 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) _____ Moderate (broken irregular rings) <input checked="" type="checkbox"/> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope <input checked="" type="checkbox"/> 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 <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 <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.) <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 <input checked="" type="checkbox"/>	
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) _____ pH Reading <u>6.9</u>	
Surficial Geologic 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) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

Jessica Brune

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1008

Field Target: 15046

Date: 6/7/15

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?

Map

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 6/7/15
Signature / Date

X
Jesse Brunie
Field Crew Chief (print)

X
Jesse Brunie 6.7.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>152B</u>	Map #: <u>228</u> Map Date: <u>6-4-15</u>
Date: <u>6/8/15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W85T1009</u>
Investigators: <u>JB, JB</u>			Team No.: <u>W85T1</u>
State: Alaska	Region: Alaska	Milepost: _____	
Latitude: <u>61°21'07.9</u>		Longitude: <u>150°52'44.1</u>	Datum: <u>WGS84</u>
Logbook No.:	Logbook Page No.:	Picture No.: <u>P. 001-004</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <u>NO</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 _____ 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>IC2, HLB3</u> <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IC2, HLB2</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)				
<u>Tree Stratum</u> (Plot sizes: <u>26' Diameter</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Betula nealaskana</u>	<u>60</u>	<u>Y</u>	<u>Fac U</u>
2.	<u>Alnus verticillata</u>			<u>Fac</u>
3.				
4.				
Total Cover: <u>60</u>				
50% of total cover: <u>3</u> 20% of total cover: <u>12</u>				
<u>Sapling/Shrub Stratum</u> (<u>26' Diameter</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Picea canadensis</u>	<u>T</u>	<u>N</u>	<u>Fac U</u>
2.	<u>Viburnum edule</u>	<u>25%</u>	<u>Y</u>	<u>Fac U</u>
3.	<u>Picea canadensis</u>	<u>T</u>	<u>N</u>	<u>Fac</u>
4.	<u>Alnus fruticosa</u>	<u>12</u>	<u>Y</u>	<u>Fac</u>
5.	<u>Ribes triste</u>	<u>8%</u>	<u>N</u>	<u>Fac</u>
6.				
7.				
8.				
9.				
Total Cover: <u>45</u>				
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</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: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 55 X 3 = 165

FACU species: 131 X 4 = 524

UPL species: 0 X 5 = 0

Column Totals: 186 (A) 689 (B)

PI = B/A = 3.70

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26' Diameter</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<u>Callamagrostis canadensis</u>	<u>5%</u>		<u>Fac</u>
2.	<u>Equisetum anense</u>	<u>20%</u>	<u>Y</u>	<u>Fac</u>
3.	<u>Gymnocarpium dryopteris</u>	<u>40%</u>	<u>Y</u>	<u>Fac U</u>
4.	<u>Carex canadensis</u>	<u>3%</u>		<u>Fac U</u>
5.	<u>Rubus arcticus</u>	<u>T</u>		<u>Fac</u>
6.	<u>Trientalis europaea</u>	<u>1%</u>		<u>Fac U</u>
7.	<u>Streptopus amplexifolius</u>	<u>2%</u>		<u>Fac U</u>
8.	<u>Mnemonia ferruginea</u>	<u>T</u>		<u>Fac U</u>
9.	<u>Equisetum sylvaticum</u>	<u>8%</u>		<u>Fac</u>
10.				
Total Cover: <u>81</u>				
50% of total cover: <u>40.5</u> 20% of total cover: <u>16.2</u>				

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N 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>6.8.15</u> Feature ID <u>W8ST1009</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		
O1 0-2							
AC1 2-5	10YR 2/1	100				Sandy loam	
A 5-7	7.5YR 3/2	100				Silt loam	
Bh/E 7-10	7.5YR 2.5/3 Bk/E 4/2	40				Sandy f	
Bhs 10-22	7.5YR 3/3	30				Silt	Many other shades of red hue present throughout horizon
	7.5YR 4/4	30					
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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>	
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 ⁵ (if present): Type: <u>NO</u> Depth (inches): _____							
Hydric Soil Present (Y/N): <u>NO</u>							
Notes: <u>Classic upland forest soil with Ash/E horizon over a Bh/Bhs. All boundaries are wavy.</u>							

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

[Signature]

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1009

Field Target: 15273

Date: 6-8-15

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 6/8/15
Signature / Date

X [Signature]
Field Crew Chief (print)

X Jessie Brunler 6/8/15
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>15014</u>	Map #: <u>244</u> Map Date: <u>6/4/15</u>
Date: <u>6/9/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W 85T1010</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W 85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>755.15</u>	
Latitude: <u>61°14.40</u>	Longitude: <u>151° 6.72</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>9</u>	Picture No.: <u>P-001-004</u>	

SITE PARAMETERS	
Subregion: <u>Southcentral</u>	Landform (hillslope, terrace, hummocks, etc.): <u>small hill</u>
Slope (%): <u>(3-5)</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</u>	Evidence of Wildlife Use: <u>moose scat & browse</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 _____ 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>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>1C2.11C1</u>

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

See map for sketch. Site was chosen to find upland in otherwise wet area.
Use topo & lidar to map dry & wet line.
Site is on a small Hill and is mapped correctly but anything in lowland landscape positions is wet.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>60' Diameter</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>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>40</u> (A/B)
1. <u>Picea mariana</u>	<u>15</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Betula neobaskana</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Picea Glauca</u>	<u>5</u>	<u>N</u>	<u>FACU</u>	
4.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>15</u> X 2 = <u>30</u> FAC species: <u>35</u> X 3 = <u>105</u> FACU species: <u>133</u> X 4 = <u>532</u> UPL species: <u>183</u> X 5 = _____ Column Totals: <u>183</u> (A) <u>667</u> (B) PI = B/A = <u>3.6</u>
Sapling/Shrub Stratum (<u>26' Diam</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Picea glauca</u>			<u>FACU</u>	
2. <u>Rosa acicularis</u>	<u>5</u>	<u>N</u>	<u>FACU</u>	
3. <u>Viburnum edule</u>	<u>40</u>	<u>Y</u>	<u>FACU</u>	
4. <u>Menziesia ferruginea</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
5. <u>Linnaea borealis</u>	<u>8</u>	<u>N</u>	<u>FACU</u>	
6. <u>Vaccinium ovalifolium</u>	<u>T</u>	<u>N</u>	<u>FAC</u>	
7. <u>Alnus Fruticosa</u>	<u>T</u>	<u>N</u>	<u>FAC</u>	
8. <u>Sorbus sitchensis</u>	<u>T</u>	<u>N</u>	<u>FACU</u>	
9. <u>Horridus oplopanax</u>	<u>T</u>	<u>N</u>	<u>FACU</u>	
Total Cover: <u>83</u> 50% of total cover: <u>41.5</u> 20% of total cover: <u>16.6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26' Diam</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Horridus oplopanax</u>	<u>T</u>	<u>N</u>	<u>FACU</u>	
2. <u>Cornus canadensis</u>	<u>7</u>	<u>N</u>	<u>FACU</u>	
3. <u>Rubus Arcticus</u>	<u>51</u>	<u>N</u>	<u>FAC</u>	
4. <u>Callamerion angustifolium</u>	<u>3</u>	<u>N</u>	<u>FACU</u>	
5. <u>Trientalis europaea</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
6. <u>Geocaulon lividium</u>	<u>2</u>	<u>N</u>	<u>FACU</u>	
7. <u>Gymnocarpium dryopteris</u>	<u>8</u>	<u>N</u>	<u>FACU</u>	
8. <u>Equis Arvens</u>	<u>T</u>	<u>N</u>		
9. <u>sylvaticum</u>	<u>T</u>	<u>N</u>		
10.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>				0 % Bare Ground 0 % Cover of Wetland Bryophytes 0 Total Cover of Bryophytes 0 % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6-9-15</u> Feature ID <u>W85T1010</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	
0-3	organics					
3-6	10YR 3/2	100				VF SaL
6-8	10YR 5/2	100				" "
8-22	7.5YR 2.5/3	20				" "
	7.5YR 4/6	60				" "
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) <u>N</u>		Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>		Alaska Redox (A14) <u>N</u>		Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>		Alaska Gleyed Pores (A15) <u>N</u>		Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>				Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>				Other (Explain in Notes) <u>N</u>		
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>—</u> Depth (inches): <u>—</u>						
Hydric Soil Present (Y/N): <u>N</u>						
Notes: <u>Soil Pit: All horizon boundaries are wavy. No</u>						

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

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brownlee

Jepson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1010

Field Target: 15014

Date: 6.9.15

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~~
map

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

Signature / Date

6/9/15

X

[Signature]

Field Crew Chief (print)

X

Jessie Browne

Signature / Date

6-9-15

Vegetation Classification Data Form

Site Description		
Date: 6.9.15	Project Name & #: Alaska LNG 26221306	Field Target: 15013
Investigators: JB, JB		Feature ID: W85T1011
Latitude: 61° 14.37219	Longitude: -151° 6.7387	Datum: WGS84
Logbook #: 1	Logbook Page #: 10	Picture #: W85T1011 1-3
Location Description:		
Upland 1C2, 11B2 veg on top of a hill slope above lowlands. Dry forest soils with thick undergrowth.		
Common Species Observed (Scientific Name)		
Betula NeoAlaskana	Corynocarpium dryopteris	
Alnus Froit-cosa	Dryopteris expansa	
Picea Glauca		
Horridus oplopanax		
Percent Cover of Dominant Structure Level: 40		
Habitat Description:		
Mature mixed forest with tall shrub cover and thick undergrowth. Moss mat thick.		
Alaska Vegetation Classification: Level I, Level II, Level III		
1C2, 11B2		
Notes:		
Site is a dry island surrounded by wetland. Any elevation below this is wet.		

Field Crew Chief: Jessie Brownlee

Field Scientist/Technician: Jeb Kralick

[Handwritten signature]

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	

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1011

Field Target: 15013

Date: 6-9-15

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~~ map

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 [Signature] 6/9/15
Signature / Date

X Jessie Brown
Field Crew Chief (print)

X [Signature] 6-9-15
Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 609.15	Project Name & #: Alaska LNG 26221306	Field Target: 75012
Investigators: JB, JA		Feature ID: W85T1012
Latitude: 61 14.22	Longitude: -151 6.87	Datum: WGS84
Logbook #: 1	Logbook Page #: 11	Picture #: W85T1012 0-3
Location Description: 0-3 slope, lowland, mixed forest, south of PEMIB Signature PSS/EMIB		
Common Species Observed (Scientific Name)		
Betula Neonotkiana	Menziesia ferruginea	
Picea Canadensis	Gymnocarpium dryopteris	
Edva Viburnum	Rosa acicularis	
Gymnocarpium dryopteris		
Percent Cover of Dominant Structure Level:		
Habitat Description:		
Tall mature Mixed forest w/ healthy shrub understory. Site is slightly higher in elevation than lowland PSS/EMIB Signature to the north		
Alaska Vegetation Classification: Level I, Level II, Level III		
I C 2, II C 2		
Notes:		
Dry Soil w/ E + Bhs horizons. No signs of hydrology.		

Field Crew Chief:

[Signature]

Field Scientist/Technician

[Signature]

[Signature]

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	

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85 T1012

Field Target: 15012

Date: 6.9.15

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?

map

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?
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7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
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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 6/9/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie Brownlee
Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 6.9.15	Project Name & #: Alaska LNG 26221306	Field Target: 15012
Investigators: JB, JA		Feature ID: W8ST1013
Latitude: 61° 14.29'	Longitude: -150° 6.8'	Datum: WGS84
Logbook #: 1	Logbook Page #: 12	Picture #: W8ST1013 1-3
Location Description:		
elevation increase to the North of the PSS/EMIB signature. Steep ~ 20 to 30% slope. Site taken on wet Dry Boundary.		
Common Species Observed (Scientific Name)		
Menziesia ferruginea		
Betula neoalaskana		
Picea mariana		
Percent Cover of Dominant Structure Level: 50%		
Habitat Description:		
Black spruce & PSS/EMIB to the South. Mature Dry IC2 to the North up slope.		
Alaska Vegetation Classification: Level I, Level II, Level III		
IC2, IIC3		
Notes:		
Steep slope. Upland site. Elevation Drives wetland status. use contours & Lidar for mapping connections (see map)		

Field Crew Chief: Jessie Breault

Field Scientist/Technician: Jeffrey

Handwritten signature/initials

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
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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
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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	
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III. Herbaceous		
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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	

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T013

Field Target: 15012

Date: 6.9.15

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~~ map

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
Wetland Scientist (print)

X [Signature] 6/9/15
Signature / Date

X Jesse Brannlee
Field Crew Chief (print)

X Jesse Brannlee 6.9.15
Signature / Date

WETLAND DETERMINATION DATA FORM

W85T1014

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15059	Map #: 203 Map Date: 6.4.15
Date: 6.10.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1014
Investigators: JB, KV			Team No.: 1185
State: Alaska	Region: Alaska	Milepost: 710.45	
Latitude: 61° 43.20203		Longitude: -150° 23.275626	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 13	Picture No.: W85T1014 1-4	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 0-3	Local relief (concave, convex, none): flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB	Evidence of Wildlife Use: animal game trail
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/EMIC
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11C1, III A2

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

Mapping notes:
Wetter than a B modifier. Suggest changing to a C. Not of water wet.

WETLAND DETERMINATION DATA FORM

W85T1014

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>60' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	<u>2</u>		<u>FACW</u>
2.			
3.			
4.			
Total Cover: <u>2</u> 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	<u>50</u>	<u>Y</u>	<u>FAC</u>
2. <i>Myrica gale</i>	<u>25</u>	<u>Y</u>	<u>OBL</u>
3. <i>Spiraea stevenii</i>	<u>5</u>	<u>N</u>	<u>FACU</u>
4. <i>Rhododendrum tomentosum</i>	<u>T</u>	<u>N</u>	<u>FACW</u>
5. <i>Vaccinium ovalifolium</i>	<u>7</u>	<u>N</u>	<u>FAC</u>
6. <i>Salix</i> sp	<u>T</u>	<u>N</u>	
7. <i>Picea mariana</i>	<u>3</u>	<u>N</u>	<u>FACW</u>
8.			
9.			
Total Cover: <u>92</u> 50% of total cover: <u>46</u> 20% of total cover: <u>18.4</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: 26 X 1 = 26
 FACW species: 5 X 2 = 10
 FAC species: 78 X 3 = 234
 FACU species: 5 X 4 = 20
 UPL species: 0 X 5 = 0
 Column Totals: 114 (A) 290 (B)
 PI = B/A = 2.54

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum fluviatile</i>	<u>1</u>	<u>N</u>	<u>OBL</u>
2. <i>Equisetum sp.</i>	<u>5</u>	<u>N</u>	
3. <i>Equisetum Arvense</i>	<u>1</u>	<u>N</u>	<u>FAC</u>
4. <i>Epilobium palustre</i>	<u>10</u>	<u>Y</u>	<u>OBL</u>
5. <i>Trientalis europaea</i>	<u>T</u>	<u>N</u>	<u>FACU</u>
6. <i>Calamagrostis canadensis</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
7. <i>E</i>			
8.			
9.			
10.			
Total Cover: <u>37</u> 50% of total cover: <u>18.5</u> 20% of total cover: <u>7.4</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
100 % Cover of Wetland Bryophytes
80 % Total Cover of Bryophytes
10 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W85T1014

SOIL		Date <u>6-10-13</u> Feature ID <u>W85T1014</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		
0-11	organics						
11-16	organics						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>Y</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</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: seasonal frost Depth (inches): 7

Hydric Soil Present (Y/N): Y

Notes: Dug to 16", All organic. Frozen @ 11"

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

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>4</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>4 in</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>2</u>	
Notes: <u>PH 5.81</u> <u>~10% of plot has standing water between hummocks.</u>		EC: <u>96</u>

AQUATIC SITE ASSESSMENT DATA FORM

W85T1014

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>2</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>87</u> Dwarf shrub (<0.5m) _____ Tall herb (≥m) _____ Short herb (<1m) <u>37</u> Moss-Lichen <u>80</u> Floating _____ Submerged _____			
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%) _____ 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) _____ 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 <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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.8</u>	
Surficial Geologic 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:

Jessie Brandlee 6.10.13

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ST1014

Field Target: 15059

Date: 6.10.15

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?
Map

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 Naley Volper
Wetland Scientist (print)

X Naley Volper 6-10-15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie Brownlee
6.10.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15061	Map #: 203 Map Date: 6.4.15
Date: 6-10-15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1015
Investigators: JB, KV			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 710.25	
Latitude: 61°43.260820' N	Longitude: 150°22.894806' W		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 15	Picture No.: W85T1015-1-4	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 0-3	Local relief (concave, convex, none): flat
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	Evidence of Wildlife Use: # Shrew observed
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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11A2, 11C2

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

See map for boundaries & codes. Site is situated black spruce open forest with thick sphagnum moss cover.

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>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (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: <u>3</u> X 1 = <u>3</u> FACW species: <u>62</u> X 2 = <u>124</u> FAC species: <u>15</u> X 3 = <u>45</u> FACU species: <u>0</u> X 4 = <u>0</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>80</u> (A) <u>172</u> (B) PI = B/A = <u>2.15</u>	
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status		
1. <i>Picea mariana</i>	40	Y	FACW		
2. <i>Betula nana</i>	7	N	FACW		
3. <i>Rhododendrum tomentosum</i>	10	N	FACW		
4. <i>Empetrum nigrum</i>	3	N	FAC		
5. <i>Chamaedaphne calyculata</i>	7	N	FACW		
6. <i>Vaccinium uliginosum</i>	5	N	FAC		
7. <i>Vaccinium vitis-idaea</i>	trace	N	FAC		
8. <i>Vaccinium oxycoccus</i>	1	N	OBL		
9. <i>Andromeda polifolia</i>	2	N	FACW		
Total Cover: <u>75</u> 50% of total cover: <u>37.5</u> 20% of total cover: <u>15</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.	
1. <i>Rubus chamaemorus</i>	3	Y	FACW		
2. <i>Poa</i> sp	1	N			
3. <i>Sphagnum</i>					
4. <i>Equisetum fluviale</i>	1	Y	OBL		
5. <i>Andromeda polifolia</i>			FACW		
6. <i>Drosera rotundifolia</i>	1	Y	OBL		
7. <i>Carex</i> sp	1	N			
8.					
9.					
10.					
Total Cover: <u>75</u> 50% of total cover: <u>37.5</u> 20% of total cover: <u>15</u>				0 % Bare Ground 70 % Cover of Wetland Bryophytes 90 Total Cover of Bryophytes 0 % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below): <u>Sphagnum</u>	

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		
0-24	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>Y</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</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: NO 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>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) _____
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
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>11</u>		
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>7</u>		
Notes:		EC: <u>58</u> pH <u>4.75</u>	

AQUATIC SITE ASSESSMENT 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 <input checked="" type="checkbox"/> Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____			
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) <u>40</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>27</u> Dwarf shrub (<0.5m) <u>6</u> Tall herb (≥1m) _____ Short herb (<1m) <u>5</u> Moss-Lichen _____ Floating _____ Submerged _____			
Number of Wetland Types (M): <u>3</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%) <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 _____ Lacustrine Fringe _____ Depressional <input checked="" type="checkbox"/> Riverine _____ Estaurine Fringe _____			

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <input checked="" type="checkbox"/> 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 _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent <input checked="" type="checkbox"/> 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 Geologic 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:

Jessie Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1015

Field Target: 15061

Date: 6.8.15

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?
map

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 Naley Volper
Wetland Scientist (print)

X Naley Volper 6-10-15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie Brownlee 6-10-15
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>15056</u>		Map #: <u>207</u> Map Date: <u>6.4.15</u>
Date: <u>6-11-15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>	Feature Id: <u>W85TIO16</u>	
Investigators: <u>JB, KV</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>716.6</u>	
Latitude: <u>61° 39.219° N</u>	Longitude: <u>150° 29.223137°</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: _____	Picture No.: <u>P-W85TIO16-001-VEG, P-W85TIO16-002-VEG, P-W85TIO16-003-PIT, P-W85TIO16-004-PLUG</u>	

SITE PARAMETERS	
Subregion: <u>Southcentral</u>	Landform (hillslope, terrace, hummocks, etc.): <u>lowland to small hill</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat to slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4B</u>	Evidence of Wildlife Use: <u>moose browsing evidence + droppings</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IC 2, IB 2</u>

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

Dry site. Tall mature mixed forest. Upper canopy is dominated by Black spruce + Betula nealaskana while understory contains white spruce primarily w/ Betula nealaskana. Much dead/damaged spruce trees. Thick feather moss. No signs of hydrology. Sporadic soils with a few perching water as evident by concentrations is the siltier material.



WETLAND DETERMINATION DATA FORM

W85 T I 016

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>60 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Picea mariana</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>
2. <u>Betula neolascana</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>
3. <u>Picea glauca</u>			
4.			

Total Cover: 20

50% of total cover: 10 20% of total cover: 4

Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Picea glauca</u>	<u>6</u>	<u>Y</u>	<u>FACU</u>
2. <u>Betula neolascana</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>
3. <u>Salix pulchra</u>	<u>7</u>	<u>N</u>	<u>FACW</u>
4. <u>Empetrum nigrum</u>	<u>1</u>	<u>N</u>	<u>FAC</u>
5. <u>Rhododendrum groenlandicum</u>	<u>1</u>	<u>N</u>	<u>FAC</u>
6. <u>Vaccinium vitis-idaea</u>	<u>4</u>	<u>N</u>	<u>FAC</u>
7. <u>Linnaea borealis</u>	<u>2</u>	<u>N</u>	<u>FACU</u>
8. <u>Spiraea stenensis</u>	<u>5</u>	<u>N</u>	<u>FACU</u>
9. <u>Asplenium adnigrum</u>	<u>1</u>	<u>N</u>	<u>FACU</u>

Vaccinium uliginosum Total Cover: 45 49
 1% FAC 50% of total cover: 23 20% of total cover: 9.8

Salix herbacea 2 FAC

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 57% (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 2 X 2 = 4

FAC species: 11 X 3 = 33

FACU species: 7 X 4 = 28

UPL species: 0 X 5 = 0

Column Totals: 20 (A) 65 (B)

PI = B/A = 3.25

Sorkus

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Cornus suecica</u>	<u>7</u>	<u>Y</u>	<u>FACU</u>
2. <u>Equisetum sylvaticum</u>	<u>1</u>	<u>N</u>	<u>FAC</u>
3. <u>Trientalis europaea</u>	<u>2</u>	<u>N</u>	<u>FACU</u>
4. <u>Geocaulon lividum</u>	<u>7</u>	<u>Y</u>	<u>FACU</u>
5. <u>Rubus pedatus</u>	<u>4</u>	<u>N</u>	<u>FAC</u>
6. <u>Chamerion angustifolium</u>	<u>1</u>	<u>N</u>	<u>FACU</u>
7. <u>Dryopteris</u>	<u>5</u>	<u>N</u>	<u>FACU</u>
8. <u>Calamagrostis lapponica</u>	<u>2</u>	<u>N</u>	<u>FAC</u>
9. <u>Streptopus amplexifolius</u>	<u>1</u>	<u>N</u>	<u>FACU</u>
10. <u>Sparganium angustifolium</u>	<u>10</u>	<u>Y</u>	<u>FACU</u>

Total Cover: 33

50% of total cover: 19 20% of total cover: 7.6

feathermoss
~ 90%

Listera cordata

T N

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations¹ (Provide supporting data in Notes)

N 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):

spargnum, feather
plot contains 7% down or dead woody debris

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6-11-15</u> Feature ID <u>W83T1016</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		
0-2	Organics							
2-3	7.5YR 5/1	100					SIL	irregular boundaries & in pockets
3-8	7.5YR 2.5/2	65					FSL	throughout profile
8-20	7.5YR 4/4	35						
	10YR 4/2	65	10YR 5/2	D	5	M	FSL	pockets of silt loam
	10YR 5/4	25	10YR 4/4	C	5	M		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): -

Hydric Soil Present (Y/N): N

Notes: Dry Spodic Forest Soil

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

Notes: no signs of hydrology

AQUATIC SITE ASSESSMENT 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 _____ 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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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: W8571016

Field Target: 15054

Date: 6.11.2015

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? *map*

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 Kaley Volper

Wetland Scientist (print)

X Kaley Volper 6-11-15

Signature / Date

X Jessie Brorne

Field Crew Chief (print)

X 12-11-15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15019	Map #: 239 Map Date: 6-4-15
Date: 6-11-15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85 T1017
Investigators: JB, KV			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 751.1	
Latitude: 61° 17.452854' N		Longitude: 151° 3.174488' W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 16	Picture No.: W85 T1017 1-5	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use:
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: PFO1/4C
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1C2.11B2

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

Area much wetter than Veg signature indicates. Standing water ~10% of plot. To the West it gains slight elevation but only gets wetter. A spring was located ~50' from plot but it was still wet above that. Area is wet to the North too until it gains in elevation. See map for details.

NW of Plot

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>60 ft</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 nealaskana</i>		25	Y	FAC	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
2. <i>Picea mariana</i>		10 15	Y	FACW	% Dominant Species that are OBL, FACW, or FAC: <u>66.7</u> (A/B)
3. <i>Alnus viridis fruticosa</i>		1	N	FAC	
4. <i>Picea glauca</i>		10 15	Y	FACU	
Total Cover: <u>55</u>					
50% of total cover: <u>27.5</u>		20% of total cover: <u>11</u>			
Sapling/Shrub Stratum (<u>26 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Prevalence Index worksheet:
1. <i>Picea glauca</i>		1	N	FACU	Total % Cover of: <u>1</u> X 1 = <u>1</u>
2. <i>Menziesia ferruginea</i>		15	Y	FACU	OBL species: <u>1</u> X 2 = <u>2</u>
3. <i>Vaccinium ovifolium</i>		5	N	FAC	FACW species: <u>8</u> X 3 = <u>24</u>
4. <i>Spiraea steyerii</i>		T	N	FACU	FAC species: <u>7</u> X 4 = <u>28</u>
5. <i>Vaccinium vitis-idaea</i>		T	N	FAC	FACU species: <u>0</u> X 5 = <u>0</u>
6. <i>Alnus viridis fruticosa</i>		30	Y	FAC	UPL species: <u>0</u> X 5 = <u>0</u>
7.					Column Totals: <u>17</u> (A) <u>51</u> (B)
8.					PI = B/A = <u>3</u>
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 ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<u>Y</u> Dominance Test is > 50%
1. <i>Equisetum arvense</i>		60	Y	FAC	<u>Y</u> Prevalence Index is ≤ 3.0
2. <i>Gymnocarpium dryopteris</i>		1	N	FACU	<u>N</u> Morphological Adaptations ¹ (Provide supporting data in Notes)
3. <i>Comarum palustre</i>		1	N	OBL	<u>N</u> Problematic Hydrophytic Vegetation ¹ (Explain)
4. <i>Cornus suecica</i>		1	N	FAC	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
5. <i>Sparganium angustifolium</i>		7	N	FACU	
6. <i>Equisetum fluviatile</i>		T	N		
7. <i>Equisetum sp.</i>		T	N		
8. <i>Rubus parviflorus</i>		T	N	FAC	
9. <i>Linnaea borealis</i>		2	N	FACU	
10. <i>Tricentris europaea</i>		T	N	FACU	
Total Cover: <u>74</u>					
50% of total cover: <u>37</u>		20% of total cover: <u>14.8</u>			
<i>Rubus dominicus</i> T					
<i>Dryopteris expansa</i> 2 FACU					
		<u>0</u> % Bare Ground <u>30</u> % Cover of Wetland Bryophytes <u>40</u> Total Cover of Bryophytes <u>10</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>6/1/15</u>		Feature ID <u>W85T1017</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	
O _i 0-2	organics						
C ₁ 2-3	25Y3/1	100					Sand Sand Lens throughout horizon
O _e 3-14	organics						
B _u 14-17	7.5YR 3/2	100					Sil
C ₂ 17-+	Rocks	100					Rocks Rock layer Angular
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) <u>N</u>		Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) ⁴ <u>N</u>			
Histic Epipedon (A2) <u>X Yes</u>		Alaska Redox (A14) <u>N</u>		Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>N</u>		Alaska Gleyed Pores (A15) <u>N</u>		Alaska Redox with 2.5Y Hue <u>N</u>			
Hydrogen Sulfide (A4) <u>N</u>				Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>			
Thick Dark Surface (A12) <u>N</u>				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>Yes</u> Depth (inches): <u>17</u>							
Hydric Soil Present (Y/N): <u>Y</u>							
Notes: Soil pit kind of smashed down from extraction. Silty layer & solid horizon of Rocks is Acting like a restrictive layer.							

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>Y</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>Y</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes: standing water, water table to surface sphagnum very wet site. Spring located ~50' away. Elevation dictating wet/dry lines	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>N</u>		
Iron Deposits (B5) <u>N</u>			
Surface Water Present (Y/N): <u>Y</u> Depth (in): <u>up to 8"</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>		EC: <u>26</u> PH <u>5.4</u>	
Notes:			

AQUATIC SITE ASSESSMENT DATA FORM

W8ST1017

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>55</u> Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) <u>31</u> Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>24</u> Moss-Lichen <u>40</u> Floating _____ Submerged _____			
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%) <u>X</u> 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 _____ 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 <u>X</u> Flat _____ 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 _____	
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>5.4</u>	
Surficial Geologic 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 <u>X</u> 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) <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: W85T1017

Field Target: 15019

Date: 6.11.2015

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?

map

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 Kaley Volper
Wetland Scientist (print)

X Kaley Volper 6-11-15
Signature / Date

X Jessie Brandy
Field Crew Chief (print)

X 6-11-15
Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 6.14.15	Project Name & #: Alaska LNG 26221306	Field Target: 15024
Investigators: JB, KV		Feature ID: W85T1018
Latitude: 61° 18.772115' N	Longitude: 151° 0.648083	Datum: WGS84
Logbook #: 1	Logbook Page #: 21	Picture #: W85T1018 1-3
Location Description:		
~ 1 miles to the east of FT 15024. cant get there due to veg & terrain. Everything to the East to LZ 748.8 is wet despite the veg signature.		
Common Species Observed (Scientific Name)		
Betula Neolascana	Rosa Aciculatis	
Picea Colauca		
Menziesia ferruginea		
Calamagrostis Canadensis		
Percent Cover of Dominant Structure Level: trees: 50%, shrub 70%		
Habitat Description:		
Tall mature Betula neolascana & white spruce open forest with thick understory of Menziesia ferruginea. Many downed trees. Site is a slight hill compared to terrain to the East		
Alaska Vegetation Classification: Level I, Level II, Level III		
1C2, 11C2		
Notes:		
See Note book & map → 235 1 page 21		

Field Crew Chief: Jessie Brownlee Field Scientist/Technician: Karen Volper

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		15
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: W8571018

Field Target: 15024

Date: 6-14-15

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 Jessie Browlee

Field Technician (print)

X [Signature] 6-14-15

Signature

X Kaley Volper

Field Crew Chief (print)

X Kaley Volper 6-14-15

Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>off road</i>	Field Target: <i>15242</i>
Map #: <i>229</i>		Map Date: <i>6.4.15</i>		
Date: <i>6-15-15</i>	Project Name & No.: Alaska LNG 60418403		Feature Id: <i>W85T1019</i>	
Investigators: <i>JB, KV</i>			Team No.: <i>W85</i>	
State: Alaska	Region: Alaska	Milepost: <i>744.1</i>		
Latitude: <i>61° 20.760035</i>		Longitude: <i>-150° 53.079529</i>		Datum: WGS84
Logbook No.: <i>1</i>	Logbook Page No.: <i>22</i>	Picture No.: <i>P-W85T1019-001 thru -004</i>		

SITE PARAMETERS	
Subregion: <i>Southcentral</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Lowland</i>
Slope (%): <i>0-3</i>	Local relief (concave, convex, none): <i>undulating</i>
Pre-mapped Alaska LNG/NWI classification: <i>1B2, 11B2</i>	Evidence of Wildlife Use: <i>NO</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, 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 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>U</i>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <i>1C2, 11B2</i>

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

see log book & map for additional info
Change mapping from 1B2, 11B2 to 1C2, 11B2

W8571019

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>60 ft</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>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>20%</u> (A/B)
1. <i>Betula Neolaskana</i>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
2. <i>Picea Colauca</i>	<u>25</u>	<u>Y</u>	<u>FACU</u>	
3.				
4.				
Total Cover: <u>55</u> 50% of total cover: <u>27.5</u> 20% of total cover: <u>11</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>4</u> FAC species: <u>57</u> X 3 = <u>171</u> FACU species: <u>201</u> X 4 = <u>804</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>260</u> (A) <u>979</u> (B) PI = B/A = <u>3.76</u>
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Oplopanax horridus</i>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
2. <i>Menziesia ferruginea</i>	<u>50</u>	<u>Y</u>	<u>FACU</u>	
3. <i>Rosa acicularis</i>	<u>5</u>	<u>N</u>	<u>FACU</u>	
4. <i>Linnaca borealis</i>	<u>1</u>	<u>N</u>	<u>FACU</u>	
5. <i>Ribes triste</i>	<u>2</u>	<u>N</u>	<u>FAC</u>	
6. <i>Vaccinium vitis-idaea</i>	<u>1</u>	<u>N</u>	<u>FAC</u>	
7. <i>Picea glauca</i>	<u>10</u>	<u>N</u>	<u>FACU</u>	
8. <i>Betula neolaskana</i>	<u>1</u>	<u>N</u>	<u>FAC</u>	
9. <i>Sorbus sp</i>	<u>1</u>	<u>N</u>	<u>-</u>	
Total Cover: <u>104</u> 50% of total cover: <u>52</u> 20% of total cover: <u>20.8</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
<u>6</u>				
1. <i>Gymnocarpium dryopteris</i>	<u>65</u>	<u>Y</u>	<u>FACU</u>	
2. <i>Spinulum annotinum</i>	<u>3</u>	<u>N</u>	<u>FACU</u>	
3. <i>Trentalis Europaea</i>	<u>5</u>	<u>N</u>	<u>FACU</u>	
4. <i>Streptopus amplexifolius</i>	<u>2</u>	<u>N</u>	<u>FACU</u>	
5. <i>Equisetum sylvaticum</i>	<u>1</u>	<u>N</u>	<u>FAC</u>	
6. <i>Cornus suecica</i>	<u>10</u>	<u>N</u>	<u>FAC</u>	
7. <i>Rubus pedatus</i>	<u>10</u>	<u>N</u>	<u>FAC</u>	
8. <i>Equisetum arvense</i>	<u>4</u>	<u>N</u>	<u>FAC</u>	
9. <i>Equisetum pratense</i>	<u>2</u>	<u>N</u>	<u>FACW</u>	% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>5</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
10. <i>Dryopteris expansa</i>	<u>1</u>	<u>N</u>	<u>FACU</u>	
Total Cover: <u>103</u> 50% of total cover: <u>51.5</u> 20% of total cover: <u>20.6</u>				
Chamerion angustifolium FACU 10%				
<i>Vitis-idaea</i> FAC				

WETLAND DETERMINATION DATA FORM

SOIL		Date <u>6-13-13</u> Feature ID <u>W85T1019</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							
2-4	7.5YR 2.5/2	100				F Sal	1/2 horizon is wood & debris
4-5	10YR 4/2	100				F Sal	wavy banding & in pockets
5-24	7.5YR 3/4	30	5YR 4/6	2	RC	RC	slight Bhs features not distinct
	7.5YR 4/4	70					few relic concentrations
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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>	
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>NO</u> Depth (inches): <u>—</u>							
Hydric Soil Present (Y/N): <u>NO</u>							
Notes: <u>Colors taken dry, Dry Forest Soil</u>							

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>N</u>		
Iron Deposits (B5) <u>N</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>	EC: <u>—</u>	
Notes: <u>no signs of Hydrology.</u>			

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brownlee

Kaley Volper

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ST1019

Field Target: 15242

Date: 6-15-15

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~~ ^{MAP} 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 Jesse Brownlee

Wetland Scientist (print)

X

Signature / Date

X Kaley Volper

Field Crew Chief (print)

X

Signature / Date

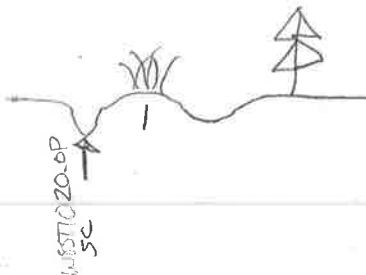
6-15-15

Vegetation Classification Data Form

Site Description		
Date: 6.15.15	Project Name & #: Alaska LNG 26221306	Field Target: 15026
Investigators: JB, KV		Feature ID: W85T1020
Latitude: 61 19.56741	Longitude: -150.59.04043	Datum: WGS84
Logbook #: 1	Logbook Page #: 27	Picture #: W85T1020-1-3
Location Description:		
Dry sandy site. Creek to south occasional over banks. site is dry see notebook for more details Page 22		
Common Species Observed (Scientific Name)		
Calamagrostis Canadensis		
Athyrium cyclosorum		
Urtica dioica		
Percent Cover of Dominant Structure Level: Herb cover 95%. few bare depressions.		
Habitat Description:		
Thick tall lady fern opening in forest. Ferns & grass over 5' tall. Surrounding forest is 1C2, 11B2 of cotton wood, Birch & spruce all tall. Very little veg diversity here.		
Alaska Vegetation Classification: Level I, Level II, Level III		
111A2		
Notes:		
see note book 1 page 22		

Field Crew Chief: Jessie Brownlee

Field Scientist/Technician Karen Volper



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: W85T1020 Field Target: 15026 Date: 6-15-15

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 Naley Volper
Field Technician (print)

X Naley Volper 6-15-15
Signature

X Jessie Brownlee
Field Crew Chief (print)

X JBR
Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15045	Map #: 733.7 Map Date: 6.9.15
Date: 6-16-2015	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1021
Investigators: JB, KV			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 733.7	
Latitude: 61° 26.617576		Longitude: -150° 39.606167	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 25	Picture No.: W85T1021-001 thru 004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Toe slope of Mt. Sisson slight hill in lowland
Slope (%): 0-3	Local relief (concave, convex, none): convex undulating
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: browsed veg, moose droppings
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IB2 IIIA2

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

See map & notebook

WETLAND DETERMINATION DATA FORM

W85T1021

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>60 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	20	Y	FAC
2. <i>Populus balsamifera</i>	15	Y	FACU
3. <i>Picea glauca</i>	5	N	FACU
4.			
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>			
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum edule</i>	20	Y	FACU
2. <i>Ribes triste</i>	5	N	FAC
3. <i>Rosa acicularis</i>	15	Y	FACU
4. <i>Oplopanax horridus</i>	10	N	FACU
5. <i>Rubus idaeus</i>	1	N	FACU
6. <i>Actaea rubra</i>	2	N	FAC
7. <i>Salix</i> sp.	1	N	—
8. <i>Alnus fruticosa</i>	3	N	FAC
9.			
Total Cover: <u>59</u> 50% of total cover: <u>28.5</u> 20% of total cover: <u>11.4</u>			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 29 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 43 X 2 = 86

FAC species: 40 X 3 = 120

FACU species: 97 X 4 = 388

UPL species: 0 X 5 = 0

Column Totals: 180 (A) 594 (B)

PI = B/A = 3.3

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Mertensia paniculata</i>	3	N	FACU
2. <i>Calamagrostis canadensis</i>	5	N	FAC
3. <i>Equisetum pratense</i>	40	Y	FACW
4. <i>Trientalis europaea</i>	4	N	FACU
5. <i>Chamerion angustifolium</i>	3	N	FACU
6. <i>Heracleum maximum</i>	10	Y	FACU
7. <i>Galium trifidum</i>	3	N	FACW
8. <i>Galium</i> sp.	5	N	—
9. <i>Gymnocarpium dryopteris</i>	10	Y	FACU
10. <i>Cornus suecica</i>	5	N	FAC
Total Cover: <u>89</u> 50% of total cover: <u>44.5</u> 20% of total cover: <u>17.8</u>			

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N 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

10 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

6/10/15 WEST1021

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							
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes	
0-4									
4-5	10YR 3/2	100					VF SaL		
5-11	10YR 4/3	100					F SaL	buried organics from 11"	
11-18	10YR 4/3	100					SaL		
18-21	10YR 3/4	100					SaL		

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): N

Hydric Soil Present (Y/N): N

Notes: Dry sandy soil. Dense root mat to cut through. Top 5" were solid roots

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>N</u>		
Iron Deposits (B5) <u>N</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: No signs of hydrology		EC: <u>N</u>	

AQUATIC SITE ASSESSMENT DATA FORM

W8T1021

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 Geologic 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: W85T102I Field Target: 15045 Date: 6.16.15

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 Kately Valper
Wetland Scientist (print)

X Kately Valper 6-16-15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X [Signature] 6-16-15
Signature / Date

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1022 Field Target: 15034 Date: 6-16-15

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 Halley Volper
Wetland Scientist (print)

X Halley Volper 6-16-15
Signature / Date

X Jessie Browlee
Field Crew Chief (print)

X [Signature] 6/16/15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 19034	Map #: 227 Map Date: 6/4/15
Date: 6-16-15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1022
Investigators: JB, KV			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 743.3	
Latitude: 61°21'35.2861		Longitude: -150 52.358991	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 26	Picture No.: W85T1022-001 thru -004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: no
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: PFO1/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1C2, 11B2

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

see map and notebook

WETLAND DETERMINATION DATA FORM

W85T1022

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>60 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nealarkans</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
2. <i>Picea Glauca</i>	<u>3</u>	<u>N</u>	<u>FACU</u>
3. <i>Picea Marianne</i>	<u>10</u>	<u>Y</u>	<u>FACW</u>
4.			
Total Cover: <u>33</u> 50% of total cover: <u>16.5</u> 20% of total cover: <u>6.6</u>			
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa Acicularis</i>	<u>10</u>	<u>N</u>	<u>FACU</u>
2. <i>Viburnum edule</i>	<u>13</u>	<u>Y</u>	<u>FACU</u>
3. <i>Alnus fruticosa</i>	<u>30</u>	<u>Y</u>	<u>FAC</u>
4. <i>Linnaea borealis</i>	<u>1</u>	<u>N</u>	<u>FACU</u>
5. <i>Spiraea steyerii</i>	<u>5</u>	<u>N</u>	<u>FACU</u>
6. <i>Vaccinium vitis-idaea</i>	<u>7</u>	<u>N</u>	<u>FAC</u>
7. <i>Rubus sp</i>	<u>5</u>	<u>N</u>	<u>—</u>
8. <i>Rubus chamaemorus</i>	<u>2</u>	<u>N</u>	<u>FACW</u>
9.			
Total Cover: <u>66</u> 50% of total cover: <u>33</u> 20% of total cover: <u>13.2</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 5 X 1 = 5
 FACW species: 17 X 2 = 34
 FAC species: 91 X 3 = 273
 FACU species: 41 X 4 = 164
 UPL species: 0 X 5 = 0
 Column Totals: 154 (A) 476 (B)
 PI = B/A = 3.09

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum Arvense</i>	<u>40</u>	<u>Y</u>	<u>FAC</u>
2. <i>Tricentatis Europaea</i>	<u>3</u>	<u>N</u>	<u>FACU</u>
3. <i>Viola sp</i>	<u>1</u>	<u>N</u>	<u>—</u>
4. <i>Galium trifidum</i>	<u>7</u>	<u>N</u>	<u>FACW</u>
5. <i>Comarum palustre</i>	<u>5</u>	<u>N</u>	<u>OBL</u>
6. <i>Cornus canadensis</i>	<u>5</u>	<u>N</u>	<u>FACU</u>
7. <i>orchid sp</i>	<u>7</u>	<u>N</u>	<u>—</u>
8. <i>Streptopus amplexifolius</i>	<u>1</u>	<u>N</u>	<u>FACU</u>
9. <i>Sagittaria canadensis</i>	<u>5</u>	<u>N</u>	<u>FACW</u>
10. <i>Sparganium angustifolium</i>	<u>7</u>	<u>N</u>	<u>FACU</u>
Total Cover: <u>63</u> 50% of total cover: <u>31.5</u> 20% of total cover: <u>12.6</u>			

Hydrophytic Vegetation Indicators:
Y 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
5 % Cover of Wetland Bryophytes
20 Total Cover of Bryophytes
10 % Cover of Water
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

N *Carex sp* 2%
 N *Calamagrostis canadensis* 1% FAC

6.16.15 W8571022

OePage 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W85T1022

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>33</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>30</u> Short shrub (0.5-2m) <u>28</u> Dwarf shrub (<0.5m) <u>8</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>63</u> Moss-Lichen <u>20</u> Floating _____ Submerged _____	
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%) _____ 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 _____ 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 <u>X</u> Flat _____ 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 _____	
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.) <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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.6</u>	
Surficial Geologic 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: W85T1022 Field Target: 15034 Date: 6-16-15

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 Halley Volper
Wetland Scientist (print)

X Halley Volper 6-16-15
Signature / Date

X Jessie Browlee
Field Crew Chief (print)

X [Signature] 6/16/15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15077</u>	Map #: <u>212</u> Map Date: <u>6/4</u>
Date: <u>6/17/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1023</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>724.5</u>	
Latitude: <u>61° 32.98</u>		Longitude: <u>150° 32.7</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>28</u>	Picture No.: <u>P 001-004</u>	

SITE PARAMETERS	
Subregion: <u>South central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>flat to slightly concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4/1B</u>	Evidence of Wildlife Use: <u>game trail</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>PSS4/1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11A3, 11C2</u>

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

See map 212 and notebook

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 (<u>76' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	20%	Y	FACW
2. <i>Betula nana</i>	30%	Y	FAC
3. <i>Rhododendrum tomentosum</i>	10%	N	FACW
4. <i>Andromeda polifolia</i>	3%	N	FACW
5. <i>Vaccinium oxycoccus</i>	3%	N	OBL
6. <i>Empetrum nigrum</i>	7%	N	FAC
7. <i>Salix fuscescens</i>	1%	N	FACW
8. <i>Myrica gale</i>	1%	N	OBL
9. <i>Alnus tenuifolia</i>	1%	N	FAC
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: 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: 30 X 1 = 30
 FACW species: 30 X 2 = 60
 FAC species: 63 X 3 = 189
 FACU species: 1 X 4 = 4
 UPL species: 0 X 5 = 0
 Column Totals: 130 (A) 295 (B)
 PI = B/A = 2.26
 Equisetum palustre 2% Fac W

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Menyanthes trifoliata</i>	10%	Y	OBL
2. <i>Comarum palustre</i>	3%	N	OBL
3. <i>Trientalis europaea</i>	1%	N	FACU
4. <i>Equisetum Fluviale</i>	3%	N	OBL
5. <i>Carex Microglochin</i>	3%	N	OBL
6. <i>Calamagrostis lapponica</i>	25%	Y	FAC
7. <i>Dracopis rotundifolia</i>	1%	N	OBL
8. <i>Carex sp</i>	1%	N	NA
9. <i>Carex chordorrhiza</i>	3%	N	OBL
10. <i>Carex marshalliana</i>	4%	N	OBL
Total Cover: <u>52</u> 50% of total cover: <u>26</u> 20% of total cover: <u>10.4</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
 90% Cover of Wetland Bryophytes *Sphagnum*
 90% Total Cover of Bryophytes
 0% Cover of Water
 Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

6.17.15 W85T1023

Oe

pH 4.74

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>20</u> Tall shrub (2-6m) <u>31</u> Short shrub (0.5-2m) <u>11</u> Dwarf shrub (<0.5m) <u>14</u> Tall herb (≥1m) <u>28</u> Short herb (<1m) <u>24</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 _____ 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%) _____ 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 <u>X</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 <u>X</u> 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 <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.) _____ 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>4.74</u>	
Surficial Geologic 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: W8ST1023 Field Target: 15049 Date: 6.17.15

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?~~ map

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  6.17.15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

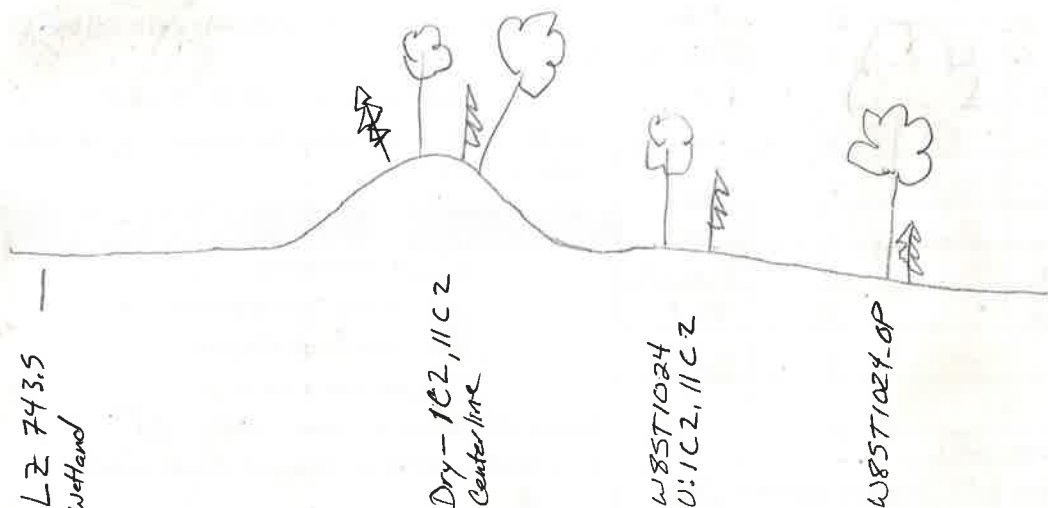
X  6.17.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15035	Map #: 743.5	Map Date: 6.12.15
Date: 6/17/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1024	
Investigators: JB, JA			Team No.: W85	
State: Alaska	Region: Alaska	Milepost: 743.4		
Latitude: 61° 21.27		Longitude: 150° 52.39	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 28	Picture No.: W85T1024 01-04		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: game trail
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1C2, 11C2

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>75' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Dominance Test worksheet: No. of Dominant Species that are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>8</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>50</u> (A/B)
1. <i>Betula neohicksiana</i>	35%	Y	FAC U	
2. <i>Picea mariana</i>	15%	Y	FAC W	
3.				
4.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>15</u> X 2 = <u>30</u> FAC species: <u>88</u> X 3 = <u>264</u> FACU species: <u>57</u> X 4 = <u>228</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>160</u> (A) <u>522</u> (B) PI = B/A = <u>3.2</u>
Sapling/Shrub Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Menziesia ferruginea</i>	7%	Y	FAC U	
2. <i>Alnus tenuifolia</i>	5%	Y	FAC	
3. <i>Ribes toxicum</i>	3%	N	FAC	
4. <i>Viburnum edule</i>	7%	Y	FAC U	
5. <i>Oplopanax horridus</i>	2%	N	FAC U	
6. <i>Rosa acicularis</i>	3%	N	FAC U	
7. <i>Linnæa borealis</i>	3%	N	FAC U	
8.				
9.				
Total Cover: <u>30</u> 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26' Diameter</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Equisetum arvense</i>	35%	N	FAC	
2. <i>Streptopus amplexifolius</i>	2%	N	FAC U	
3. <i>Calamagrostis canadensis</i>	35%	Y	FAC	
4. <i>Geocaulon hybridum</i>	5%	N	FAC U	
5. <i>Gymnocarpium dryopteris</i>	20%	Y	FAC U	_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>30</u> Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
6. <i>Rubus arcticus</i>	5%	N	FAC	
7. <i>Trientalis europæa</i>	8%	N	FAC U	
8. <i>Athyrium cyclosorum</i>	5%	N	FAC	
9. <i>Cornus canadensis</i>	5%	N	FAC U	
10.				
Total Cover: <u>120</u> 50% of total cover: <u>60</u> 20% of total cover: <u>24</u>				

WETLAND DETERMINATION DATA FORM

6-17-15

W85T1024

Y

SOIL	Date	Feature ID	Soil Pit Required (Y/N)
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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								
3-4	10YR 3/2	100					Sal	
4-20	10YR 4/2		5YR 3/2	15	C	Matrix	Sil	Packet of buried organics
			5YR 4/4	5	C	M		Concentration nodules

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</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: N Depth (inches): -

Hydric Soil Present (Y/N): N

Notes: Soils have lots of concentrations but don't make an indicator. Likely form from seasonal melt. They look relic

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>M see note below</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>Y see note</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes: ~50% of Profile reacts to XX, Not extremely strong however.	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</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>Y</u>	Depth (in): <u>15</u>	EC: <u>-</u>

Notes: water seeping in at 15" slowly (not enough for EC just enough to stuff in soil)
A few small concave spots that pond water.

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brownell

6/17/15

John

6/17/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1024

Field Target: ISO35

Date: 6/7/15

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 6.17.15
Signature / Date

X

Jessie Brownlee
Field Crew Chief (print)

X

Jessie Brownlee 6.17.15
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>15058</u>	Map #: <u>204</u> Map Date: <u>04.15</u>
Date: <u>04.18.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8ST1025</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>711.2</u>	
Latitude: <u>61 42.7878</u>	Longitude: <u>-150 24.1274</u>		Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>30</u>	Picture No.: <u>W8ST1025 1-4</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>U:IC2</u>	Evidence of Wildlife Use: <u>Moose scat</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 _____ 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>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IC2, 11B2</u>

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

Mature tall mixed forest. Dry soils. No signs of hydrology. Undulating topography. I walked around and confirmed the lower spots are dry as well. Mapped correctly.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100' diameter</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>7</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>42</u> (A/B)
1. <u>Betula Neobanksiana</u>	<u>30%</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Picea glauca</u>	<u>20%</u>	<u>Y</u>	<u>FAC W</u>	
3.				
4.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>5</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>20</u> X 2 = <u>40</u> FAC species: <u>60</u> X 3 = <u>180</u> FACU species: <u>104</u> X 4 = <u>416</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>184</u> (A) <u>636</u> (B) PI = B/A = <u>3.5</u>
Sapling/Shrub Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Rosa acicularis</u>	<u>2%</u>	<u>N</u>	<u>FAC U</u>	
2. <u>Picea glauca</u>	<u>5%</u>	<u>Y</u>	<u>FAC U</u>	
3. <u>Alnus tenuifolia</u>	<u>10%</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Spiraea stevenii</u>	<u>2%</u>	<u>N</u>	<u>FAC U</u>	
5. <u>Ribes triste</u>	<u>6%</u>	<u>Y</u>	<u>FAC</u>	
6. <u>Viburnum edule</u>	<u>5%</u>	<u>N</u>	<u>FAC U</u>	
7. <u>Vaccinium uliginosum</u>	<u>2%</u>	<u>N</u>	<u>FAC</u>	
8. <u>Sorbus sitchensis</u>	<u>2%</u>	<u>N</u>	<u>FAC U</u>	
9. <u>Linnaea borealis</u>	<u>T</u>	<u>N</u>	<u>FAC U</u>	
Total Cover: <u>34</u> 50% of total cover: <u>17</u> 20% of total cover: <u>6-8</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26' Diameter</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <u>N</u> Dominance Test is > 50% <u>N</u> Prevalence Index is ≤ 3.0 <u>N</u> Morphological Adaptations ¹ (Provide supporting data in Notes) <u>N</u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Equisetum arvense</u>	<u>4</u>	<u>N</u>	<u>FAC</u>	
2. <u>Equisetum sylvaticum</u>	<u>6</u>	<u>N</u>	<u>FAC</u>	
3. <u>Cornus canadensis</u>	<u>45%</u>	<u>Y</u>	<u>FAC U</u>	
4. <u>Rubus arcticus</u>	<u>2%</u>	<u>N</u>	<u>FAC</u>	
5. <u>Gymnocarpium diopteris</u>	<u>6%</u>	<u>N</u>	<u>FAC U</u>	
6. <u>Streptopus amplexifolius</u>	<u>2%</u>	<u>N</u>	<u>FAC U</u>	
7. <u>Chamerion angustifolium</u>	<u>T</u>	<u>N</u>	<u>FAC U</u>	
8. <u>Sparganium angustifolium</u>	<u>35%</u>	<u>Y</u>	<u>FAC U</u>	
9.				
10.				
Total Cover: <u>100</u> 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>15</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6-18-15 WEST1025

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 Color (moist) Dry	%	Redox Features Color (moist) % Type ¹ Loc ² Texture Notes
0-3			
3-5	10YR 4/2	100	Si-L Ash
5-10	5YR 4/4	100	Si-L
10-20	10YR 4/4	100	Si-L
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>N</u>		Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>		Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>		Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>			Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>			Other (Explain in Notes) <u>-</u>
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>N</u> Depth (inches): <u>-</u>			
Hydric Soil Present (Y/N): <u>N</u>			
Notes: Colors taken Dry. Wavy boundaries between horizons. Typical Dry LC 2 Forest soils.			

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

AQUATIC SITE ASSESSMENT 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/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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brownlee 6.18.15

John Blum 6/18/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1025

Field Target: 15058

Date: 6/19/19

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?~~
Map

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

- N/A ☐ 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
Jessie Brownlee
Field Crew Chief (print)

X
Jessie Brownlee 6-18-15
Signature / Date

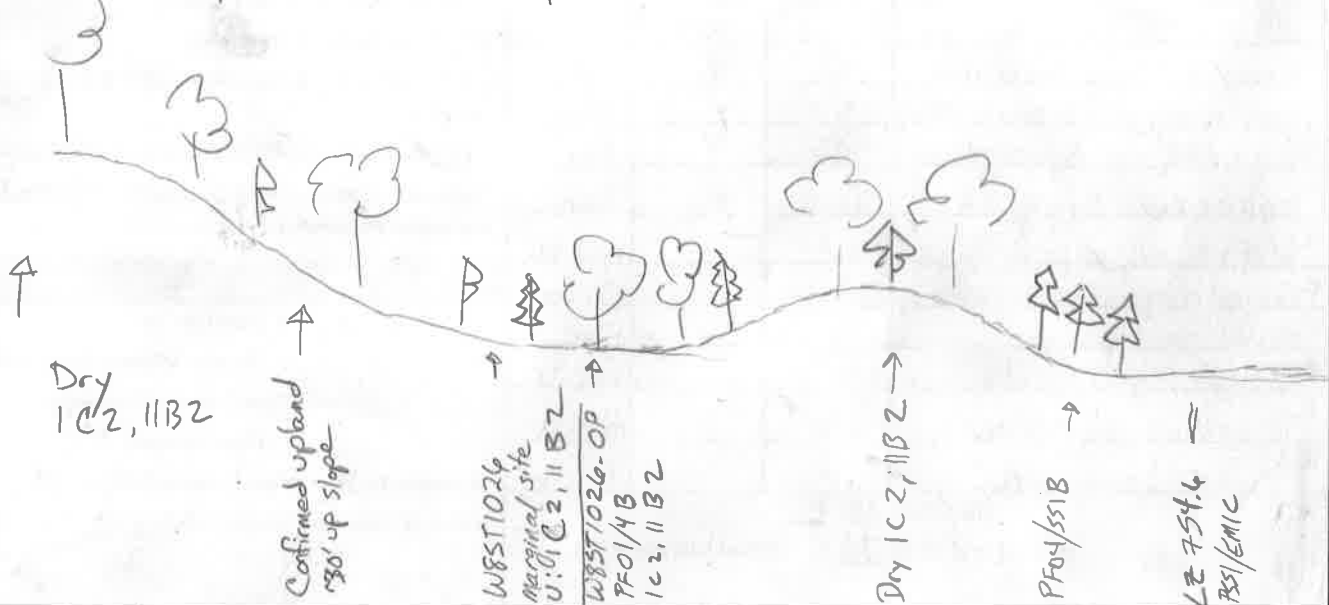
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15015</u>	Map #: <u>7546</u> Map Date: <u>6.12</u>
Date: <u>6.18.15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W8ST1026</u>
Investigators: <u>JB JA</u>			Team No.: <u>W85</u>
State: Alaska	Region: Alaska	Milepost: _____	
Latitude: <u>61° 14.8078</u>	Longitude: <u>-151.6951</u>		Datum: WGS84
Logbook No.: <u>U1° 14.8078</u>	Logbook Page No.: <u>30</u>	Picture No.: <u>W8ST1-026 1-4</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <u>Moose brows</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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1B2, 11B2</u>

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

Site marks wet dry boundary. Marginal hydrology. Soils show sign of water table at 19-22"
Elevation drives mapping. Site is at Base of small hill where it dries out completely.
other areas within plot reacted to ~~dry~~ positively.



See transect on map

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</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>7</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>71%</u> (A/B)
1. <u>Betula neolascana</u>	<u>45%</u>	<u>Y</u>	<u>FAC U</u>	
2. <u>Picea glauca</u>	<u>20%</u>	<u>Y</u>	<u>FAC U</u>	
3.				
4.				
Total Cover: <u>65</u> 50% of total cover: <u>32.5</u> 20% of total cover: <u>13</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>3</u> X 2 = <u>6</u> FAC species: <u>165</u> X 3 = <u>495</u> FACU species: <u>104</u> X 4 = <u>416</u> UPL species: _____ X 5 = _____ Column Totals: <u>272</u> (A) <u>917</u> (B) PI = B/A = <u>3.37</u>
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Alnus tenuifolia</u>	<u>25%</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Picea glauca</u>	<u>2%</u>		<u>FAC U</u>	
3. <u>Oplopanax harridus</u>	<u>4%</u>		<u>FAC U</u>	
4. <u>Vaccinium uliginosum</u>	<u>7%</u>		<u>FAC</u>	
5. <u>Rosa acicularis</u>	<u>3%</u>		<u>FAC U</u>	
6. <u>Menziesia ferruginea</u>	<u>4%</u>		<u>FAC U</u>	
7. <u>Spiraea stevenii</u>	<u>5%</u>		<u>FAC U</u>	
8.				
9.				
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Athyrium cylindrorum</u>	<u>35%</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Calamagrostis canadensis</u>	<u>25%</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Equisetum sylvaticum</u>	<u>45%</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Equisetum arvense</u>	<u>20%</u>	<u>Y</u>	<u>FAC</u>	
5. <u>Streptopus amplexifolius</u>	<u>2%</u>		<u>FAC U</u>	<u>0</u> % Bare Ground <u>15%</u> % Cover of Wetland Bryophytes <u>Sphagnum</u> <u>30%</u> Total Cover of Bryophytes <u>0</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <u>Gymnocarpium diopteris</u>	<u>15%</u>		<u>FAC U</u>	
7. <u>Rubus arcticus</u>	<u>8%</u>		<u>FAC</u>	
8. <u>Cornus canadensis</u>	<u>3%</u>		<u>FAC U</u>	
9. <u>Trientalis europaea</u>	<u>1%</u>		<u>FAC U</u>	
10. <u>Viola longsdorffii</u>	<u>3%</u>		<u>FAC W</u>	
Total Cover: <u>157</u> 50% of total cover: <u>78.5</u> 20% of total cover: <u>31.4</u>				

WETLAND DETERMINATION DATA FORM

6-18-15

W85T1026

Y

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		
0-4							
4-8	7.5YR 3/2	100				SiL	
8-19	10YR 3/2	100				SiL	
19-24	10YR 4/3	70	5YR 4/6	28	C	M	
			7.5YR 5/6	2	C	RC	
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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>-</u>	
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>N</u> Depth (inches): <u>N</u>							
Hydric Soil Present (Y/N): <u>N</u>							
Notes: Soil shows signs of water table at 19-22"							

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>1</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes: Site has marginal hydrology. Areas of sphagnum & muddy depressions. Test hole 10' away had positive O ₂ @ 6", depth.	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
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>21</u>			
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u> Depth (in): <u>19</u>		EC: <u>- 55</u>	
Notes: Water table sits @ around 19-22" and depletes the matrix and explains the masses of concentrations			

AQUATIC SITE ASSESSMENT 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 _____ 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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brannan 6.18.15

GPS Technician QA/QC check:

Janfa Dur 6/18/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1026

Field Target: 15015

Date: 6/18/15

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

- N/A ☐ 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 6/18/15
Signature / Date

X

Jessie Brownlee
Field Crew Chief (print)

X

Jessie Brownlee 6.18.19
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>ISOL</u>	Map #: <u>7546</u> Map Date: <u>6.12.15</u>
Date: <u>6.18.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8ST1027</u>
Investigators: <u>JB, JK</u>			Team No.: <u>WBS</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>754.6</u>	
Latitude: <u>61.250116</u>		Longitude: <u>-151.108589</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>31</u>	Picture No.: <u>W8ST1027 1-4</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <u>NONE</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 _____ 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>U</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>1C2, 11B2</u>

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

Plot is right on boundary of wet/dry. Positive Alpha Alpha is the only soil indicator & veg. Does not make dominance or PI. Originally I was going to use BPJ to push call toward a wetland but after reviewing data again I will change this status to upland and draw boundary just down slope of this site.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nealascana</i>	35%	Y	Fac U
2. <i>Picea Canadensis</i>	15%	Y	Fac U
3.			
4.			
Total Cover: <u>50</u>			
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			
<u>Sapling/Shrub Stratum</u> (<u>210'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Oplopanax horridus</i>	15%	Y	Fac U
2. <i>Viburnum edule</i>	10%	N	Fac U
3. <i>Alnus tenuifolia</i>	40%	Y	Fac
4. <i>Ribes triste</i>	6%	N	Fac
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>71</u>			
50% of total cover: <u>35.5</u> 20% of total cover: <u>14.2</u>			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 8 (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: 40 X 2 = 80

FAC species: 106 X 3 = 318

FACU species: 152 X 4 = 608

UPL species: _____ X 5 = _____

Column Totals: 298 (A) 1006 (B)

PI = B/A = 3.37

gymnocarpium dryopteris Fac U (25%) Y

Sanguisorba menziesii ? T

Linnaea borealis (10%)

Trientalis europaea 3% Fac U

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>210'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Dryopteris expansa</i>	45%	Y	Fac U
2. <i>Calamagrostis canadensis</i>	15%	N	Fac
3. <i>Equisetum arvense</i>	40%	Y	Fac
4. <i>Mertensia paniculata</i>	T	N	Fac U
5. <i>Geranium erianthum</i>	T	N	Fac U
6. <i>Viola longdopii</i>	20%	Y	Fac W
7. <i>Equisetum sylvaticum</i>	5%	N	Fac
8. <i>Galium boreale</i>	4%	N	Fac U
9. <i>Thalictrum occidentale</i>	3%	N	Fac U
10. <i>Impatiens noli-tangere</i>	20%	Y	Fac W
Total Cover: <u>177</u>			
50% of total cover: <u>88.5</u> 20% of total cover: <u>35.4</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

0 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

6.18.15

W8571027

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-3								
3-5	10YR 2/1	100					S:L	Sand lens in A horizon
5-24	10YR 3/3	70	7.5YR 3/3	15	C	M+RC	S:L	
			7.5YR 3/4	15	C	M+RC		

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>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Thick Dark Surface (A12) <u>N</u>	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
	Other (Explain in Notes) <u>N</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: NO Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: positive dx @ 8" from top of mineral soil surface and positive reaction to the bottom. Not calling soil Hydric due to marginal soil indicator and lack of hydrophytic veg.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)	SECONDARY INDICATORS (2 or more required)
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>-1</u>
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):
Iron Deposits (B5) <u>N</u>	
	Water-stained Leaves (B9) <u>N</u>
	Stunted or Stressed Plants (D1) <u>N</u>
	Drainage Patterns (B10) <u>N</u>
	Geomorphic Position (D2) <u>N</u>
	Oxidized Rhizospheres along Living Roots (C3) <u>Y</u>
	Shallow Aquitard (D3) <u>N</u>
	Presence of Reduced Iron (C4) <u>Y</u>
	Microtopographic Relief (D4) <u>N</u>
	Salt Deposits (C5) <u>N</u>
	FAC-Neutral Test (D5) <u>N</u>
	Notes:

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>18</u>	
Saturation Present (Y/N): <u>Y</u>	Depth (in): <u>14</u>	EC: <u>76</u>
		pH <u>5.69</u>

Notes: positive dx from 8" of mineral surface. Sparsely concave surfaces scattered around.

Disregard FA data. Changing original call from wetland to upland. Site was right on wet/dry boundary. Map Boundary will be adjusted to reflect that wetland starts just down slope of this location

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> 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): <u>3</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%) _____ 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 <input checked="" type="checkbox"/> 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 <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 <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 _____	
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 <input checked="" type="checkbox"/>	
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 Geologic 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:

Jessie Brownlee 6/18/15

GPS Technician QA/QC check:

Jerry Dn 6/18/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ST1027

Field Target: 15016

Date: 6.18.15

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 Ann 6/18/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie Brownlee 6/18/15
Signature / Date

WETLAND DETERMINATION DATA FORM

OFF ROW

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/>		Field Target: 15277	Map #: 198 Map Date: 6.4.15
Date: 6/19/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1028
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 699	
Latitude: 61° 51.3925		Longitude: 150° 16.1062	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 32	Picture No.: P 001-004 N, S	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: <input checked="" type="checkbox"/> grazing
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 1B3, 11C2

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

Site is a Dry Aspen woodland with thick Aspen saplings and willow both of which have been heavily browsed. Dry sandy soils & no signs of hydrology.
See map for boundaries

WETLAND DETERMINATION DATA FORM

12:30 CHRIS

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</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>7</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>28%</u> (A/B)
1. <u>Populus tremuloides</u>	<u>15%</u>	<u>Y</u>	<u>Fae U</u>	
2. <u>Picea glauca</u>	<u>10%</u>	<u>Y</u>	<u>Fae U</u>	
3.				
4.				
Total Cover: <u>25</u> 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>25</u> X 2 = <u>50</u> FAC species: <u>5</u> X 3 = <u>15</u> FACU species: <u>131</u> X 4 = <u>524</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>161</u> (A) <u>589</u> (B) PI = B/A = <u>3.6</u> Calling plot a woodland to capture overall signature But since plot is between two signatures we have a slightly higher tree cover and higher spruce percent than the over all signature.
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <u>Populus tremuloides</u>	<u>30%</u>	<u>Y</u>	<u>Fae U</u>	
2. <u>Spiraea stevenii</u>	<u>25%</u>	<u>Y</u>	<u>Fae U</u>	
3. <u>Salix pulchra</u> +	<u>25%</u>	<u>Y</u>	<u>Fae W</u>	
4. <u>Rosa acicularis</u>	<u>2%</u>		<u>Fae U</u>	
5. <u>Vaccinium uliginosum</u>	<u>30%</u>	<u>Y</u>	<u>Fae U</u>	
6. <u>Chamaedaphne</u>			<u>Fae W</u>	
7. <u>Alnus tenuifolia</u>	<u>2%</u>		<u>Fae</u>	
8. <u>Picea glauca</u>	<u>4%</u>			
9.				
Total Cover: <u>118</u> 50% of total cover: <u>59</u> 20% of total cover: <u>23.6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</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. <u>Chamaedaphne angustifolia</u>	<u>4%</u>		<u>Fae U</u>	
2. <u>Calamagrostis canadensis</u>	<u>3%</u>		<u>Fae</u>	
3. <u>Rubus arcticus</u>	<u>40%</u>	<u>Y</u>	<u>Fae U</u>	
4. <u>Frientalis europaea</u>	<u>2%</u>		<u>Fae U</u>	
5. <u>Stellaria sp</u>	<u>2%</u>		<u>-</u>	_____ % Bare Ground _____ % Cover of Wetland Bryophytes <u>30</u> Total Cover of Bryophytes _____ % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
6. <u>Sedge sp</u>	<u>2%</u>		<u>-</u>	
7. <u>Cornus canadensis</u>	<u>3%</u>		<u>Fae U</u>	
8. <u>Iris setosa</u>	<u>T</u>		<u>FAC</u>	
9.				
10.				
Total Cover: <u>56</u> 50% of total cover: <u>28</u> 20% of total cover: <u>11.2</u>				

WETLAND DETERMINATION DATA FORM

6.19.15

W85T1028

Y

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		
0-3								
3-8	10YR 3/2	40					Loom	Wavy boundaries & variable depths
	10YR 2/2	40						
8-10	10YR 5/4	70					Sal	Additional Pink color 7.5YR 6/4 5%
	2.5Y 2/3	25						
16-24	2.5Y 5/2	90	7.5YR 4/4	10	C	M	Sal	Faint concentrations at ~20" but difficult to color given Sandy texture ~7.5YR 7/4
	2.5Y 4/4							
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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>-</u>		
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>N</u> Depth (inches): <u>-</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes:								

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

AQUATIC SITE ASSESSMENT 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 Geologic 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: W85F1028

Field Target: 15277

Date: 6.19.15

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~~ map

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

[Signature] 6/19/15

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

6.19.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X DEF ROAD</u>
Field Target: <u>15276</u>		Map #: <u>198</u> Map Date: <u>6.4.15</u>	
Date: <u>6.19.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8ST1029</u>
Investigators: <u>JB, JA</u>			Team No.: <u>W8S</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>699</u>	
Latitude: <u>61° 51.3246</u>		Longitude: <u>150° 15.8468</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>32</u>	Picture No.: <u>W8ST1029 1-4 S, N</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>U: 1C2</u>	Evidence of Wildlife Use: <u>moose trail scat</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 No <u>X</u>
Hydric Soil Present? Yes No <u>X</u>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes No <u>X</u>	Alaska Vegetation Classification (Vioreck): <u>1C2 11C2</u>

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

Dry Mixed forest of Black spruce, Aspen, and paper birch. Understory of thick feather moss saplings and willow. Sandy Bhs soils.

Transect had a lot of elevation changes on transect from W8ST1028 and 029.

All dry inbetween LZ 699 W8ST1028 and W8ST1029.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Tree Stratum (Plot sizes: <u>100' Diameter</u>)						
1.	<i>Populus tremuloides</i>	7		FACU		
2.	<i>Betula neoalaskana</i>	7		FAC		
3.	<i>Picea Mariana</i>	40%	Y	FACU		
4.						
Total Cover: <u>54</u> 50% of total cover: <u>27</u> 20% of total cover: <u>10.8</u>						
Sapling/Shrub Stratum (<u>26' Diameter</u>)			Indicator Status	Dominant Species? (Y/N)	Absolute % Cover	
1.	<i>Rhododendrum groenlandicum</i>	45%	Y	FAC		
2.	<i>Vaccinium uliginosum</i>	5%		FAC		
3.	<i>Linnaea borealis</i>	2.5%	Y	FACU		
4.	<i>Vaccinium vitis-idaea</i>	2.5%	Y	FAC		
5.	<i>Salix bebbiana</i>	7%		FAC		
6.	<i>Rosa acicularis</i>	3%		FACU		
7.	<i>Betula neoalaskana</i>	7%		FAC		
8.	<i>Picea Mariana</i>	40%	Y	FACU		
9.	<i>Salix bebbiana</i>	T		FAC		
Total Cover: <u>160</u> 50% of total cover: <u>80.5</u> 20% of total cover: <u>32</u>						

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 7 (B)
 % Dominant Species that are OBL, FACW, or FAC: 57 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species: 0 X 1 = 0
 FACW species: 80 X 2 = 160
 FAC species: 96 X 3 = 288
 FACU species: 63 X 4 = 252
 UPL species: 0 X 5 = 0
 Column Totals: 239 (A) 700 (B)
 PI = B/A = 2.92
Populus tremuloides 3%

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Herb Stratum (<u>26' Diameter</u>)						
1.	<i>Cornus canadensis</i>	20%	Y	FACU		
2.	<i>Cheerian angustifolium</i>	7%	Y	FACU		
3.	<i>Grass sp</i>	T				
4.	<i>Equisetum pratense</i>	T		FACU		
5.						
6.						
7.						
8.						
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.

0 % Bare Ground
0 % 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):

WETLAND DETERMINATION DATA FORM

6.19.15

W85T1029

Y

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		Type ¹	Loc ²	Texture	Notes
	Color (moist)	%	Color (moist)	%				
0-4								
4-5.5	10YR 4/1	60					ASH	Ashy
	10YR 6/1	40						
5.5-24	7.5YR 3/3	20					SAL	Pockets of buried organics at 12"
	7.5YR 4/4	75						Colors alternate in band, boundaries are wavy.
	10YR 5/4	5						
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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>		
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. <u>N</u>								
Restrictive Layer (if present): Type: <u>—</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes:								

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

AQUATIC SITE ASSESSMENT 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 (≥ 1 m) _____ 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 Geologic 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 ($\geq 2\%$) _____	
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:

Jessie Brownlee 6/19/15

GPS Technician QA/QC check:

George Brown 6/19/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1029

Field Target: 15276

Date: 6/19/15

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

Ju B. Kas 6/19/15
Signature / Date

X

Jessie Brownlee
Field Crew Chief (print)

X

Jessie Brownlee 6.19.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15279	Map #: 197 Map Date: 6.4.15
Date: 6.19.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8ST1030
Investigators: JB JA			Team No.: W8S
State: Alaska	Region: Alaska	Milepost: 696.6	
Latitude: 61° 53.0749		Longitude: 150° 13.2732	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 32	Picture No.: W8ST1030 1-4 E, W	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Undulating
Pre-mapped Alaska LNG/NWI classification: U:1A2	Evidence of Wildlife Use: NO
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: U
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1A2

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

Dry open Black spruce forest. Undulating topography and higher and drier than LZ 696.7.
Took additional point W8ST1030-OP to confirm up status.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
Tree Stratum (Plot sizes: <u>100'</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>		50%	Y	FACW	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
2.					% Dominant Species that are OBL, FACW, or FAC: <u>60</u> (A/B)
3.					
4.					
Total Cover: <u>50</u>					Prevalence Index worksheet:
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>					
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Total % Cover of: _____ Multiply by: _____
1. <i>Picea Mariana</i>		30%	Y	FACW	OBL species: <u>0</u> X 1 = <u>0</u>
2. <i>Vaccinium vitis-idaea</i>		15%	Y	FAC	FACW species: <u>90</u> X 2 = <u>180</u>
3. <i>Empetrum nigrum</i>		7%	N	FAC	FAC species: <u>28</u> X 3 = <u>84</u>
4. <i>Vaccinium uliginosum</i>		3%	N	FAC	FACU species: <u>20</u> X 4 = <u>80</u>
5. <i>Salix Bebbiana</i>		3%	N	FAC	UPL species: <u>0</u> X 5 = <u>0</u>
6. <i>Rhododendrum tomentosum</i>		10%	N	FACW	Column Totals: <u>138</u> (A) <u>344</u> (B)
7.					PI = B/A = <u>2.5</u>
8.					
9.					
Total Cover: <u>68</u>					
50% of total cover: <u>34</u> 20% of total cover: <u>13.6</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>Carex lasiocarpa</i>		10%	Y	FACU	<input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0
2. <i>Cornus canadensis</i>		10%	Y	FACU	<input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes)
3.					<input checked="" type="checkbox"/> 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>20</u>					<input type="checkbox"/> % Bare Ground
50% of total cover: <u>10</u> 20% of total cover: <u>4</u>					<input type="checkbox"/> % Cover of Wetland Bryophytes
					<u>95</u> Total Cover of Bryophytes
					<input type="checkbox"/> % Cover of Water
					Hydrophytic Vegetation Present (Y/N): <u>N</u>
					Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6-19-15

W8ST1030

Y

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			
0-6								Dry organics	
6-7	10YR 2/1	100					VF SaL	Charcoal	
7-14	7.5YR 3/4	100					F SaL	Seasonal frost from 10-14"	
	7.5YR 3/2	30						10YR 5/4 is a 3rd color in Bhs at 10 1/2"	
14-19	10YR 6/4	100					F SaL	Buried organics	
19-24	7.5YR 4/10	100					SaL		
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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>			
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>			
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>			
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>-</u>			
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>yes</u> Depth (inches): <u>10</u> <u>seasonal frost</u>									
Hydric Soil Present (Y/N): <u>N</u>									
Notes: All boundaries are wavy. Evidence of past fire. No saturation despite frost.									

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>Y</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>N</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			
Surface Water Present (Y/N): <u>N</u> Depth (in): <u>-</u>		Wetland Hydrology Present (Y/N): <u>1</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>		EC: <u>-</u>	
Notes:			

AQUATIC SITE ASSESSMENT 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 Geologic 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:

JB 6.19.15

Jeffrey 6/19/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W851103D

Field Target: 15279

Date: 6/19/15

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

6/19/15
Signature / Date

X

Jessie Brownlee
Field Crew Chief (print)

X

Jessie Brownlee 6.19.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15053	Map #: 208 Map Date: 6/1/15
Date: 6.20.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1031
Investigators: JB JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 717.3	
Latitude: 61° 38.6057		Longitude: -150° 29.3017	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 34	Picture No.: W85T1031 1-4 N.S	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 0-3	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: PF04B 1A2	Evidence of Wildlife Use: Browse (moose)
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1C2

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

See note book and map: Although the veg data in our plot indicates that the deciduous tree level is low, but the overall polygon is more dense in deciduous trees than presented in our plot. Thus the polygon is mapped as a 1C2.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>		<u>25</u>	<u>Y</u>	<u>FACW</u>
2. <i>Betula Neoalaskana</i>		<u>10</u>		<u>FAC</u>
3. <i>Picea glauca</i>		<u>25</u>	<u>Y</u>	<u>FACU</u>
4.				
Total Cover: <u>60</u> 50% of total cover: <u>30</u> 20% of total cover: <u>12</u>				
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa Acicularis</i>		<u>10</u>	<u>Y</u>	<u>FACU</u>
2. <i>Vaccinium vitis-idaea</i>		<u>10</u>	<u>Y</u>	<u>FAC</u>
3. <i>Betula Neoalaskana</i>		<u>15</u>	<u>Y</u>	<u>FACU</u>
4. <i>Spiraea Stevenii</i>		<u>5</u>		<u>FACU</u>
5. <i>Picea mariana</i>		<u>20</u>	<u>Y</u>	<u>FACW</u>
6. <i>Vaccinium uliginosum</i>		<u>4</u>		<u>FAC</u>
7. <i>Picea glauca</i>		<u>10</u>	<u>Y</u>	<u>FACU</u>
8. <i>Salix sp</i>		<u>1</u>		<u>—</u>
9. <i>Rhododendrum groenlandicum</i>		<u>1</u>		<u>FAC</u>
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: 4 (A)
 Total Number of Dominant Species Across All Strata: 9 (B)
 % Dominant Species that are OBL, FACW, or FAC: .44 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 45 X 2 = 90
 FAC species: 73 X 3 = 219
 FACU species: 127 X 4 = 508
 UPL species: 0 X 5 = 0
 Column Totals: 245 (A) 817 (B)
 PI = B/A = 3.33
Dryopteris expansa T FACU
Epimedium alpinum 10 FACU
Calamagrostis canadensis T FAC

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Geocaulon lividum</i>		<u>30</u>	<u>Y</u>	<u>FACU</u>
2. <i>Pyrola</i>				
3. <i>Cornus canadensis</i>		<u>25</u>	<u>Y</u>	<u>FACU</u>
4. <i>Trientalis europaea</i>		<u>10</u>		<u>FACU</u>
5. <i>Streptopus amplexifolius</i>		<u>2</u>		<u>FACU</u>
6. <i>Equisetum sylvaticum</i>		<u>3</u>		<u>FAC</u>
7. <i>Neottia cordata</i>		<u>1</u>		<u>FACU</u>
8. <i>Pyrola grandifolia</i>		<u>15</u>		<u>FAC</u>
9. <i>Calamagrostis lapponica</i>		<u>1</u>		<u>FAC</u>
10. <i>Rubus parvifolius</i>		<u>15</u>		<u>FAC</u>
Total Cover: <u>110</u> 50% of total cover: <u>55</u> 20% of total cover: <u>22</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: 90 Feather moss
 % Cover of Water: 0
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.20.15 W8ST1031

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		
0-2								Dry organics Charcoal present
2-5	10YR 5/1	100					FSaL	
5-24	7.5YR 2.5/3	10					SaL	
	7.5YR 3/4	10						
	10YR 4/4	50						
	10YR 5/3	30						
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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>		
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. <u>N</u>								
Restrictive Layer (if present): Type: <u>N</u> Depth (inches): <u>1</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: All horizons have extremely wavy boundaries and inconsistent depths.								

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

AQUATIC SITE ASSESSMENT 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Pemeable _____	
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:

Jesse Brownlee 6.20.15

6/20/15

646-845-1884

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1031

Field Target: 15053

Date: 6.20.15

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 6/20/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie Brownlee 6.20.15
Signature / Date

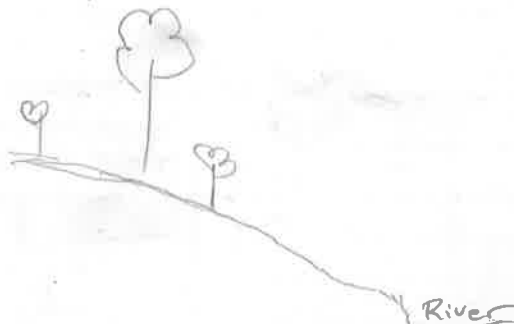
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>OFF ROW</u>
Field Target: <u>15243</u>		Map #: <u>210</u> Map Date: <u>6-4-15</u>	
Date: <u>6-20-15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8ST1032</u>
Investigators: <u>Jessie Browne</u> <u>Jennifer Anderson</u>			Team No.: <u>W8S</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>720.5</u>	
Latitude: <u>61° 35.9623</u>	Longitude: <u>-150° 30.6489</u>		Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>35</u>	Picture No.: <u>W8ST1032 1-4 W, E</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hill side/terrace</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>U 1C2, 11B2</u>	Evidence of Wildlife Use: <u>Bear trail</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 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>U</u>
Wetland Hydrology Present? Yes No <u>X</u>	Alaska Vegetation Classification (Vioreck): <u>1B2, 11B2</u>

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

Site is a dry Mature Betula nealaskana forest with trees over 100' tall. Thick understory of Alder, Ferns, and devils club. One small wet spot was seen along route here but otherwise its a dry site. Wet spot was marked on map



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nealaskana</i>	40%	Y	FAC
2. <i>Picea glauca</i>	10%	Y	FACU
3. <i>Alnus fruticosa</i> (JA)			
4.			
Total Cover: <u>50</u>			
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Oplopanax horridus</i>	25%	Y	FACU
2. <i>Ribes triste</i>	4%	N	FAC
3. <i>Rosa acicularis</i>	2%	N	FACU
4. <i>Viburnum edule</i>	10%	N	FACU
5. <i>Alnus fruticosa</i>	40%	Y	FAC
6.			
7.			
8.			
9.			
Total Cover: <u>84</u>			
50% of total cover: <u>42</u> 20% of total cover: <u>16.8</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 6 (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: 0 X 2 = 0
 FAC species: 105 X 3 = 315
 FACU species: 102 X 4 = 408
 UPL species: 0 X 5 = 0
 Column Totals: 207 (A) 723 (B)
 PI = B/A = 3.49

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Dryopteris expansa</i>	40%	Y	FACU
2. <i>Equisetum arvens</i>	15%	Y	FAC
3. <i>Streptopus amplexifolius</i>	2%		FACU
4. <i>Calamagrostis canadensis</i>	3%		FAC
5. <i>Spinulum Annatum</i>	2%		FACU
6. <i>Gymnocarpium dryopteris</i>	2%		FACU
7. <i>Viola sp</i>	5		-
8. <i>Trientalis europaea</i>	5		FACU
9. <i>Carlina boreale</i>	7		FACU
10.			
Total Cover: <u>74</u>			
50% of total cover: <u>37</u> 20% of total cover: <u>14.8</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

6-20-15

W8ST1032

Y

SOIL	Date	Feature ID	Soil Pit Required (Y/N)
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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								
5-24	10YR 2/2		7.5YR 2.5/2	2	C	RC	SiL	Dry organics Concentrations are relic A horizon has 1 small pocket of 10YR 3/3.

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Soil is a thick horizon of a material w/ buried organics throughout. Slightly platy structure. No color change or textural change in the A horizon.

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

Notes:

AQUATIC SITE ASSESSMENT 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/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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brantley

[Signature] 6/20/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1032

Field Target: 15243

Date: 6.20.15

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)

Kennifer Anderson

X

Signature / Date

Jessie Brounlee 6/20/15

X

Field Crew Chief (print)

Jessie Brounlee

X

Signature / Date

Jessie Brounlee 6.20.15

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <u>OFF ROW</u>	Field Target: <u>15274</u> Map #: <u>15274</u> Map Date: <u>2-2-15</u>
Date: <u>7.3.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W8STIO33</u>
Investigators: <u>Jessie Brownlee, Jennifer Anderson</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>740</u>	
Latitude:	Longitude:		Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>1</u>	Picture No.: <u>1 thru 4</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>toe slope of Mt Susitna</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U1C2</u>	Evidence of Wildlife Use: <u>None</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 No <u>X</u>
Hydric Soil Present? Yes No <u>X</u>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes No <u>X</u>	Alaska Vegetation Classification (Viereck): <u>1B2</u>

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

Mature Bet Nee open forest w/ trees ~ 65+ feet tall. Understory of Cal Cag & Equisetum.
No signs of hydrology. Soils are interesting with alternating bands of depleted silty clay loam and sandier oxidized layers that repeat to depth.
A few wet inclusions to the south east toward LZ #39.9 but not enough to pull out mapping.

Also a R4SB is draining the wetland to the NW of the LZ but
No point was taken, use Lidar for placement.

Due to GPS failure.

* GPS Broke at this sight. It was Flagged for surveyors to go get
sub meter accurate point
My handheld garmin GPS point is $66^{\circ}23'04.5''$ - $150^{\circ}47'42.1''$

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Tree Stratum (Plot sizes: <u>100'</u>)						
1.	<i>Betula Neolascana</i>			FAC	Y	40%
2.	<i>Picea Canadensis</i>			FACU		5%
3.						
4.						
Total Cover: <u>45</u>						
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>						
Sapling/Shrub Stratum (<u>26'</u>)			Indicator Status	Dominant Species? (Y/N)	Absolute % Cover	
1.	<i>Linnaea Borealis</i>		FACU		1%	
2.	<i>Ribes Triste</i>		FAC		2%	
3.	<i>Spiraea Stevenii</i>		FACU		2%	
4.	<i>Rosa Acicularis</i>		FACU	Y	3%	
5.	<i>Viburnum edule</i>		FAC	Y	5%	
6.	<i>Betula Neolascana</i>		FAC		2%	
7.						
8.						
9.						
Total Cover: <u>15</u>						
50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>						

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 6 (B)
 % Dominant Species that are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 131 X 3 = 393
 FACU species: 48 X 4 = 192
 UPL species: 0 X 5 = 0
 Column Totals: 179 (A) 585 (B)
 PI = B/A = 3.26

VEGETATION (use scientific names of plants)				Indicator Status	Dominant Species? (Y/N)	Absolute % Cover
Herb Stratum (<u>26'</u>)						
1.	<i>Equisetum Arvense</i>		FAC	Y	30%	
2.	<i>Equisetum sylvaticum</i>		FAC	Y	20%	
3.	<i>Calamagrostis canadensis</i>		FAC	Y	30%	
4.	<i>Rubus prostratus</i>		FAC		2%	
5.	<i>Cornus canadensis</i>		FACU		15%	
6.	<i>Trientalis europaea</i>		FACU		5%	
7.	<i>Gymnocarpium dryopteris</i>		FACU		15%	
8.	<i>Streptopus amplexifolius</i>		FACU		T	
9.	<i>Coarctum erianthum</i>		FACU		2%	
10.	<i>Galium boreale</i>		FACU		T	
Total Cover: <u>119</u>						
50% of total cover: <u>59.5</u> 20% of total cover: <u>23.8</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

7-3-15

W85T1033

Y

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							
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes	
0-3								Dry organics	
3-5	10YR 2/1	100						Silt Loam	
5-10	10YR 3/2	85	5YR 3/4	10	C	M		very fine sandy loam	
10-24	10YR 4/6	45	5Y 5/8	10	C	M		fine sandy loam	
	10YR 5/1	45						silty 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 SOILS³

Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: Bw2 is alternating bands of depleted silty clay loam + very fine sandy loam that has oxidized (alternating to depth of textural differences explain contrast, site likely has saturated soil for some part of spring but remains dry long enough to not make indicators, Neg Kx throughout)

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

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): (includes capillary fringe) <u>N</u>	Depth (in):	
EC: <u>—</u>		

Notes: a few pockets of wet inclusions on walk from LZ

AQUATIC SITE ASSESSMENT 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 _____ 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 Geologic 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:

Jessie Brown

7/3/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1033 Field Target: 15274 Date: 7.3.15

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 An 7/15/15
Signature / Date

X Jessie Browlee
Field Crew Chief (print)

X Jessie Browlee 7.3.15
Signature / Date

* GPS Broke at Point. No sub meter Accurate point taken but trail flagged.

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>OFF ROAD</u>
Field Target: <u>15278</u>		Map #: <u>15278</u> Map Date: <u>7-4-15</u>	
Date: <u>7.5.15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W85TI034</u>
Investigators: <u>Jessie Brownlee, Jennifer Anderson</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost:	
Latitude: <u>61° 02' 97.1</u>	Longitude: <u>150° 21' 39.6</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>2</u>	Logbook Page No.: <u>2</u>	Picture No.: <u>1 thru 4</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flat / lowland</u>
Slope (%): <u>0</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U: 11B2, 11C2</u>	Evidence of Wildlife Use: <u>moose droppings</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 No	Is the Sampled Area within a Wetland? Yes No <u>X</u>
Hydric Soil Present? Yes No <u>X</u>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes No <u>X</u>	Alaska Vegetation Classification (Vioreck): <u>III A2</u>

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

Burned Pic Mar^{open} forest, with Cal Can & Fireweed regen. No to little spruce regen.
Dry sandy soil with no signs of Hydrology.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Burned Dead Picea Mariana</u>	<u>40%</u>	<u>Y</u>	<u>—</u>
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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Vaccinium vitis-idaea</u>	<u>1%</u>	<u>Y</u>	<u>FAC</u>
2. <u>Salix Bebbiana</u>	<u>1%</u>	<u>Y</u>	<u>FAC</u>
3. <u>Betula neolascana</u>	<u>1%</u>	<u>Y</u>	<u>FAC</u>
4. <u>Picea mariana</u>	<u>1%</u>	<u>Y</u>	<u>FACW</u>
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: 6 (A)
 Total Number of Dominant Species Across All Strata: 6 (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: 50 X 3 = 150
 FACU species: 11 X 4 = 44
 UPL species: 0 X 5 = 0
 Column Totals: 62 (A) 196 (B)
 PI = B/A = 3.16

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Chamerion angustifolium</u>	<u>5%</u>		<u>FACU</u>
2. <u>Equisetum sylvaticum</u>	<u>15%</u>	<u>Y</u>	<u>FAC</u>
3. <u>Calamagrostis canadensis</u>	<u>30%</u>	<u>Y</u>	<u>FAC</u>
4. <u>Cornus suecica</u>	<u>2%</u>		<u>FAC</u>
5. <u>Cornus canadensis</u>	<u>3%</u>		<u>FACU</u>
6. <u>Carex sp.</u>	<u>3%</u>		
7. <u>Lupinus arcticus</u>	<u>3%</u>		<u>FACU</u>
8.			
9.			
10.			
Total Cover: <u>61</u> 50% of total cover: <u>30.5</u> 20% of total cover: <u>12.2</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
60 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

7.5.15

W85T1034

Y

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		
0-2								Dry organics
2-4	Black						Loam	Charcoal pockets of Ash & E horizon
4-12	10YR 4/4	95					Loamy sand	10YR 4/1 very spotty
12-15	7.5YR 2.5/3	5						
15-24	7.5YR 4/3	80	7.5YR 4/6	20	C	M+RC	Fine sandy loam	Ash component
	10YR 4/3	100					Loamy 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)	N	Alaska Gleyed (A13)	N
Histic Epipedon (A2)	N	Alaska Redox (A14)	N
Black Histic (A3)	N	Alaska Gleyed Pores (A15)	N
Hydrogen Sulfide (A4)	N	Alaska Redox with 2.5Y Hue	N
Thick Dark Surface (A12)	N	Alaska Gleyed without 5Y Hue or Redder Underlying Layer	N
		Other (Explain in Notes)	N

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 Depth (inches): -

Hydric Soil Present (Y/N):

Notes: Dry Sandy Soils. Charcoal & burn material throughout pit in ununiform distribution due to tree throw. All boundaries & horizons discontinuous & wavy.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	N	Water-stained Leaves (B9)	N
High Water Table (A2)	N	Stunted or Stressed Plants (D1)	N
Saturation (A3)	N	Inundation Visible on Aerial Imagery (B7)	N
Water Marks (B1)	N	Drainage Patterns (B10)	N
Sediment Deposits (B2)	N	Oxidized Rhizospheres along Living Roots (C3)	N
Drift Deposits (B3)	N	Presence of Reduced Iron (C4)	N
Algal Mat or Crust (B4)	N	Microtopographic Relief (D4)	N
Iron Deposits (B5)	N	Salt Deposits (C5)	N
		FAC-Neutral Test (D5)	N
		Notes:	

Surface Water Present (Y/N): N	Depth (in): -	Wetland Hydrology Present (Y/N): N
Water Table Present (Y/N): N	Depth (in): -	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): -	EC: -

Notes: Dry site. No Hydrology

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brownlee 7.3.15

7/5/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1004

Field Target: 15278

Date: 7/5/15

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 7/5/15

Signature / Date

X

Jessie Brannon

Field Crew Chief (print)

X

Jessie Brannon 7.5.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline <input checked="" type="checkbox"/>	Access Road (explain) _____	Other (explain) ^{AND} GFF Row	Field Target: 15040	Map #: 15040 Map Date: 7.2.15
Date: 7.5.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1035	
Investigators: Jessie Brownlee, Jennifer Anderson			Team No.: W85	
State: Alaska	Region: Alaska	Milepost: 740.4		
Latitude: 61° 22' 38.13		Longitude: 150° 47' 55.48	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 2	Picture No.: 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U: 1A1, 1A2	Evidence of Wildlife Use: Moose droppings
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: PSS4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1A2

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

Shrub black spruce open forest with Ego Syl and dense sphagnum ~ 10" thick.
 >24" of damp but not saturated organics. Popped 2 other holes looking for saturation
 but they were damp too. We make hydrology on 4 secondaries.
 Site is likely saturated in most years with normal precipitation.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.				
2.				
3.				
4.				
Total Cover: _____				
50% of total cover: _____ 20% of total cover: _____				
<u>Sapling/Shrub Stratum</u> (<u>25'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea Mariana</i>	55%	Y	FACW
2.	<i>Rhododendrum tomentosum</i>	20%	N	FACW
3.	<i>Vaccinium vitis-idaea</i>	4%		FAC
4.	<i>Empetrum nigrum</i>	10%		FAC
5.	<i>Chamaedaphne calyculata</i>	3%		FACW
6.	<i>Vaccinium oxycoccus</i>	1%		OBL
7.	<i>Betula nana</i>	2%		FAC
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: 1 X 1 = 1

FACW species: 83 X 2 = 166

FAC species: 71 X 3 = 213

FACU species: _____ X 4 = _____

UPL species: _____ X 5 = _____

Column Totals: 155 (A) 380 (B)

PI = B/A = 2.45

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>25'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Equisetum sylvaticum</i>	55%	Y	FAC
2.	<i>Geocaulon lividum</i>	T		FACU
3.	<i>Rubus chamaemorus</i>	5%		FACW
4.	<i>Drosera rotundifolia</i>	T		OBL
5.				
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>60</u>				
50% of total cover: <u>30</u> 20% of total cover: <u>12</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

90 % Cover of Wetland Bryophytes *sphagnum*

95 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

γ

OK

Notes: Marginal Hydrology but its dry spring & summer following low ~~at~~ snow fall this winter. Site is likely saturated long enough in the growing season in most years. Popped 2 other holes. Lower in elevation slightly & they were not saturated either.

AQUATIC SITE ASSESSMENT 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>0</u> Sapling (<5 dbh, <6m tall) <u>55</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>25</u> Dwarf shrub (<0.5m) <u>15</u> Tall herb (≥1m) _____ Short herb (<1m) <u>60</u> Moss-Lichen _____ Floating _____ Submerged _____		
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%) _____ 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) _____ 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 _____ 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 _____	
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 Geologic 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:

Jessie Brownlee

[Signature] 7/5/18

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W 85T1035

Field Target: 15040

Date: 7/5/15

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  7/5/15
Signature / Date

X Jesse Brownlee
Field Crew Chief (print)

X  7-5-15
Signature / Date

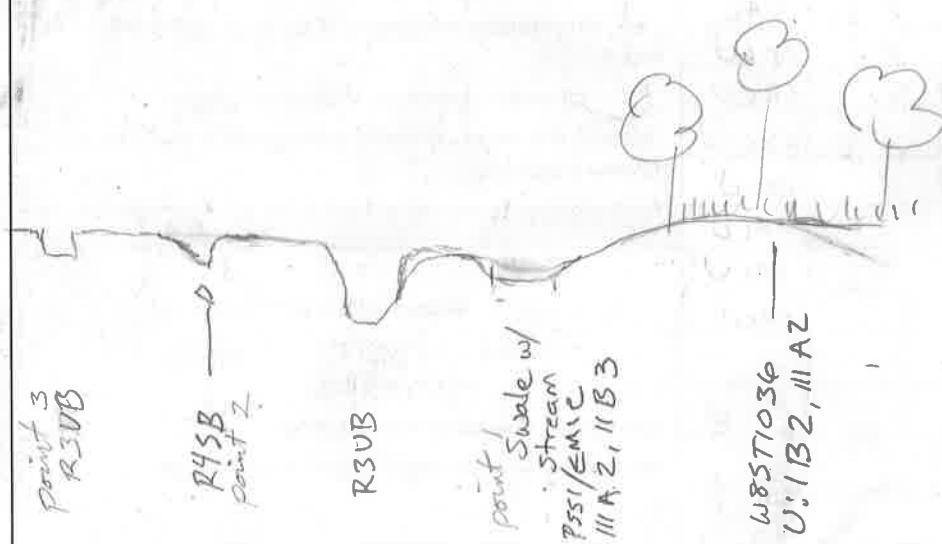
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15044	Map #: 218 Map Date: 6.4.15
Date: 7.5.15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1036
Investigators: Jessie Brownee, Jennifer Anderson			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 736.3	
Latitude: 61.4088		Longitude: 150.7438	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 3	Picture No.: 1 thru 4	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Toe slope Mt. Susitna
Slope (%): 3-5	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: U:1C2	Evidence of Wildlife Use: moose browse
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
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1B2, III A 2

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

Mature Betula woodland to open forest with trees being over 60' tall.
Dense understory of Cal Can, browsed Vib Edv.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula Neolaskana</i>	30%	Y	FAC
2.				
3.				
4.				
Total Cover: <u>30</u> 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				
<u>Sapling/Shrub Stratum</u> (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Viburnum edule</i>	10%	Y	FACU
2.	<i>Rosa acicularis</i>	3%		FACU
3.	<i>Linnaea borealis</i>	2%		FACU
4.	<i>Ribes triste</i>	3%		FAC
5.	<i>Oplopanax horridus</i>	5%	Y	FACU
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>				

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: 0.33 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 0 X 2 = 0
 FAC species: 42 X 3 = 126
 FACU species: 58 X 4 = 236
 UPL species: 0 X 5 = 0
 Column Totals: 100 (A) 362 (B)
 PI = B/A = 3.62

<i>Equisetum Arvens</i>	H	2%	FAC
<i>Moehringia lateriflora</i>	H	T	FACU
<i>Fern sp</i>	H	5%	NA
<i>Heracleum maximum</i>	2X	2%	FACU

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i>	7%	Y	FAC
2.	<i>Gymnocarpium dryopteris</i>	15%	Y	FACU
3.	<i>Cornus canadensis</i>	10%	Y	FACU
4.	<i>Equisetum pratense</i>	T		FACW
5.	<i>Chamerion angustifolium</i>	3%		FACU
6.	<i>Dryopteris expansa</i>	5%		FACU
7.	<i>Streptopus amplexifolius</i>	1%		FACU
8.	<i>Trifolium europaea</i>	2%		FACU
9.	<i>Rubus pedatus</i>	T		FAC
10.	<i>Geranium erianthum</i>	T		FACU
Total Cover: <u>52</u> ? 50% of total cover: <u>26</u> 20% of total cover: <u>10.4</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.

<u>0</u> % Bare Ground
<u>0</u> % Cover of Wetland Bryophytes
<u>30</u> Total Cover of Bryophytes
<u>0</u> % Cover of Water

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

WETLAND DETERMINATION DATA FORM

7-5-15

W8ST1036

Y

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		
0-3								Dry organics
3-5	10YR 4/2	100					Loam	
5-17	7.5YR 3/4	30					Loam	
	7.5YR 3/2	70						
17-24	7.5YR 3/4	100					very gravelly 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) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>N</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: slight E/Bhs properties. Dry Loam w/ ~~coarse~~ gravels @ 17-24"

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

AQUATIC SITE ASSESSMENT 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/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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____
Surficial Geologic 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:

Jessie Brownlee

GPS Technician QA/QC check:

Jufu 7/5/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1036

Field Target: 15044

Date: 7/5/15

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)? 1345 87011281
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X  7/5/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X  7.5.15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: ISO <input checked="" type="checkbox"/>	Map #: <u>217</u> Map Date: <u>6-4-15</u>
Date: <u>7.6.15</u>	Project Name & No.: Alaska LNG 60418403		Feature Id: <u>W8ST1037</u>
Investigators: <u>Jessie Brownlee, Jennifer Anderson</u>			Team No.: <u>W8S</u>
State: Alaska	Region: Alaska	Milepost: _____	
Latitude: <u>61° 44' 32"</u>		Longitude: <u>-150° 05' 86"</u>	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>4</u>	Picture No.: <u>1-4 W, E</u>	

SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Toeslope at Susitna</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>flat to slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>U:IC2</u>	Evidence of Wildlife Use: <u>wolf track, moose droppings, Bear area</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 <u>Y</u> No _____	Is the Sampled Area within a Wetland? Yes <u>Y</u> No _____
Hydric Soil Present? Yes <u>Y</u> No _____	Wetland Type: <u>PEM1E</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>III A 3</u>

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

Slope wetland with thick Car Agw coverage + little else.
Iron staining throughout area. Slope with feeding off Base of ~~at~~ Susitna.
Steep slope than would be expected for site.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			
<u>Sapling/Shrub Stratum</u> (<u>13 x 40'</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: _____			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)
 Total Number of Dominant Species Across All Strata: 1 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 81 X 1 = 81
 FACW species: _____ X 2 = _____
 FAC species: 4 X 3 = 12
 FACU species: _____ X 4 = _____
 UPL species: _____ X 5 = _____
 Column Totals: 85 (A) 93 (B)
 PI = B/A = 1.09

Carex is a subspecies, sitchensis, as per Hutten

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>13 x 40'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Calamagrostis canadensis</u>	<u>4%</u>		<u>FAC</u>
2. <u>Equisetum Fluvatile</u>	<u>1%</u>		<u>OBL</u>
3. <u>Carex Aquatilis</u>	<u>80%</u>	<u>Y</u>	<u>OBL</u>
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>85</u> 50% of total cover: <u>42.5</u> 20% of total cover: <u>17.0</u>			

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

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

15 % Bare Ground
5 % Cover of Wetland Bryophytes
 _____ Total Cover of Bryophytes
8 % Cover of Water

Hydrophytic Vegetation Present (Y/N): YES

Notes: (If observed, list morphological adaptations below):
Elongated wetland patch, excluding surrounding forest in vegetation.

WETLAND DETERMINATION DATA FORM

7.5.15

WBST1037

Y

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		
0-4								Organics stained red from iron
4-11								Saturated organics
11-20								Saturated 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>Y</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						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>N</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: Thick organic mat stained red from iron. <u>Restoring</u>								

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>Y</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>—</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>N</u>		
Iron Deposits (B5) <u>Y</u>			
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>φ</u>			
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u> Depth (in): <u>φ</u>		EC: <u>Flushing 3999</u> ? ^{was working correctly to last spot which} <u>PH 5.88</u> ^{read 2.69}	
Notes:			

AQUATIC SITE ASSESSMENT 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) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) _____ Tall herb (≥m) <u>85</u> _____ Short herb (<1m) _____ Moss-Lichen _____ Floating _____ Submerged _____	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even <input checked="" type="checkbox"/>
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) <input checked="" type="checkbox"/> Medium (5-25 species) _____ 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 <input checked="" type="checkbox"/> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <input checked="" type="checkbox"/> 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>5.82</u>	
Surficial Geologic 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 _____ 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.) <input checked="" type="checkbox"/> Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
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:

Jessie Browne

7/6/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ST1037

Field Target: 15D45

Date: 7/10/15

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

J. Anderson 7/6/15

Signature / Date

X

Jessie Browlee

Field Crew Chief (print)

X

Jessie Browlee 7/6/15

Signature / Date

WETLAND DETERMINATION DATA FORM

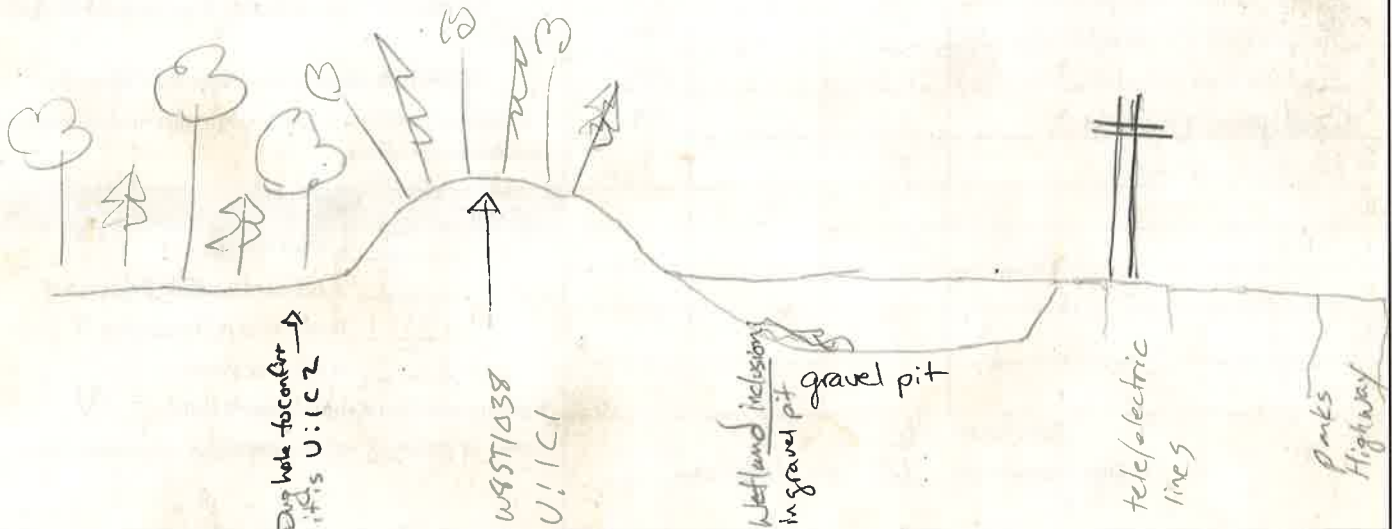
OFF ROW

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target: 15245
Date: 7-7-2015	Project Name & No.: Alaska LNG 60418403	Feature Id: W8ST1038	Map #: 15246 Map Date: 7/6/15
Investigators: JB, KV	Team No.: W85		
State: Alaska	Region: Alaska	Milepost: 673	
Latitude: 62° 19' 77.779" N	Longitude: -150° 21' 306.43" W	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 5	Picture No.: P-W85T1038-001 thm 004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): mound
Slope (%): 3-5	Local relief (concave, convex, none): convex & undulating
Pre-mapped Alaska LNG/NWI classification: U: ?	Evidence of Wildlife Use: No
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 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
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1C1

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

site looks disturbed in distant past. Ground is uneven and veg looks like mature regen all being the same age & packed in w/ closed canopy. Good gravel source. Dug hole to the North where landscape drops down in elevation. Soil was dry ash. No hydrology. Veg was 1C2.



WETLAND DETERMINATION DATA FORM

W85 T1038

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Neolastana</i>	10	N	FACU
2. <i>Picea glauca</i>	25	Y	FACU
3. <i>Populus balsamifera</i>	25	Y	FACU
4.			
Total Cover: <u>60</u>			
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Neolastana</i>	20	Y	FACU
2. <i>Picea glauca</i>	25	Y	FACU
3. <i>Viburnum edule</i>	T		FACU
4. <i>Oplopanax horridus</i>	T		FACU
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>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 0 X 3 = 0

FACU species: 145 X 4 = 580

UPL species: 0 X 5 = 0

Column Totals: 145 (A) 580 (B)

PI = B/A = 4

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	40	Y	FACU
2. <i>Streptopus amplexifolius</i>	T		FACU
3. <i>Equisetum sylvaticum</i>	T		FAC
4. <i>Godia repens</i>	T		FAC
5. <i>Neotria cordata</i>	T		FACU
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:

N Dominance Test is > 50%

N 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

7.7.15

W8571038

Y

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						
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-2								
2-9	10YR 4/4	50					Fine sandy loam	~35% gravels
	7.5YR 3/4	50						
9-15	10YR 4/5	100						40% gravels
15-24	10YR 5/1	75	7.5YR 4/4	25	C	RM/M	Silt loam	Ash concentrations are relic
								40% gravels; boundary wavy

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>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>
Thick Dark Surface (A12) <u>N</u>	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
	Other (Explain in Notes) <u>N</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: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Slight Bb properties. Very gravelly soil. Thick ash layer w/ relic concentrations at the bottom

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

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>	Depth (in): <u>—</u>	EC: <u>—</u>

Notes: No signs of hydrology

AQUATIC SITE ASSESSMENT DATA FORM

W85T1038

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-Needle-leaved _____ Scrub Shrub-Evergreen-Broad-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/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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brumlee 7.7.15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1038 Field Target: 15245 Date: 7-7-15

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

- N/A* ☐ 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)?
- N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper
Wetland Scientist (print)

X Haley Volper 7-7-15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X Jessie 7-7-15
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15007	Map #: 250 Map Date: 7-31-15
Date: 8/6/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1039
Investigators: Jessie Brownlee, Abigail Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 761.85	
Latitude: 61° 09' 05.62" N	Longitude: 151° 07' 56.06" W		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 28	Picture No.: P - W85T1039-VEG-VEG-PIT-ALL 6	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): flat
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIE 11C2 11A2	Evidence of Wildlife Use: Moose droppings
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/SSIE
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11A3 11C2

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

Plot is dominated by ego flu & Cal can w/ lots of willow and Myr Gal. Standing water inbetween tussocking plants. This site is higher in EMI than SS1 But mapping is good as is for surrounding areas. R3UBH to the east has a thick iron sheen And currently has no flow just stagnant water. See map 250 for mapping updates



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)
1.			
2.			
3.			
4.			
Total Cover: _____			
50% of total cover: _____		20% of total cover: _____	
Sapling/Shrub Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)
1.	<i>Myrica gale</i>	17	Y
2.	<i>Salix pulchra</i>	5	
3.	<i>Alnus viridis</i>	4	
4.	<i>Betula neobaskana</i>	1	
5.	<i>Betula glandulosa</i>	1	
6.	<i>Salix fuscescens</i>	T	
7.			
8.			
9.			
Total Cover: <u>28</u>			
50% of total cover: <u>14</u>		20% of total cover: <u>5.6</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: 95 X 1 = 95
 FACW species: 5 X 2 = 10
 FAC species: 94 X 3 = 282
 FACU species: _____ X 4 = _____
 UPL species: _____ X 5 = _____
 Column Totals: 194 (A) 387 (B)
 PI = B/A = 1.99

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)
1.	<i>Comarum palustre</i>	8	
2.	<i>Calamagrostis canadensis</i>	88	Y
3.	<i>Equisetum fluviale</i>	70	Y
4.	<i>Tridentalis europaea</i>	T	
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>166</u>			
50% of total cover: <u>83</u>		20% of total cover: <u>33.2</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
☒ Total Cover of Bryophytes
☒ % Cover of Water

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

WETLAND DETERMINATION DATA FORM

8.10.15

W85T1039

Y

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		
01 0-12								Saturated organics
02 12-18								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>Y</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		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: Frost Depth (inches): 23

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

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>3"</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0</u>	EC: <u>67</u> pH <u>5.63</u> <u>53.9%</u>
Notes:		

AQUATIC SITE ASSESSMENT DATA FORM

W85T1039

8-6-15

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>1</u> Tall shrub (2-6m) <u>4</u> Short shrub (0.5-2m) <u>23</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>None</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%) _____ 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 _____ >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 <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 _____ 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 <input checked="" type="checkbox"/>	
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 _____ 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 _____ Unrestricted Outflow <input checked="" type="checkbox"/>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.63</u>	
Surficial Geologic 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: W85T1039 Field Target: 15007 Date: 8.6.15

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?
Form

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

Abigail Fisher

Wetland Scientist (print)

X

[Signature]

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8.6.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 15006	Map #: 250 Map Date: 7.31.15
Date: 8/6/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85T1040
Investigators: Jessie Brunkle, Morgan Fisher			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 761.9	
Latitude: 61°09'05.08"N	Longitude: 151°07'47.85"W	Datum: WGS84	
Logbook No.: 17	Logbook Page No.: 28	Picture No.: P-W85T1040-VEG-VEG PIT P106	

SITE PARAMETERS	
Subregion: Cook Inlet Basin Sub	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: U 1C2, 11B2	Evidence of Wildlife Use: Moose Browse
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: PFO1/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 1C2, 11C2

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

Mosaic/Transitional site. See map for updated boundaries & coding.
Tall mature Bet Neo, Pic Cola open forest ~ 30-50'. Lots of downed trees. Diverse shrub understory
& Forb community. Soils > 8" of moist organics. Only secondary hydrology Indicator
Positive XX in > 60% of 4" mineral horizon. Use Lidar/Contours for mapping
Area dries out on way back to LZ before getting wet in PSS4/1B plot on map B/C I don't have contours.
Did not update the polygon for this

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	14	Y	FacW
2. <i>Betula neobaskana</i>	18	Y	Fac
3.			
4.			
Total Cover: <u>32</u> 50% of total cover: <u>16</u> 20% of total cover: <u>6.4</u>			
Sapling/Shrub Stratum (<u>26ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spiraea stevenii</i>	13	Y	FacU
2. <i>Vaccinium uliginosum</i>	1		Fac
3. <i>Menziesia ferruginea</i>	22	Y	FacU
4. <i>Oplopanax horridus</i>	3		FacU
5. <i>Salix pulchra</i>	5		FacW
6. <i>Picea mariana</i>	1		FacW
7. <i>Betula neobaskana</i>	4		Fac
8. <i>Vaccinium vitis-idaea</i>	1		Fac
9. <i>Vaccinium ovalifolium</i>	2		Fac
Total Cover: <u>52</u> 50% of total cover: <u>26</u> 20% of total cover: <u>10.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 7 (B)
 % Dominant Species that are OBL, FACW, or FAC: 71 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = _____
 FACW species: 38 X 2 = 76
 FAC species: 78 X 3 = 234
 FACU species: 49 X 4 = 196
 UPL species: _____ X 5 = _____
 Column Totals: 165 (A) 506 (B)
 PI = B/A = 3.06

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	7		FacU
2. <i>Rubus padalis</i>	4		Fac
3. <i>Equisetum arvense</i>	25	Y	Fac
4. <i>Streptopus amplexifolius</i>	2		FacU
5. <i>Calamagrostis canadensis</i>	20	Y	Fac
6. <i>Equisetum sylvaticum</i>	3		Fac
7. <i>Cornus canadensis</i>	1		FacU
8. <i>Carex disperma</i>	18	Y	FacW
9. <i>Rubus arcticus</i>	1		Fac
10. <i>Linnaea borealis</i>	1		FacU
Total Cover: <u>81</u> 50% of total cover: <u>40.5</u> 20% of total cover: <u>16.2</u>			
11. <i>Trientalis europaea</i>	1		FacU
12. <i>Chamerion angustifolium</i>	1		FacU
13. <i>Rubus chamaemorus</i>	1		FacW

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
☒ 30 % Cover of Wetland Bryophytes
☒ 70 Total Cover of Bryophytes
☒ % Cover of Water

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

WETLAND DETERMINATION DATA FORM

8-16-15

W85T1040

Y

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			
0-5	10YR 2/2						damp sphagnum	
5-10	10YR 2/2						damp organics 1" mineral band @ 5-10"	
10-14	10YR 2/2	50				silt loam	mineral & organics mixed (70% organics)	
14-24	10YR 3/2	50	7.5YR 4/4	3	C	M RC	very fine sandy loam	
	10YR 2/2	47						

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>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>	
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>	
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>	Alaska Redox with 2.5Y Hue <u>N</u>	
Hydrogen Sulfide (A4) <u>N</u>		Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>	
Thick Dark Surface (A12) <u>N</u>		Other (Explain in Notes) <u>Y</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: N Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Positive α in mineral soil. Using BPT to call soils hydric given seeping @ 16" & lowland positioning

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

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>16</u>	EC: <u>—</u>

Notes: Water seeping in starting @ 16" from ~ 3 different spot about a nickel Big (each wet spot) Hole open for 30 minutes and no water accumulated @ bottom of hole. Thick sphagnum organic build up that pushed saturation below 12" otherwise it would have made primary hydrology.

AQUATIC SITE ASSESSMENT DATA FORM

W85T1040

8-6-15

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> 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>32</u> Sapling (<5 dbh, <6m tall) <u>5</u> Tall shrub (2-6m) <u>6</u> Short shrub (0.5-2m) <u>46</u> Dwarf shrub (<0.5m) <u>1</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>21</u> Moss-Lichen <u>70</u> Floating <u>C</u> Submerged <u>0</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%) _____ 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 _____ 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/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 _____ 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 <input checked="" type="checkbox"/> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brainerd

GPS Technician QA/QC check:

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1040

Field Target: 15006

Date: 8.6.15

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?
form

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

Abigail Fisher

Wetland Scientist (print)

X



Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8.10.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____	Field Target: <u>5741</u>		Map #: <u>253</u> Map Date: <u>6.4.15</u>
Date: <u>8/6/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1041</u>
Investigators: <u>Jessie Brownke, Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>764.1</u>	
Latitude: <u>61°07'49.51"N</u>		Longitude: <u>151°05'06.45"W</u> Datum: <u>WGS84</u>	
Logbook No.: <u>82</u>	Logbook Page No.: <u>29</u>	Picture No.: <u>P-W85T1041-VEG-VE6 PIT PLUG</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Bluff / Coastal Terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U1C211B2</u>	Evidence of Wildlife Use: <u>Moose browse</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 _____ 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>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>1B2, 11A2</u>

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

Deep steep incised erosional feature went to point.
Jumped down and dig around. It's dry w/ extremely gravelly
soil ~12" deep. Acts as seasonal run off route in spring
(?) further down toward the inlet.



Tall Bet Neo open forest
Pic Gls. Dense Cal can &
Cor Can Cover. Dry soils
No signs of hydrology

W85T1041
U: 1B2 11A2

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula nealashana</i>	35	Y	Fac
2.	<i>Picea glauca</i>	10	Y	FACU
3.				
4.				
Total Cover: <u>45</u>				
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>				
<u>Sapling/Shrub Stratum</u> (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Spiraea stevenii</i>	15	Y	FacU
2.	<i>Salix pulchra</i>	5		FacW
3.	<i>Oplopanax horridus</i>	2		FacU
4.	<i>Salix bebbiana</i>	15	Y	FAC
5.	<i>Ribes fruticosum</i>	4		Fac
6.				
7.				
8.				
9.				
Total Cover: <u>41</u>				
50% of total cover: <u>20.5</u> 20% of total cover: <u>8.2</u>				

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 40% (AB)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 17 X 2 = 34

FAC species: 81 X 3 = 243

FACU species: 108 X 4 = 432

UPL species: 0 X 5 = 0

Column Totals: 206 (A) 709 (B)

PI = B/A = 3.44

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Cornus canadensis</i>	70	Y	FacU
2.	<i>Dryopteris expansa</i>	3		FacU
3.	<i>Chamerion angustifolium</i>	3		FacU
4.	<i>Rubus arcticus</i>	7		Fac
5.	<i>Calamagrostis canadensis</i>	20	Y	Fac
6.	<i>Galium boreale</i>	1		
7.	<i>Viola langsdorfi</i>	12		FacW
8.	<i>Trientalis europaea</i>	1		FacU
9.	<i>Streptopus amplexifolius</i>	1		Fac
10.				
Total Cover: <u>120</u>				
50% of total cover: <u>60</u> 20% of total cover: <u>24</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

8-6-15

W85T1041

Y

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		
A 0-4	10YR 3/3	100					Loam	Dense root mat
4-5	Black	100						Burned organics
Bw1 5-11	7.5YR 4/4	100					Silt loam	
Bw2 11-18	10YR 6/4	30					Fine sandy loam	
	10YR 3/4	70						
Bw3 18-24	10YR 4/2	50					Silt loam	~5% organic material with very platy structure
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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						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>N</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: All boundaries wavy due to tree throw possibly. Below 24" soil is 10YR 5/1 w/ ~10% relic concentrations								

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

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brownlee

Allyson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1641

Field Target: 15241

Date: 8-6-15

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?

Form

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

Abigail Fisher

Wetland Scientist (print)

X



Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8-10-15

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>15278</u> Map #: <u>882</u> Map Date: <u>8-7-15</u>	
Date: <u>8/7/15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1042</u>
Investigators: <u>Jessie Brown & Abigail Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>763</u>	
Latitude: <u>61°08'33.43" N</u>		Longitude: <u>151°06'14.48" W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>02</u>	Logbook Page No.: <u>30</u>	Picture No.: <u>P-W85T1042-VEG-VEG-P1-P11</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</u>	Landform (hillslope, terrace, hummocks, etc.): <u>historic cookinlet terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>U1C2, 11B2</u>	Evidence of Wildlife Use: <u>None</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 _____ 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>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>1C2 11B2</u>

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

Mature open Picola & Bet Neo Forest ~30-40' tall with lots of Bet Neo saplings in understory.
 MenFer is thick & ~5' tall. Diverse shrub & forb community.
 Dry sandy E/Bs soils. No sign of hydrology.
 Classic dry forest.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</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>6</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>16.6</u> (A/B)
1. <i>Picea alaura</i>	10	Y	FacU	
2. <i>Betula nealashana</i>	10	Y	Fac	
3.				
4.				
Total Cover: <u>20</u> 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = _____ FACW species: <u>0</u> X 2 = _____ FAC species: <u>31</u> X 3 = <u>93</u> FACU species: <u>153</u> X 4 = <u>612</u> UPL species: _____ X 5 = _____ Column Totals: <u>184</u> (A) <u>705</u> (B) PI = B/A = <u>3.83</u>
Sapling/Shrub Stratum (<u>26 ft</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Menziesia ferruginea</i>	75	Y	FacU	
2. <i>Viburnum edule</i>	8		FacU	
3. <i>Picea edule</i>	5		FacU	
4. <i>Betula nealashana</i>	7		Fac	
5. <i>Vaccinium vitis-idaea</i>	T		Fac	
6. <i>Vaccinium uliginosum</i>	T		Fac	
7. <i>Rosa acicularis</i>	1		FacU	
8. <i>Sorbus scopulina</i>	3		FACU	
9.				
Total Cover: <u>98</u> 50% of total cover: <u>49</u> 20% of total cover: <u>19.6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26 ft</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 <input checked="" type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Chamerion angustifolium</i>	2		Fac	
2. <i>Rubus odoratus</i>	3		Fac	
3. <i>Equisetum sylvaticum</i>	T		Fac	
4. <i>Gymnocarpium dryopteris</i>	17	Y	FacU	
5. <i>Sparganium angustifolium</i>	20	Y	FacU	% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>25</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):
6. <i>Rubus arcticus</i>	3		Fac	
7. <i>Equisetum arvense</i>	1		Fac	
8. <i>Cornus canadensis</i>	14	Y	FacU	
9. <i>Pyrola grandiflora</i>	5		Fac	
10. <i>Pyrola asarifolia</i>	1		FacU	
Total Cover: <u>66</u> 50% of total cover: <u>33</u> 20% of total cover: <u>13.2</u>				
11. <i>Rubus chamaemorus</i>	T		FacW	

WETLAND DETERMINATION DATA FORM

8.7.15

W85T1042

Y

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					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Notes
0-5							Band of mineral in middle of horizon
5-6	2.5Y 6/1	100					loamy sand
6-10	7.5YR 5/6	100					sandy loam
10-18	10YR 5/8	100					sandy loam
18-20							
18-24	7.5YR 4/4	85	10YR 3/1	5	organics		fishy organics in pockets - free throw possibly.
	10YR 5/4	10					
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.							
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS³	
Histosol or Histel (A1) <u>N</u>		Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) ⁴ <u>N</u>			
Histic Epipedon (A2) <u>N</u>		Alaska Redox (A14) <u>N</u>		Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>N</u>		Alaska Gleyed Pores (A15) <u>N</u>		Alaska Redox with 2.5Y Hue <u>N</u>			
Hydrogen Sulfide (A4) <u>N</u>				Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>			
Thick Dark Surface (A12) <u>N</u>				Other (Explain in Notes) <u>N</u>			
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>N</u> Depth (inches): <u>N</u>							
Hydric Soil Present (Y/N): <u>N</u>							
Notes:							

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

AQUATIC SITE ASSESSMENT 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 Geologic 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:

Jessie Brown

[Signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1042 Field Target: 15272 Date: 8.7.15

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?

Form

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

Abigail Fisher

Wetland Scientist (print)

X



Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8/10/15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>15005</u>	Map #: <u>251</u> Map Date: <u>6.4.15</u>
Date: <u>8.7.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1043</u>
Investigators: <u>Jessie Brownlee Abby Fisher</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>762.7</u>	
Latitude: <u>61°08'42.50"N</u>	Longitude: <u>151°06'39.12"W</u>		Datum: <u>WGS84</u>
Logbook No.: <u>02</u>	Logbook Page No.: <u>31</u>	Picture No.: <u>P_W85T1043-VEG-VEG-PIT-PIN</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Flood plain / Back channel</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSSI E 11B2, 11C2</u>	Evidence of Wildlife Use: <u>Moose droppings, trails</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>PSSI/EMIC</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>11B2, 11A2</u>

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

Creek floods frequently (every 1-2 yrs typically). Area is a mosaic w/ higher elevation being dry and up out of water table but >50% of area here is low enough to be wet. water table @ 11" often enough to gley sandy soil

Use Lidar to map. 2 Terraces are upland and hiding in shadow of imagery.

W85T1043

R30BH


WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>15x35'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Alnus viridis</i>	5	Y	Fae
2.				
3.				
4.				
Total Cover: <u>Y</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>				
Sapling/Shrub Stratum (<u>15x35'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neobabingtoniana</i>	1		Fae
2.	<i>Alnus viridis</i>	38	Y	Fae
3.	<i>Myrica gale</i>	3		OBL
4.	<i>Salix scouleriana</i>	10		Fae
5.	<i>Salix pulchra</i>	1		Fae
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: 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: 32 X 1 = 32
 FACW species: 9 X 2 = 18
 FAC species: 81 X 3 = 243
 FACU species: 1 X 4 = 4
 UPL species: 1 X 5 = 5
 Column Totals: 122 (A) 293 (B)
 PI = B/A = 2.40

Plot size adjusted to represent Back Channel & Not the terraces bordering it.



VEGETATION (use scientific names of plants)				
Herb Stratum (<u>15x35'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Carex utriculata</i>	7		OBL
2.	<i>Deschampsia cespitosa</i>	2		FAC
3.	<i>Achillea millefolium</i>	1		FACU
4.	<i>Calamagrostis canadensis</i>	25	Y	Fae
5.	<i>Equisetum pratense</i>	7		Fae
6.	<i>Carex aquatilis</i>	22	Y	OBL
7.	<i>Galium trifidum</i>	1		Fae
8.	<i>Viola sp.</i>	1		
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:
Y Dominance Test is > 50%
Y Prevalence Index is ≤ 3.0
N Morphological Adaptations¹ (Provide supporting data in Notes)
N Problematic Hydrophytic Vegetation¹ (Explain)

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

20 % Bare Ground
0 % Cover of Wetland Bryophytes
5 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

8.7.15

W85T1043

Y

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		Type ¹	Loc ²	Texture	Notes
	Color (moist)	%	Color (moist)	%				
C 0-5	2.5Y 4/2	100					Sand	
B ₁ 5-11	2.5Y 4/2	75	7.5YR 3/3	15			Sand	con primarily around rock & organic particles
B ₂ 11-16	N 4/	100	7.5YR 4/6	10			Sand	Buried organics. Pos X
B ₃ 16-24	N 3/	100					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>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>Y</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>Y</u>		
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>No</u> Depth (inches): <u>X</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>Hydrogen sulfide present but below 12" Positive X throughout B₂ & B₃ horizons.</u>								

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>Y</u>	Geomorphic Position (D2) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>Y</u>	Oxidized Rhizospheres along Living Roots (C3) <u>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>Y</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>Y</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>Y</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>Y</u>	Notes:	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes): <u>—</u>		
Iron Deposits (B5) <u>N</u>			
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>20</u>		
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>17</u>	EC: <u>83</u> S.L. pH	
Notes: <u>Water table consistently @ 11" as is evident by Gleyed soils lacking concentrations.</u>			

AQUATIC SITE ASSESSMENT DATA FORM

W8571043

8-7-15

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>1</u> Tall shrub (2-6m) <u>53</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>64</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>6</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 <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 _____ 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 <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 <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 _____ Sediment Observed on Wetland Substrate <u>X</u> Fluvuquent Soils Sediment Created <u>X</u>	
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 _____ 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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.6</u>	
Surficial Geologic 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:

GPS Technician QA/QC check:

Jessie Brownlee

Chris Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8571043 Field Target: 1500S Date: 8.7.15

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?
Form

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)?

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

X

Angela Fisher

Wetland Scientist (print)

X

[Signature]

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8-10-15

Signature / Date

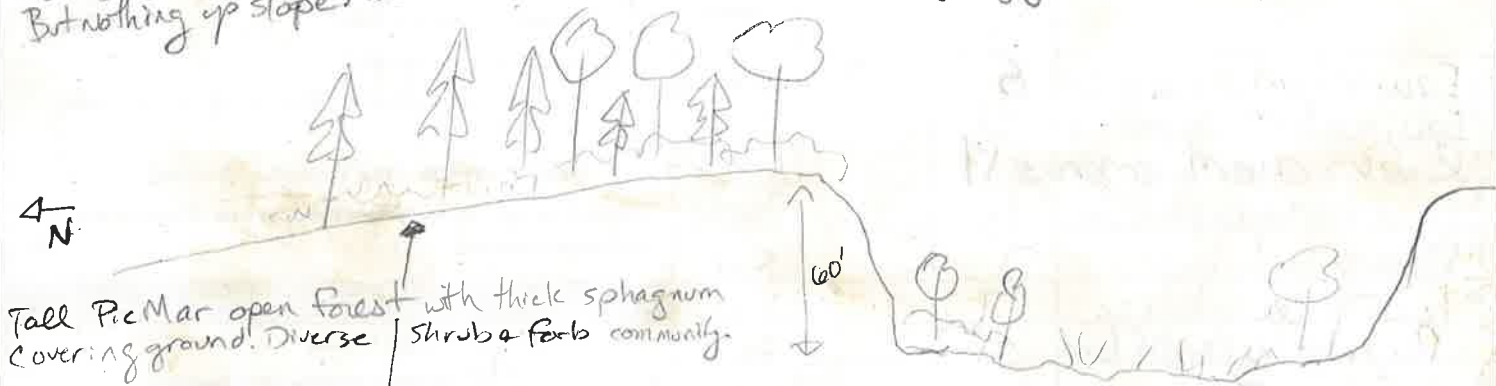
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 1507	Map #: 1507 Map Date: 8.5.15
Date: 8/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8ST1044
Investigators: Jessie Brannan, Abigail Fisher			Team No.: W8S
State: Alaska	Region: Alaska	Milepost: _____	
Latitude: 61°17'09.82"N	Longitude: 151°03'38.13"W	Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 31	Picture No.: P_W8ST1044_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PFO4B: 1A2	Evidence of Wildlife Use: None
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: PFO4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1A2

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

Marginal site. Likely gets water as it moves North & down slope. Marginal Hydrology but thick layer of organics & positive XX starting @ 12". Redraw boundary to include this spot. But nothing up slope. Used BPJ to throw soils in due to high organic content & positive XX



Tall Pic Mar open forest with thick sphagnum covering ground. Diverse shrub & forb community.

W8ST1044
PFO4B

W8ST1044-02
5C

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Picea mariana</i>	30	Y	FacW
2.				
3.				
4.				
Total Cover: <u>30</u>				
50% of total cover: _____		20% of total cover: _____		
Sapling/Shrub Stratum (<u>25ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Vaccinium uliginosum</i>	7	Y	Fac
2.	<i>Vaccinium vitis-idaea</i>	6	Y	Fac
3.	<i>Empetrum nigrum</i>	7	Y	Fac
4.	<i>Betula neophytica</i>	5		Fac
5.	<i>Menyanthes ferruginea</i>	12	Y	FacU
6.	<i>Picea mariana</i>	5		FacW
7.	<i>Betula glandulosa</i>	4		Fac
8.	<i>Rhododendrum tomentosum</i>			FacW
9.				
Total Cover: <u>46</u>				
50% of total cover: <u>23</u>		20% of total cover: <u>9.2</u>		

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: 52 X 2 = 104
 FAC species: 93 X 3 = 279
 FACU species: 22 X 4 = 88
 UPL species: _____ X 5 = _____
 Column Totals: 167 (A) 471 (B)
 PI = B/A = 2.82

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>25ft</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Equisetum arvense</i>	60	Y	Fac
2.	<i>Equisetum sylvaticum</i>	4		Fac
3.	<i>Rubus chamaemorus</i>	17		FacW
4.	<i>Sparganium angustifolium</i>	10		FacU
5.	<i>Rubus pedatus</i>	T		Fac
6.	<i>Cornus canadensis</i>	T		FacU
7.	<i>Pyrola grandiflora</i>	T		Fac
8.				
9.				
10.				
Total Cover: <u>91</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
98 % 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

8.7.15

W8571044

Y

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		
	Color (moist)	%	Color (moist)	%
			Type ¹	Loc ²
			Texture	Notes
0-7				2 bank of mineral in horizon
7-12	7.5YR 2.5/2	100		mucky organics
12-18	7.5YR 2.5/2	100		mucky silt loam Positive XXX
18-24	7.5YR 3/3	100		fine sandy loam Positive XXX

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 Histal (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>N</u>	Alaska Redox (A14) <u>N</u>
Black Histic (A3) <u>N</u>	Alaska Gleyed Pores (A15) <u>N</u>
Hydrogen Sulfide (A4) <u>N</u>	Alaska Color Change (TA4) ⁴ <u>N</u>
Thick Dark Surface (A12) <u>N</u>	Alaska Alpine Swales (TA5) <u>N</u>
	Alaska Redox with 2.5Y Hue <u>N</u>
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>
	Other (Explain in Notes) <u>Y positive XXX</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: N Depth (inches): —

Hydric Soil Present (Y/N): —

Notes: Positive XXX throughout mineral soil. Soil is very high in organic matter. Doesn't meet indicators but am using BPJ to throw soils in.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)	SECONDARY INDICATORS (2 or more required)
Surface Water (A1) <u>N</u>	Surface Soil Cracks (B6) <u>N</u>
High Water Table (A2) <u>N</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>
Saturation (A3) <u>N</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>N</u>
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):
Iron Deposits (B5) <u>N</u>	
	Notes:

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>N</u>	Depth (in): <u>—</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>	Depth (in): <u>—</u>	EC: <u>—</u>

Notes: Soil is moist but not saturated. Microtopography few hummocks & depressions that hold water longer.

AQUATIC SITE ASSESSMENT DATA FORM

W85T1044

8-7-15

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>30</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>23</u> Dwarf shrub (<0.5m) <u>13</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>91</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>6</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%) _____ 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) _____ 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 _____ 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 _____	
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 <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 Geologic 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 _____ 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:

Jessie Brumwell

Chely Sohr

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1044 Field Target: 15017 Date: 8-7-15

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?
Form

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

Abigail Fisher

Wetland Scientist (print)

X

[Signature]

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 8.10.15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>ISOY</u>	Map #: <u>221</u> Map Date: <u>6.4.15</u>
Date: <u>7.3.15</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Feature Id: <u>W85T1032 45 4B</u>
Investigators: <u>Jessie Brownlee, Jennifer Anderson</u>			Team No.: <u>W85</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>739.3</u>	
Latitude: <u>61° 23.4908</u>		Longitude: <u>150° 46.6666</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>1</u>	Picture No.: <u>1 thru 4, N, SW</u>	

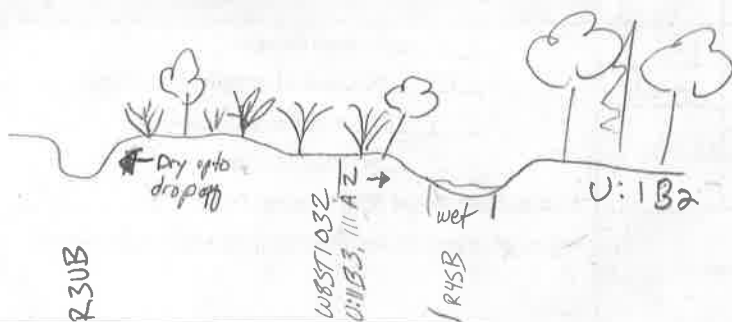
SITE PARAMETERS	
Subregion: <u>South Central</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>U: 1C2</u>	Evidence of Wildlife Use: <u>NO</u>
Are climatic/hydrologic 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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>11 B 2, 111 A 2</u>

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

Plot sits between to streams. The R3UB sits a good 10' feet below the elevation of ^{old terrace that} this plot is on. Plot is more influenced by wet R45B ~20' to the east that should be pulled out in mapping.

Veg is a Alder woodland with thick Fern cover.

Soil is marginal + shows signs of a water table ~16-25" at some point in spring
But not an wetland



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus fruticosa</i>		15%	Y	FAC
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>Viburnum edule</i>		2%		FACU
2. <i>Rubus idaeus</i>		6%	Y	FACU
3. <i>Ribes triste</i>		3%	Y	FAC
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 5 X 2 = 10
 FAC species: 53 X 3 = 159
 FACU species: 73 X 4 = 292
 UPL species: _____ X 5 = _____
 Column Totals: 131 (A) 461 (B)
 PI = B/A = 3.5

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Athyrium cyclosorum</i>		25%	Y	FAC
2. <i>Dryopteris expansa</i>		46%	Y	FACU
3. <i>Urtica dioica</i>		15%		FACU
4. <i>Heracleum maximum</i>		5%		FACU
5. <i>Trientalis europaea</i>		2%		FACU
6. <i>Equisetum pratense</i>		5%		FACU
7. <i>Gymnocarpium dryopteris</i>		2%		FACU
8. <i>Galium boreale</i>		1%		FACU
9. <i>Calamagrostis canadensis</i>		10%		FAC
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.

% 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):

WETLAND DETERMINATION DATA FORM

7.3.15

W85T1032

45 413

Y

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					
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	Notes
0-3								Dry organic S
3-7	10YR 3/2						Silt Loam	Part of organics
7-16	10YR 3/3	65	7.5YR 4/6	5	C	RC+M	Silt Loam	Layers of organic S; Depletions 10YR 4/1-2% RC
16-18	7.5YR 4/3	38	2.5Y 5/1	2	D	RC	Loamy Sand	
18-25	2.5Y 4/1	100	5YR 5/6	60	C		very fine sand/loam	Buried organics; Positive OX @ 100%
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) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) ⁴ <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>N</u>		
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>N</u> Depth (inches): <u> </u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: Soil damp but not saturated. water table fluctuates in the 16-25" range for long enough periods in spring to deplete matrix and create a band of concentrations above it. Positive OX in Bg but too deep in profile to use as an indicator								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)					SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>N</u>		Surface Soil Cracks (B6) <u>N</u>		Water-stained Leaves (B9) <u>N</u>		Stunted or Stressed Plants (D1) <u>N</u>		
High Water Table (A2) <u>N</u>		Inundation Visible on Aerial Imagery (B7) <u>N</u>		Drainage Patterns (B10) <u>N</u>		Geomorphic Position (D2) <u>N</u>		
Saturation (A3) <u>N</u>		Sparsely Vegetated Concave Surface (B8) <u>N</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>N</u>		
Water Marks (B1) <u>N</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>N</u>		Microtopographic Relief (D4) <u>N</u>		
Sediment Deposits (B2) <u>N</u>		Hydrogen Sulfide Odor (C1) <u>N</u>		Salt Deposits (C5) <u>N</u>		FAC-Neutral Test (D5) <u>N</u>		
Drift Deposits (B3) <u>N</u>		Dry-Season Water Table (C2) <u>N</u>		Notes:				
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
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): (includes capillary fringe) <u>N</u>		Depth (in):		EC: <u> </u>				
Notes: water table fluctuates from 16-25 most years in spring run off But no sign of hydrology.								

AQUATIC SITE ASSESSMENT 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 _____ 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 surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic 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:

Jessie Brownlee

C. J. Brownlee 7/15/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1032⁴⁵⁴⁶ Field Target: 15041 Date: 7.3.15

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  7/3/15
Signature / Date

X Jessie Brownlee
Field Crew Chief (print)

X  7.3.15
Signature / Date

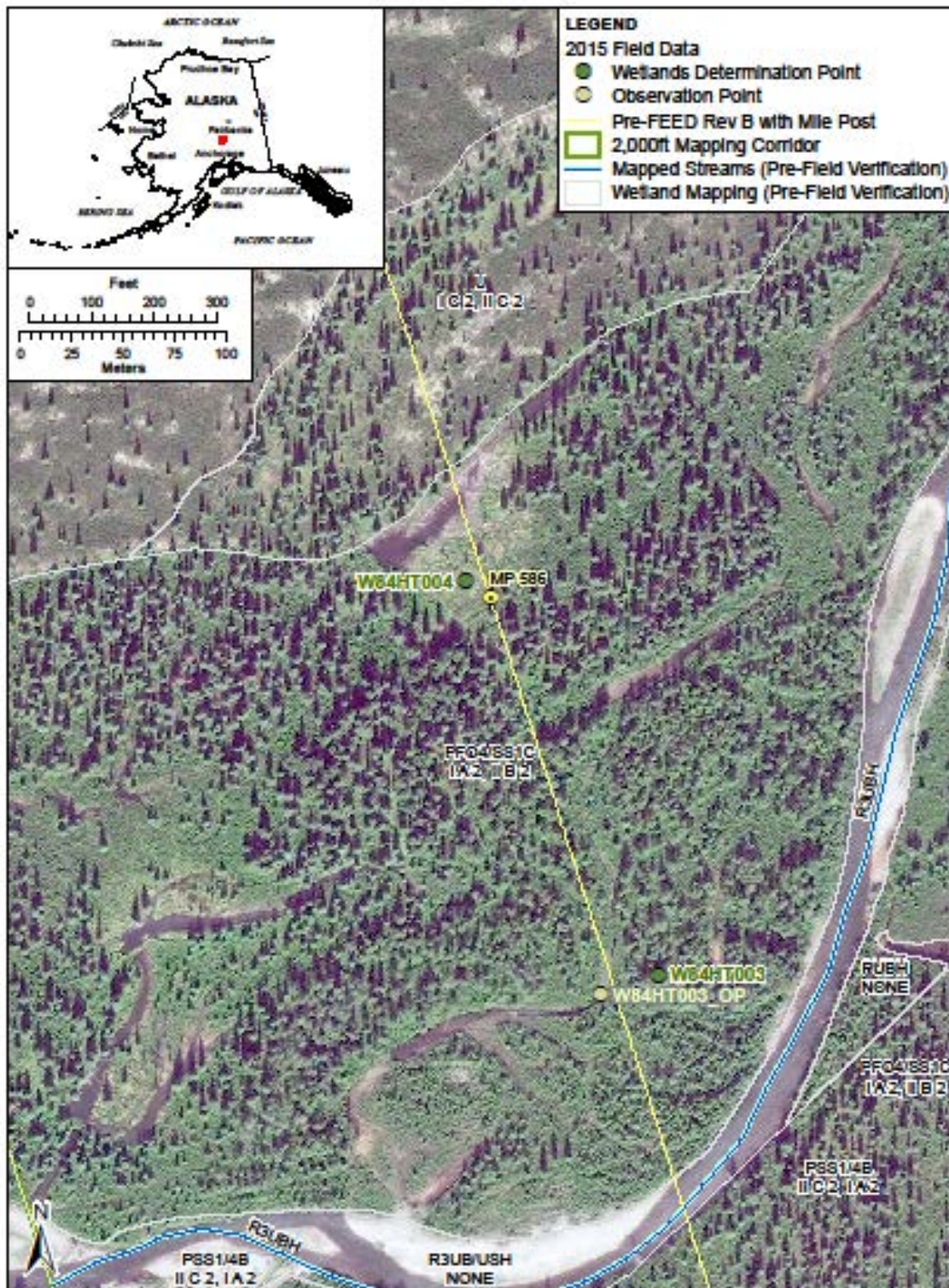
	2015 WETLAND FIELD STUDY REPORT	USAI-P1-SRZZZ-00-000002-000 DECEMBER 17, 2015 REVISION: 0

APPENDIX D – EXAMPLES OF EXTRAPOLATING FIELD DATA TO ADJACENT MAPPING

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In the following example, three field reference data points (W84HT003, W84HT003_OP, W84HT004) collected on a terrace of the Middle Fork Chulitna River (MP 586) assisted in map revisions in the immediate area. Initially mapped conservatively as an assemblage of forested and scrub-shrub riverine wetland communities, field data established photographic signatures and landscape positions associated with wetlands and non-wetlands on the terrace. Notated field maps and field notes informed the mapper's understanding of the landscape and vegetation classifications of the areas surrounding the field reference data points and calibrated the mapper's eyes to these photo signatures in context with LiDAR contour data. The two map views (below) are followed by field site photos of the area (Figures D-3 to D-7).

Figure D-1. Initial Project Mapping near Mile Post 586 of the Rev B Study Area Corridor



[illegible]


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Figure D-3. W84HT003 Vegetation - Upland, White Spruce-Cottonwood Forest (I C 2)



Photo by Jennifer Anderson

Figure D-4. W84HT003 WDF Soil Pit – Well Drained Gravelly Alluvium



Photo by Jennifer Anderson


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Figure D-5. W84HT003_OP – PUB/USF Pond on a Low River Terrace



Photo by Jennifer Anderson

Figure D-6. W84HT004 – PSS1/EM1Cb Tall Open Willow/ Emergent Herbaceous



Photo by Jennifer Anderson


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Figure D-7. W84HT004 – Soil Plug - A14 Alaska Redox



Photo by Jennifer Anderson

A second example demonstrating the application of extrapolated field data (MP 220) shows two data points (W84AY009, W84AY009_OP) establishing a repeating pattern of subtle concave swales supporting hydric soils and wetland hydrology separated by slightly convex landscape features (interfluvies) hosting non-wetland communities. Previously mapped as a continuous wetland, field data established the subtle landscape pattern that mappers were able to extrapolate to the surrounding area. A slight but noticeable difference in the size and density of white spruce and a coincident shift in tone and texture in the aerial imagery correspond to the muted topographical features that differentiate the two soil drainage classes of each swale and interfluvie in the vicinity of the field data. The two map views (below) are followed by field site photos of the area (Figures D-10 to D-13).

[illegible]

[illegible]