

ALASKA LNG PROJECT	DOCKET No. CP17-____-000 RESOURCE REPORT No. 2 APPENDIX G PART 18 OF 19	Doc No: USAKE-PT-SRREG-00- 000006-000 APRIL 14, 2017 REVISION: 0
	PUBLIC	

Part 18 of 19 of Appendix G of Resource Report No. 2

AQUATIC SITE ASSESSMENT DATA FORM

W106AY009

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:

J. Brumby

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A1039

Field Target: ^{New}Coldfoot # 2

Date: 7-17-16

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

X

Wetland Scientist (print)

X

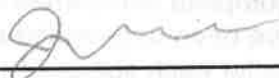
Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

 7.17.16

Signature / Date

WETLAND DETERMINATION DATA FORM

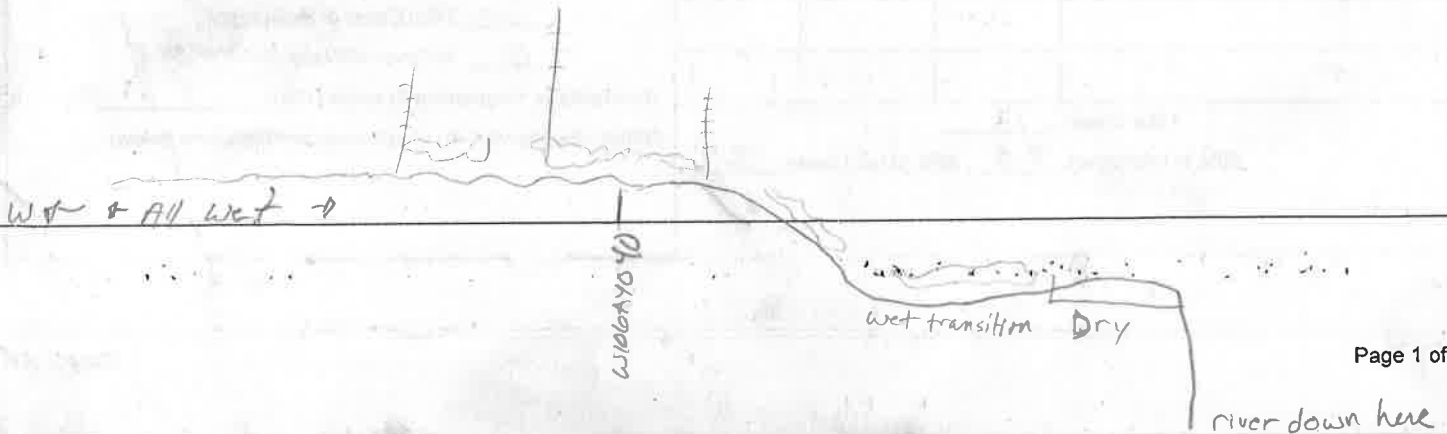
New FT Coldfoot 1

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target: <input checked="" type="checkbox"/>
Date: 7/18/19	Project Name: Alaska LNG	Feature Id: W106AY040	
Investigators: Jessie Brownlee	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 282	
Latitude: 66.7734095	Longitude: 150.657762	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 37	Picture No.: W106AY040-001 to -004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): River terrace / Bluff
Slope (%): 3-5	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: NA not mapped	Evidence of Wildlife Use: NONE
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: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 11C2, 111A2

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

Previously burned Picmar woodland. Now shrub & Emergent regen with RhoTom & Car Big Dominating. Many Burned standing snags around Area borders a vast wetland and is situated between it & a dry Bluff over a river. This area is wet with water ~ 18' away from center of plot (just outside of 26' plot size) and transitions slowly to being dry right @ Bluff



WETLAND DETERMINATION DATA FORM

W106A4040

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> Snags (dead) → 10*			—
2. <i>Betula neobaskana</i>	T		FACU
3.			
4.			
Total Cover: <u>10</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendrum tomentosum</i>	45	Y	FAC
2. <i>Betula piana</i>	5		FAC
3. <i>Vaccinium uliginosum</i>	5		FAC
4. <i>Betula neobaskana</i> 3'-5'	6		FACU
5. <i>Vaccinium vitis-idaea</i>	8		FAC
6. <i>Spiraea stevenii</i>	3		FACU
7. <i>Picea mariana</i>	T		FACU
8. <i>Picea glauca</i>	T		FACU
9.			
Total Cover: <u>72</u> 50% of total cover: <u>36</u> 20% of total cover: <u>14.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 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: — X 1 = —
 FACW species: 7 X 2 = 14
 FAC species: 73 X 3 = 219
 FACU species: 9 X 4 = 35
 UPL species: — X 5 = —
 Column Totals: 89 (A) 2108 (B)
 PI = B/A = 3.01

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Chamaenerion angustifolium</i>	T		FACU
2. <i>Carex bigelowii</i>	10	Y	FAC
3. <i>Grass sp</i>	T		—
4. <i>Rubus chamaemorus</i>	5	Y	FACW
5. <i>Eriophorum vaginatum</i>	2		FACW
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>17</u> 50% of total cover: <u>8.5</u> 20% of total cover: <u>3.4</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.

_____ % Bare Ground *Chert moss ~ 7*
 _____ % Cover of Wetland Bryophytes
 _____ % Total Cover of Bryophytes
 _____ % Cover of Water *Some oiledge*
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W106A4040

7.18.14

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								Dry organics charcoal
2-4	10YR 2/2	100					Loam	Low/high organics & charcoal
4-10	2.5Y 4/1	85	7.5YR 3/4	10	con	M RC	Silt loam	Saturated & seeping
			7.5YR 4/4	5	con	M RC		
10-24	2.5Y 4/1	88	10YR 4/4	10	com	M	silt loam w/	Dry throughout
			5YR 3/2	2	con	M	pockets of sandier material	
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>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>✓</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: Positive <u>XX</u> throughout Bg								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)					SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>N</u> See note		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>✓</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>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>on Edge</u>		Depth (in): <u>-</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>✓</u>		Depth (in): <u>-</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>4</u>		EC: <u>-</u>				
Notes: Seepage from 6-12" Water just outside of plot by 3' but not in plot to the West								

AQUATIC SITE ASSESSMENT DATA FORM

WIDGAYO 40

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) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>90</u> Dwarf shrub (<0.5m) <u>10</u> Tall herb (≥1m) _____ Short herb (<1m) <u>40</u> Moss-Lichen <u>10</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 <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.) _____ 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%) _____ High Gradient (≥2%) <u>X</u>
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A7040

Field Target: ^{New}Coldfoot 41

Date: 7.18.19

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?

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

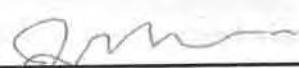
X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date



7-18-19

WETLAND DETERMINATION DATA FORM

→ New FT Coldfoot 4

SITE DESCRIPTION				
Survey Type: Centerline		Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target:
Date: 7.18.16	Project Name: Alaska LNG		Feature Id: W106A4041	
Investigators: Jessie Brownlee			Team No.: W106	
State: Alaska	Region: Alaska	Milepost: 291		
Latitude: 66.659		Longitude: 150.1004	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 37	Picture No.: P-W106A4041-001 thru 004		

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): slight swale
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: NA, Not Mapped	Evidence of Wildlife Use: unknown scott wolf? Bear?
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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): 11A 2.11 C 2

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 w/ majority of trees being < 20' tall. Low diversity shrub + herb communities. Thick moss abounds w/ majority of it being sphagnum.
Soil is 11" of organics (moss) unsaturated but damp. Seasonal frost from 15-18 which was easy to break through. Soil is saturated from 18" down due to a slow seep @ 18".
Wetland to the East tapers out here. This area is transitional w/ the upland boundary about 50' to west.



WETLAND DETERMINATION DATA FORM

W106A4041

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>10x2</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	10	Y	FACW
2.			
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
2. <i>Vaccinium uliginosum</i>	14		FAC
3. <i>Rhododendron laurentinum</i>	15	Y	FAC
4. <i>Betula nana</i>	2		FAC
5. <i>Spiraea stevenii</i>	1		FACW
6. <i>Picea mariana</i>	20	Y	FACW
7. <i>Salix pulchra</i>	2		FACW
8. <i>Salix bebbiana</i>	1		FAC
9.			

Total Cover: 74

50% of total cover: 37 20% of total cover: 14.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: _____ X 1 = _____

FACW species: 40 X 2 = 80

FAC species: 62 X 3 = 186

FACU species: 1 X 4 = 4

UPL species: _____ X 5 = _____

Column Totals: 103 (A) 270 (B)

PI = B/A = 2.62

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	13		FAC
2. <i>Petasites frigidus</i>	13		FACW
3. <i>Colanagrostis lapponica</i>	2		FAC
4. <i>Carex bigelowii</i>	6	Y	FAC
5. <i>Rubus chamaemorus</i>	1		FACW
6. <i>Eriophorum vaginatum</i>	4	Y	FACW
7.			
8.			
9.			
10.			

Total Cover: 19

50% of total cover: 9.5 20% of total cover: 3.8

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.

0 % Bare Ground

55 % 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

W106AY041

71816

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	
O _i 0-5							Dry Feathermoss
O _e 5-11	10YR 3/1	60					Damp organics
	10YR 2/1	40					Pockets of mucky material
A 11-15	10YR 2/1	100					
AD _o F 15-18	10YR 2/2	95	10YR 5/3	5	con	m	Ice lenses & charcoal
R _u 18-26	10YR 2/2	95	10YR 4/4	5	con	m	Saturated
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>M</u>		Alaska Redox (A14) <u>N</u>		Alaska Alpine Swales (TA5) <u>N</u>			
Black Histic (A3) <u>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) <u>AID</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>Seasonal Frost</u> Depth (inches): <u>15</u>							
Hydric Soil Present (Y/N): <u>Yes</u>							
Notes: <u>Neg XX Throughout</u> <u>Pockets of Mucky material in O_e horizon (A10)</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>M</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>X</u> Y	
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>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>N</u> X <u>Y</u> Depth (in): <u>18</u>							
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe) Depth (in): <u>13 & 18</u>				EC: <u>—</u>			
Notes: <u>Seeping @ 18" below the 3" seasonal Frost. It is a slow seep but I believe it would fill to this level if given several hours, calling it a water table.</u>							

AQUATIC SITE ASSESSMENT DATA FORM

W106A-Y041

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>10</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>40</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>20</u> Moss-Lichen <u>10</u> 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 <u>N/A</u>		
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.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) <input checked="" type="checkbox"/>	
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 <input checked="" type="checkbox"/> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J. Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A Y041

Field Target: ^{New}Coldfoot 4

Date: 7.18.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Browlee

Field Crew Chief (print)

X

 7.18.16

Signature / Date

WETLAND DETERMINATION DATA FORM

New FT Yukon 14

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target: <input checked="" type="checkbox"/>
Date: 7.18.16	Project Name: Alaska LNG	Feature Id: W106AY042	Map #: 5 Map Date: 7.15.16
Investigators: Jessie Brownlee			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 324.5	
Latitude: 66.2461556	Longitude: -150.2778575	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 37	Picture No.: P-W106AY042-001-004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 5-8	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification: NA Not mapped	Evidence of Wildlife Use: Bear 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: PSS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 11B2

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

Open alder & willow tall shrub community. Site has much sediment deposits that are unvegetated. Vegetation is showing preferential growth to higher drier ground. Site is Episaturated w/water pouring in from 3" between the organics & mineral soil. Mineral soil was initially dry. The larger wetland as a whole is a seep/spring wetland w/ silt deposited plumes throughout larger area. Spring expresses with Active Flow channeling just to the S.W. of this Plot. channel flows to the East.

WETLAND DETERMINATION DATA FORM

W106AY042

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>4</u>		FACW
2. <u>Add to Shrub</u>			
3. <u>layer</u>			
4.			

Total Cover: —

50% of total cover: — 20% of total cover: —

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	<u>10</u>		FACW
2. <i>Alnus frumosa</i>	<u>35</u>	<u>Y</u>	FAC
3. <i>Spiraea stevensii</i>	<u>12</u>	<u>Y</u>	FACW
4. <i>Vaccinium uliginosum</i>	<u>2</u>		FAC
5. <i>Rhododendrum groenlandicum</i>	<u>6</u>		FAC
6. <i>Vaccinium vitis-idaea</i>	<u>2</u>		FAC
7. <i>Betula glandulosa</i>	<u>3</u>		FAC
8. <i>Empetrum nigrum</i>	<u>4</u>		FAC
9. <i>Picea mariana</i>	<u>3</u>		FACW

Total Cover: 86

50% of total cover: 43 20% of total cover: 17.2

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: — X 1 = —

FACW species: 18 X 2 = 36

FAC species: 64 X 3 = 192

FACU species: 13 X 4 = 52

UPL species: — X 5 = —

Column Totals: 95 (A) 280 (B)

PI = B/A = 2.94

Salix bebbiana 5 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	<u>7</u>	<u>Y</u>	FAC
2. <i>Chamaenerion angustifolium</i>	<u>7</u>		FACW
3. <i>Pyrola</i> sp ⁰	<u>7</u>		—
4. <i>Rubus chamaemorus</i>	<u>1</u>		FACW
5. <i>Sparganium angustifolium</i>	<u>1</u>		FACU
6. <i>Carex</i> sp	<u>7</u>		—
7.			
8.			
9.			
10.			

Total Cover: 9

50% of total cover: 4.5 20% of total cover: 1.8

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.

25 % Bare Ground

15 % Cover of Wetland Bryophytes

30 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

W106A4042

7-18-16

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
0-1.5	-						Saturated organics
1.5-3	-						mucky-greasy Saturated organics
A 3-4.5	10YR 3/1	95	7.5YR 3/4	5	con	PL	very gravelly silt loam
Bw1 4.5-9	10YR 3/2	87	7.5YR 3/4	10	con	M	very gravelly silt loam
			2.5Y 7/1	3	Dep	M	
Bw2 9-20	2.5Y 3/2	92	7.5YR 3/4	8	con	M RL	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>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>Yes</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: Positive <u>XX</u> through Bw1. Soil is episaturated w/ seep coming in from organics & Mineral. Muck material (A10) & <u>XX</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>Y</u>		Stunted or Stressed Plants (D1) <u>N</u>	
High Water Table (A2) <u>N (See note)</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>Y</u>		Sparsely Vegetated Concave Surface (B8) <u>Y</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>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>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>- outside of Plot (Y)</u>		Wetland Hydrology Present (Y/N): <u>Y</u>			
Water Table Present (Y/N): <u>N</u>		Depth (in): <u>- see note</u>					
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>0</u>		EC: <u>150</u> S.22			
Notes: Not calling watertable B/c soil is Epi sat w/ water pouring in from 3" @ Oa/A							

AQUATIC SITE ASSESSMENT DATA FORM

W10611042

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, >8m tall) <u>4</u> Sapling (<5 dbh, <6m tall) <u>3</u> Tall shrub (2-6m) <u>33</u> Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) _____ Tall herb (>1m) _____ Short herb (<1m) <u>20</u> Moss-Lichen <u>20</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) <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 _____ Sediment Observed on Wetland Substrate <u>X</u> Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.22</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 _____ 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) _____	

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A7042 Field Target: ^{new} Yukon #11 Date: 7.18.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date



7.18.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 198	Map #: 105 Map Date: 5.27
Date: 6-3-16	Project Name: Alaska LNG		Feature Id: W106HTool
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 658.6	
Latitude: 62°24' 6.65" N	Longitude: 150°15' 48.87" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 29	Picture No.: P-W106HTool-001 thru -004	

SITE PARAMETERS	
Subregion: Cook Inlet Lowland Basin	Landform (hillslope, terrace, hummocks, etc.): Slight Swale
Slope (%): 0-3	Local relief (concave, convex, none): \uparrow slightly concave \downarrow slightly convex
Pre-mapped Alaska LNG/NWI classification: PSS1/FOIB 1C2, 11C2	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: PFO1/SS1B
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.

Open mixed forest of Betula & Picea glauca with thick patches of Alder.
 Forb community dominated by ferns & Cal can.
 Dug 2 additional dips in plot w/ positive $\Delta\Delta$ reaction w/in mineral surface
 & water table ~ 6". Microtopography drives wet/dry call in this slight swaling feature between to uplands running N/S

N \rightarrow S

W \rightarrow E

WETLAND DETERMINATION DATA FORM

W106HT001

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neolascana</i>	35	Y	FAC
2.	<i>Picea Canadensis</i>	8		FACU
3.				
4.				
Total Cover: <u>43</u>				
50% of total cover: <u>21.5</u>		20% of total cover: <u>8.6</u>		
Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Vaccinium ovalifolium</i>	2		FAC
2.	<i>Ribes fruticosum</i>	1		FAC
3.	<i>Alnus tenuifolia</i>	20 25	Y	FAC
4.	<i>Rosa acicularis</i>	T		FACU
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>23</u>				
50% of total cover: <u>11.5</u>		20% of total cover: <u>4.6</u>		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 148 X 3 = 444

FACU species: 9 X 4 = 36

UPL species: 0 X 5 = 0

Column Totals: 157 (A) 480 (B)

PI = B/A = 3.06

Alnus is prevalent but mostly outside at Plot size 35-40% in general area

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Equisetum sylvaticum</i>	15		FAC
2.	<i>Streptopus amplexifolium</i>	T		FACU
3.	<i>Calamagrostis canadensis</i>	35	Y	FAC
4.	<i>Dryopteris expansa</i>	40	Y	FAC
5.	<i>Trientalis Europaea</i>	1		FACU
6.				
7.				
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:

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.

6 % Bare Ground

20 % Cover of Wetland Bryophytes

30 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

W106H7001

6.3.16

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
0-3.5								Damp
3.5-8	Black							Marginal Mucky organics Damp
8-9	10YR 2/2	100					mucky loam	
9-17	10YR 3/2	100					silt loam	
17-24	10YR 6/4	85	7.5YR 5/6	10	con	m	VF sandy loam	
			2.5Y 7/2	5	Dep	m		
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>M</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>See notes</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): _____								
Hydric Soil Present (Y/N): <u>Y</u> <i>↳ Negative XX @ this specific spot but positive reaction in 2 other test pits in 26' plot size</i>								
Notes: <i>Mucky organic material in the 3.5-8" range. Organics not saturated but definitely very moist. ↳ having a hard time teasing out true mucky texture from Andic soil properties.</i>								
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>Y</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>Y</u>		Oxidized Rhizospheres along Living Roots (C3) <u>Y</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>See Notes on Front Page</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>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>12</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>10</u>						
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W1064T001

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>45</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>30</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>25</u> Moss-Lichen <u>0</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 <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 _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ 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 _____ 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:

J. Brane

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106H T001

Field Target: 198

Date: 6-3-16

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

X

Wetland Scientist (print)

Naley Volper

X

Signature / Date

Naley Volper 6-6-16

X

Field Crew Chief (print)

J. Brownlee

X

Signature / Date

Jessie Brownlee 6.3.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 199	Map #: 104 Map Date: 5-27
Date: 6-3-16	Project Name: Alaska LNG		Feature Id: W106HT002
Investigators: Jessie Brownlee, Kaley Kolper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 657.6	
Latitude: 62.24'56.42"		Longitude: -150.15'28.65"	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 29	Picture No.: P-W106HT002-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U: 1C2, 11C2	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 (Vioreck): 1C2, 11B2

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

open to woodland Mixed Forest w/ Bet Neo & Pic Cola w/ Alder, Devils club and Vib Edu shrub understory - Walk in from parking lot was all dry. Target moved from exact spot which was a 100% Alder, Devil Clubs thicket which was also dry



WETLAND DETERMINATION DATA FORM

W106HT002

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula nealastana</i> ~65'	25	Y	FAC
2.	<i>Picea canadica</i> ~70'	10	Y	FACU
3.				
4.				
Total Cover: <u>35</u>		50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>		
Sapling/Shrub Stratum (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Oplopanax horridus</i>	15	Y	FACU
2.	<i>Ribes triste</i>	3		FAC
3.	<i>Viburnum edule</i>	8		FACU
4.	<i>Rubus idaeus</i>	4		FACU
5.	<i>Rosa acicularis</i>	2		FACU
6.	<i>Alnus tenuifolia</i>	10	Y	FAC
7.	MT Ash <i>Sorbus scopulina</i>	T		FACU
8.				
9.				
Total Cover: <u>42</u>		50% of total cover: <u>21</u> 20% of total cover: <u>8.4</u>		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: _____ X 2 = _____

FAC species: 82 X 3 = 246

FACU species: 71 X 4 = 284

UPL species: _____ X 5 = _____

Column Totals: 153 (A) 530 (B)

PI = B/A = 3.46

<i>Geranium erianthus</i>	T		FACU
<i>Equisetum pratense</i>	T		FACU
Forb sp	T		

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Calamagrostis canadensis</i>	35	Y	FAC
2.	<i>Equisetum sylvaticum</i>	7		FAC
3.	<i>Aceraceae maximum</i>	5		FACU
4.	<i>Streptopus amplexifolius</i>	T		FACU
5.	<i>Gymnocarpium dryopteris</i>	T		FACU
6.	<i>Chamaenerion angustifolium</i>	2		FACU
7.	<i>Galium boreale</i>	T		FACU
8.	<i>Dryopteris expansa</i>	25	Y	FACU
9.	<i>Compositae veratrum viride</i>	2		FAC
10.	<i>Mertensia paniculata</i>	T		FACU
Total Cover: <u>76</u>		50% of total cover: <u>38</u> 20% of total cover: <u>15.2</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.

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):

Alder has higher % outside of Plot

WETLAND DETERMINATION DATA FORM

W106HT002

6.3.16

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		
0i 0-2							
A 2-3	10YR 3/2	100				loam	
E 3-5	10YR 5/2	100				silt loam	
Bhs 5-9	7.5YR 3/3	35				silt loam	
	7.5YR 3/4	65					
Bw1 9-24	7.5YR 5/6	95				silt loam	
	10YR 5/3	5					

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: NO Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: All horizons wavy, discontinuous

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>—</u>	Depth (in):	Wetland Hydrology Present (Y/N): <u>N</u>
Water Table Present (Y/N): <u>—</u>	Depth (in):	
Saturation Present (Y/N): <u>—</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 _____ 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:

Jessie Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106H1002 Field Target: 199 Date: 6-3-2016

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

- ☒ NA 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 Valper X Haley Valper 6-6-16
Wetland Scientist (print) Signature / Date

X J. Brownlee X Jessie Brownlee
Field Crew Chief (print) Signature / Date

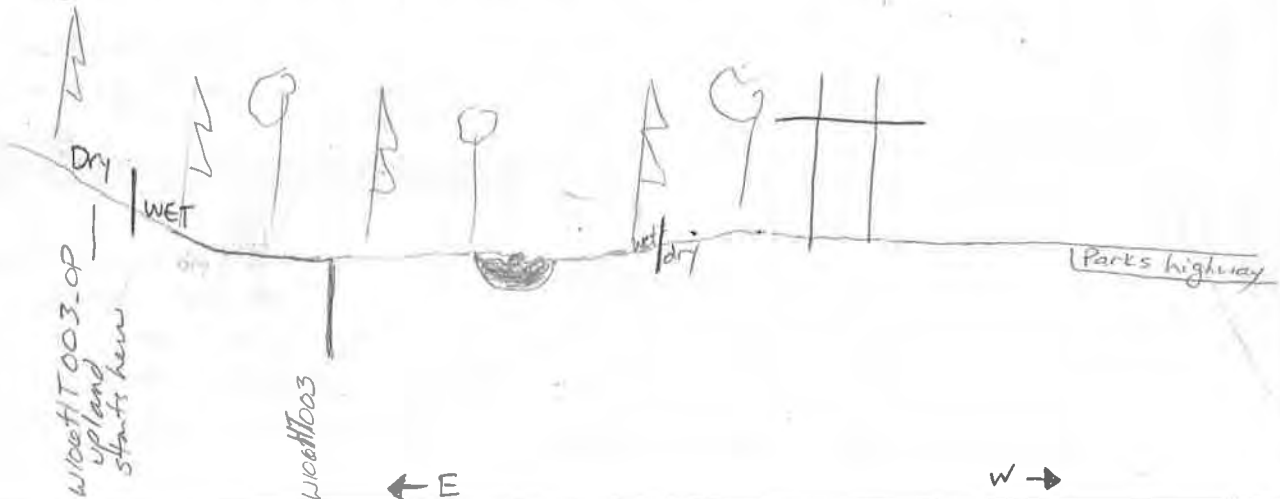
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 201	Map #: 101 Map Date: 5-27
Date: 6-4-16	Project Name: Alaska LNG		Feature Id: W106HT003
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 165.4	
Latitude: 62.445	Longitude: -150.265	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 30	Picture No.: P-W106HT003-001 thru 004	

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/F04B 1C2, 11C2	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/F04B
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.

Open mixed forest of Pic Mar & Bet Neo w/ Alder understory. Diverse veg community w/ sphagnum, Marsh five finger and few small depressions w/ standing water & no veg. To the west of plot are 2 ponds ~ 20-30' long & 10' wide. UNSURE if they are natural: too small & hidden under tree canopy to cut out.



WETLAND DETERMINATION DATA FORM

W1064T003

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>6</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>83</u> (A/B)
1. <i>Betula nivalis</i>	15	Y	FAC	
2. <i>Picea canadensis</i>	20	Y	FAC	
3. <i>Picea canadensis</i>	T		FACU	
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: <u>4</u> X 1 = <u>4</u> FACW species: <u>10</u> X 2 = <u>20</u> FAC species: <u>93</u> X 3 = <u>279</u> FACU species: <u>21</u> X 4 = <u>84</u> UPL species: _____ X 5 = _____ Column Totals: <u>128</u> (A) <u>387</u> (B) PI = B/A = <u>3.02</u> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <i>Spiraea angustifolia</i> T FACU </div>
Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Betula nivalis</i>	T		FAC	
2. <i>Spiraea angustifolia</i>	8	Y	FACU	
3. <i>Alnus tenuifolia</i>	10	Y	FAC	
4. <i>Betula nivalis</i>	13	Y	FAC	
5. <i>Salix fuscescens</i>	T		FACU	
6.				
7.				
8.				
9.				
Total Cover: <u>31</u> 50% of total cover: <u>15.5</u> 20% of total cover: <u>6.2</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Equisetum sylvaticum</i>	35	Y	FAC	
2. <i>Rubus chamaemorus</i>	10		FACU	
3. <i>Dracopis eximius</i>	10		FACU	
4. <i>Cornus canadensis</i>	2		FACU	
5. <i>Trentalis europaea</i>	1		FACU	% Bare Ground: <u>2</u> % Cover of Wetland Bryophytes: <u>50</u> Total Cover of Bryophytes: <u>0</u> % Cover of Water: <u>3</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <i>Streptopus amplexifolius</i>	T		FACU	
7. <i>Camassia palustre</i>	4		OBL	
8. <i>Equisetum pratense</i>	T		FAC	
9. <i>Viola sp</i>	T			
10. <i>Rubus arcticus</i>	T		FAC	
Total Cover: <u>62</u> 50% of total cover: <u>31</u> 20% of total cover: <u>12.4</u>				

WETLAND DETERMINATION DATA FORM

W106H7003

6-4-16

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								Saturated organics
4-16								Saturated organics
								considerable woody debris
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)		
³ One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.								
⁴ Give details of color change in Notes.								
Restrictive Layer (if present): Type: _____ Depth (inches): _____								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes:								
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>M</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>Y</u>		Depth (in): <u>3</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>10</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>2</u>						
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106 HT 003

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) 35 Sapling (<5 dbh, <6m tall) 25 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0
 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 40 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 3 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 4.27

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:

f. Brownlee

TV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1064T003 Field Target: 201 Date: 6-4-16

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

X

Wetland Scientist (print)

Naley Volper

X

Signature / Date

Naley Volper 6-6-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

Jessie Brownlee 6-4-15

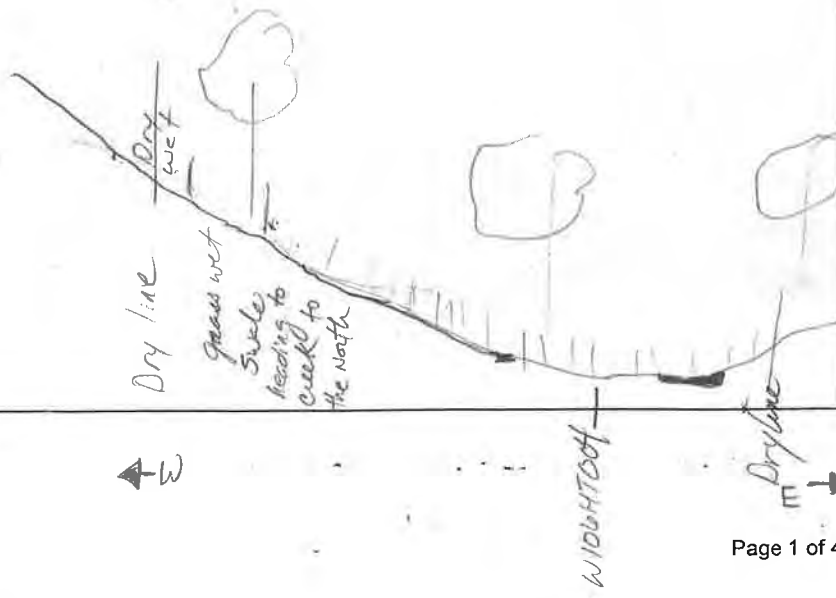
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Facility <input checked="" type="checkbox"/> Other (explain) <input type="checkbox"/>	Field Target: 200	Map #: 102	Map Date: 5.27
Date: 6-4-16	Project Name: Alaska LNG	Feature Id: W106HT004	
Investigators: Jessie Brownlee, Kaley Volper		Team No.: W106	
State: Alaska	Region: Alaska	Milepost: 656.1	
Latitude: 62° 26' 5.051"N	Longitude: 150° 15' 18.877"W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 30	Picture No.: P-W106HT004-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 0-3	Local relief (concave, convex, none): Slightly concave flat
Pre-mapped Alaska LNG/NWI classification: PFOI/EMIB	Evidence of Wildlife Use: none
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: PFOI/EMIB PEMI/FOIB
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1B3, III A2

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

Bet Neo woodland w/ Cal can & Ego sp understory. Standing water, sphagnum Com pal present. Wet to west expand fine. Eoot line good. Updated on map.
Area wetter than mapped & complex. Map updated w/ wet/dry boundaries



WETLAND DETERMINATION DATA FORM

W106HT004

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	20	Y	FAC
2. <i>Picea mariana</i>	8	Y	FACU
3.			
4.			

Total Cover: 28

50% of total cover: 14 20% of total cover: 5.6

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spiraea stevensii</i>	5	Y	FACU
2. <i>Vaccinium ovalifolium</i>	5	Y	FAC
3. <i>Mentzelia ferruginea</i>	5	Y	FAC
4. <i>Ribes</i> sp	T		-
5. <i>Linnaea borealis</i> (growing on tree)	T		FACU
6.			
7.			
8.			
9.			

Total Cover: 15

50% of total cover: 7.5 20% of total cover: 3

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 = 0

FACW species: 2 X 2 = 4

FAC species: 85 X 3 = 255

FACU species: 16 X 4 = 64

UPL species: 0 X 5 = 0

Column Totals: 103 (A) 319 (B)

PI = B/A = 3.09

Equisetum sylvaticum 10 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	15	Y	FAC
2. <i>Equisetum Arvense</i>	30	Y	FAC
3. <i>Tridentalis Europaea</i>	P		FACU
4. <i>Rubus chamaemorus</i>	2		FACW
5. <i>Rubus pedatus</i>	T		FAC
6. <i>Cornus canadensis</i>	1		FACU
7. <i>Rubus Arcticus</i>	T		FAC
8. <i>Cymodoicum dryopteris</i> (on tree)	T		FACU
9. <i>Sparganium angustifolium</i> (on tree)	T		FACU
10. <i>Comarum palustre</i>	T		OBL

Total Cover: 60

50% of total cover: 30 20% of total cover: 12

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

75 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

15 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

W106HT004

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 <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>25</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>80</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>45</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 <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 <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope <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 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>4.57</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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT004 Field Target: 200 Date: 6-4-16

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?

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

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

Wetland Scientist (print)

Naley Volper

X

Signature / Date

Naley Volper

6/6/16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

Jessie Brownlee

6.4.15

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 202	Map #: 102 Map Date: 5.27
Date: 6-4-16	Project Name: Alaska LNG		Feature Id: W106HT005
Investigators: Jessie Browner, Kelsey Valper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 656.3	
Latitude: 62° 26' 1.73"	Longitude: 150° 15' 36.41"	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 30	Picture No.: P-W106HT005-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin NW	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U: 1C2, 11C2	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 _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: Upland
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1C2, 11B2

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

open mixed Forest of Bet Neo & Pic Gla w/ Alder shrub understory
and Cal Can & Ego Forb community
Site is Dry w/ typical Andic Bs material & no sign of hydrology
Area is very complicated to map and extensive wet-dry
lines have been added to the map - refer to it
lightening & thunder started up in middle of doing plot. Data was collected speedily.

WETLAND DETERMINATION DATA FORM

W106H T005

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Neolaskana</i>	20	Y	FAC
2. <i>Picea Canadensis</i>	10	Y	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>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Sambucus racemosa</i>	4	Y	FACU
2. <i>Alnus tenuifolia</i>	10	Y	FAC
3. <i>Spiraea stevenii</i>	1		FACU
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>			

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: 4 X 2 = 8
 FAC species: 79 X 3 = 237
 FACU species: 75 X 4 = 300
 UPL species: - X 5 = -
 Column Totals: 158 (A) 545 (B)
 PI = B/A = 3.44

Streptopus amplexifolius T FACU

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Veratrum viride</i>			
2. <i>Dryopteris expansa</i>	25	Y	FACU
3. <i>Chamerion Angustifolium</i>	2		FACU
4. <i>Calamagrostis Canadensis</i>	30	Y	FAC
5. <i>Heracleum maximum</i>	2		FACU
6. <i>Cornus canadensis</i>	1		FACU
7. <i>Gymnocarpium dryopteris</i>	30	Y	FACU
8. <i>Equisetum Arvense</i>	8		FAC
9. <i>Trifolium Europaeum</i>	4		FACU
10. <i>Equisetum sylvaticum</i>	4		FAC
Total Cover: <u>113</u> 50% of total cover: <u>56.5</u> 20% of total cover: <u>22.6</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
 Didn't record in field ~30% 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

W106HT 005

6-4-16

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			
0i 0-4									
A/E 4-9	10YR 3/2						silt loam	Dry organics	
	10YR 3/2							horizon seems to be transitioning from A to E.	
Bh 59-15	7.5YR 2.5/3						silt loam		
	7.5YR 4/4								
Bw 15-24	7.5YR 5/4	97	7.5YR 3/4	3	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>-</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: All horizons wavy

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

W106H7005

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:

J. Brownlee

CV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W100HT005 Field Target: 202 Date: 6-4-16

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)?

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

☒

Wetland Scientist (print)

Katey Vopper

☒

Signature / Date

Katey Valper 6-6-16

☒

Field Crew Chief (print)

J Browne

☒

Signature / Date

Jessie Browne 6.4.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline _____ Access Road (explain) _____ Other (explain) <u>X facility</u>		Field Target: <u>203</u>	Map #: <u>100</u> Map Date: <u>5.27.16</u>
Date: <u>6-7-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106HT006</u>
Investigators: <u>Jessie Brannlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>1647.7</u>	
Latitude: <u>62° 32' 45.38"</u>		Longitude: <u>-150° 14' 48.66"</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>31</u>	Picture No.: <u>P-W106HT006-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</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>PFOI/4B</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 <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PFOI/4B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <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.

Tall open mixed forest with Alder understory. Diverse forb community. Soils saturated organics to 20+". Followed snow machine trail here. After a day of heavy rain area is very wet.



WETLAND DETERMINATION DATA FORM

W106HT006

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Neodulaskana</i>	<u>30.25</u>	<u>Y</u>	<u>FAC</u>
2. <i>Picea Canadensis</i>	<u>35</u>	<u>Y</u>	<u>FACU</u>
3. <i>Picea mariana</i>	<u>25</u>	<u>Y</u>	<u>FACW</u>
4.			

Total Cover: 55
50% of total cover: 27.5 20% of total cover: 11

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	<u>T</u>		<u>FAC</u>
2. <i>Alnus tenuifolia</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>
3. <i>Spiraea stevenii</i>	<u>15</u>	<u>Y</u>	<u>FACU</u>
4. <i>Vaccinium ovalifolium</i>	<u>2</u>		<u>FAC</u>
5. <i>Betula neoalaskana</i>	<u>5</u>		<u>FAC</u>
6. <i>Picea glauca</i>	<u>T</u>		<u>FACU</u>
7.			
8.			
9.			

Total Cover: 47
50% of total cover: 23.5 20% of total cover: 9.4

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)
60.7

Prevalence Index worksheet:

Total % Cover of: 102 Multiply by:
OBL species: 0 X 1 = 0
FACW species: 37.5 X 2 = 75
FAC species: 75 X 3 = 225
FACU species: 51 X 4 = 204
UPL species: 0 X 5 = 0
Column Totals: 163 (A) 428 (B)

PI = B/A = 2.62

<i>Vida sp</i>	<u>T</u>		

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	<u>3</u>		<u>FACU</u>
2. <i>Rubus chamaemorus</i>	<u>2</u>		<u>FACW</u>
3. <i>Dryopteris expansa</i>	<u>25</u>	<u>Y</u>	<u>FACU</u>
4. <i>Tridentalis europaea</i>	<u>1</u>		<u>FACU</u>
5. <i>Equisetum sylvaticum</i>	<u>15</u>	<u>Y</u>	<u>FAC</u>
6. <i>Sparganium angustifolium</i>	<u>2</u>		<u>FACW</u>
7. <i>Streptopus amplexifolius</i>	<u>T</u>		<u>FACU</u>
8. <i>grass</i>	<u>5</u>		<u>-</u>
9. <i>Calamagrostis lapponica</i>	<u>3</u>		<u>FAC</u>
10. <i>Equisetum pratense</i>	<u>10</u>		<u>FACW</u>

Total Cover: 66
50% of total cover: 33 20% of total cover: 13.2

Hydrophytic Vegetation Indicators:

NY 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.

0 % Bare Ground
60 % Cover of Wetland Bryophytes
70 Total Cover of Bryophytes
~3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106HT006

6.7.16

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			
Oe 0-6								Saturated organics	
Oa 6-20								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 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>			
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>Woody Debris throughout</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>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>-</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>Y</u>					
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>9</u>							
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>4</u>							
EC: <u>52</u> pH <u>5.13</u>									
Notes: <u>water seeping slowly from 9". Expect water table to rise to this level</u>									

AQUATIC SITE ASSESSMENT DATA FORM

W106417006

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>50</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>25</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>X 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 <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 <u>X</u> Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.13</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:

f. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT D06

Field Target: 203

Date: 6.7.13

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 Nancy Volper X Nancy Volper 6-10-16
Wetland Scientist (print) Signature / Date

X J Brownlee X [Signature] 6.7.16
Field Crew Chief (print) Signature / Date

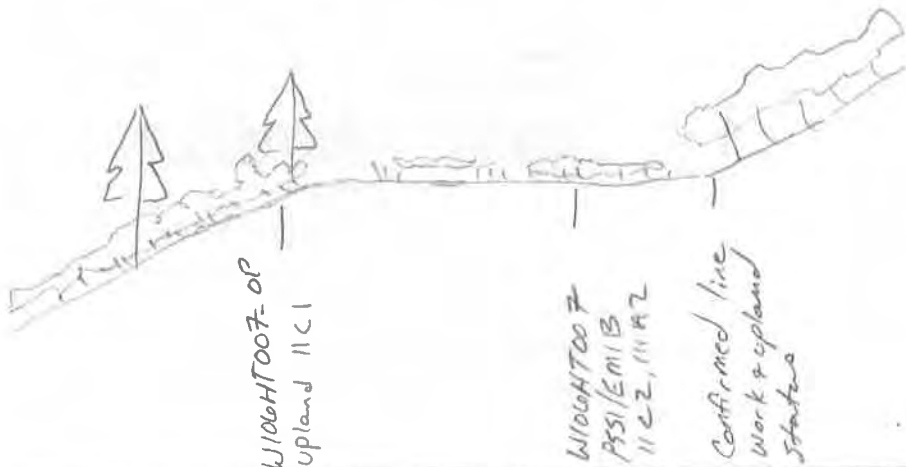
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain) <input checked="" type="checkbox"/>	Other (explain)	Field Target: 209
Date: 6-7-16	Project Name: Alaska LNG	Feature Id: W106HT007	Map #: 916 Map Date: 5.27
Investigators: Jessie Brownlee, Kaley Volper	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 604	
Latitude: 63° 00' 54.8442" N	Longitude: 149° 34' 38.648" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 32	Picture No.: P-W106HT007-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace/Bench
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	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: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Vioreck): 11 C2, 111 A 2

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

Dwarf scrub tundra dominated by emp Nig, Rho Tom and Car. Thick cover of sphagnum moss with pockets of standing water scattered about. Confirmed upland status up slope & down slope along with line work. The PSS1B to the south was a mosaic of up/wet dictated by slight micro topograph and elevation changes. Hole dug w/ water table @ 10-12" in sandy soil.



WETLAND DETERMINATION DATA FORM



W106HT007

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>Betula nana</i>	15		FAC
2. <i>Vaccinium uliginosum</i>	8		FAC
3. <i>Rhododendrum tomentosum</i>	25	Y	FACW
4. <i>Empetrum nigrum</i>	40	Y	FAC
5. <i>Andromeda polifolia</i>	5		FACW
6. <i>Vaccinium vitis-idaea</i>	81		FAC
7. <i>Picea Mariana</i>	3		FACW
8. <i>Vaccinium oxycoccus</i>	T		OBL
9.			

Total Cover: 97

50% of total cover: 48.5 20% of total cover: 19.4

Dominance Test worksheet:

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: — X 1 = —

FACW species: 35 X 2 = 70

FAC species: 84 X 3 = 252

FACU species: — X 4 = —

UPL species: — X 5 = —

Column Totals: 119 (A) 322 (B)

PI = B/A = 2.70

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	2		FACW
2. <i>Carex Bigelowii</i>	20	Y	FAC
3. <i>Drosera rotundifolia</i>	T		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 22

50% of total cover: 11 20% of total cover: 4.4

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.

0 % Bare Ground

50 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

8 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

W106HT007

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106HT007

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) <input type="radio"/> Sapling (<5 dbh, <6m tall) <input type="radio"/> Tall shrub (2-6m) <input type="radio"/> Short shrub (0.5-2m) <input type="radio"/> Dwarf shrub (<0.5m) <input checked="" type="radio"/> Tall herb (≥1m) <input type="radio"/> Short herb (<1m) <input type="radio"/> Moss-Lichen <input type="radio"/> Floating <input type="radio"/> Submerged <input type="radio"/>		
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%) <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 <input checked="" type="checkbox"/> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric <input checked="" type="checkbox"/> 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 _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>4.6</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%) _____ 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.) _____ 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:

J. Browne

XV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT007 Field Target: 209 Date: 6.7.16

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

X Nancy Valper
Wetland Scientist (print)

X Nancy Valper 6-10-16
Signature / Date

X J. Brownlee
Field Crew Chief (print)

X J. Brownlee 6.7.16
Signature / Date

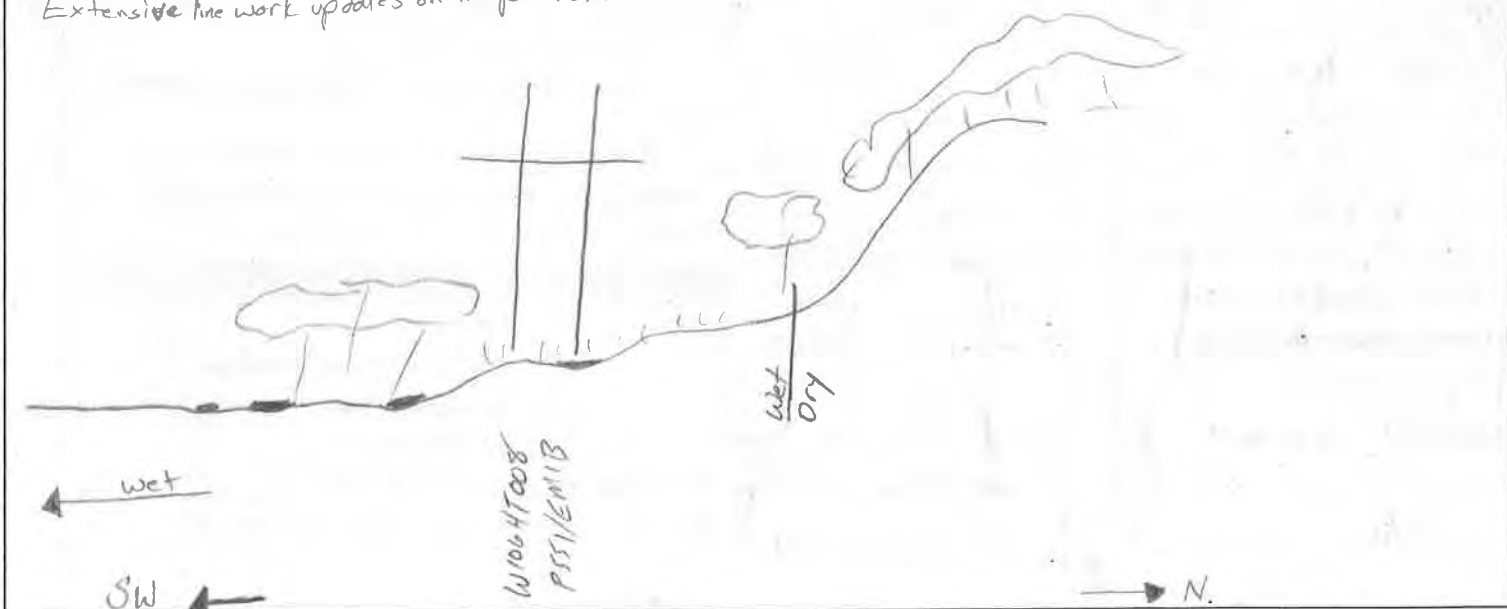
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <u>208</u>	Map #: <u>97</u> Map Date: <u>5-27</u>
Date: <u>6-8-11</u>	Project Name: Alaska LNG		Feature Id: <u>W106HT008</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>603.4</u>	
Latitude: <u>63° 00' 46.8278" N</u>	Longitude: <u>149° 33' 28.748"</u>	Datum: WGS84	
Logbook No.: <u>1</u>	Logbook Page No.: <u>33</u>	Picture No.: <u>P-W106HT008-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace Bench</u>
Slope (%): <u>10</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</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 <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: <u>PSS1/EM1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>11B2, 111A2</u>

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

Swaling Feature seeping out of elevation gain/slope and expressing from here down slope out of corridor. Pockets of standing water @ site & increase down slope
Extensive line work updates on map from CZ to here.



WETLAND DETERMINATION DATA FORM

W106H1008

VEGETATION (use scientific names of plants)				Dominance Test worksheet:	
<u>Tree Stratum</u> (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.					Total Number of Dominant Species Across All Strata: <u>4</u> (B)
2.					% Dominant Species that are OBL, FACW, or FAC: <u>75</u> (A/B)
3.					
4.					
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____					Prevalence Index worksheet:
<u>Sapling/Shrub Stratum</u> (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Total % Cover of: _____ Multiply by: _____
1.	<i>Spiraea stevenii</i>	<u>20</u>	<u>Y</u>	<u>FACU</u>	OBL species: <u>-</u> X 1 = <u>-</u>
2.	<i>Salix pulchra</i>	<u>8</u>		<u>FACW</u>	FACW species: <u>14</u> X 2 = <u>28</u>
3.	<i>Alnus Fruticosa</i>	<u>15.20</u>	<u>Y</u>	<u>FAC</u>	FAC species: <u>66</u> X 3 = <u>198</u>
4.	<i>Salix fuscescens</i>	<u>3</u>		<u>FACW</u>	FACU species: <u>31</u> X 4 = <u>124</u>
5.	<i>Betula nana</i>	<u>T</u>		<u>FAC</u>	UPL species: <u>-</u> X 5 = <u>-</u>
6.					Column Totals: <u>111</u> (A) <u>350</u> (B)
7.					PI = B/A = <u>3.15</u>
8.					<i>Rubus chamaemorus</i> <u>T</u> <u>FACW</u>
9.					<i>Rubus arcticus</i> <u>T</u>
Total Cover: <u>51</u> 50% of total cover: <u>25.5</u> 20% of total cover: <u>10.2</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
<u>Herb Stratum</u> (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<u>Y</u> Dominance Test is > 50%
1.	<i>Streptopus amplexifolius</i>	<u>1</u>		<u>FACU</u>	<u>N</u> Prevalence Index is ≤ 3.0
2.	<i>Veratrum viride</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>	<u>-</u> Morphological Adaptations ¹ (Provide supporting data in Notes)
3.	<i>Viola palustris</i>	<u>3</u>		<u>FACW</u>	<u>-</u> Problematic Hydrophytic Vegetation ¹ (Explain)
4.	<i>Carex bigelowii</i>	<u>18</u>	<u>Y</u>	<u>FAC</u>	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
5.	<i>Chamerion angustifolium</i>	<u>2</u>		<u>FACU</u>	
6.	<i>Dryopteris expansa</i>	<u>5</u>		<u>FACU</u>	
7.	<i>Gymnocarpium dryopteris</i>	<u>5</u>		<u>FACU</u>	
8.	<i>Sanguisacha canadensis</i>	<u>T</u>		<u>FACW</u>	
9.	<i>Calamagrostis lapponica</i>	<u>8</u>		<u>FAC</u>	
10.	<i>Equisetum sylvaticum</i>	<u>T</u>		<u>FAC</u>	
Total Cover: <u>62</u> 50% of total cover: <u>31</u> 20% of total cover: <u>12.4</u>					<u>0</u> % Bare Ground <u>5</u> % Cover of Wetland Bryophytes <u>30</u> Total Cover of Bryophytes <u>8</u> % Cover of Water Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W106HT008

6-8-16

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
5-6								
6-9								Saturated organics
9-18	10YR 3/2	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>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>NO</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes:								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)						SECONDARY INDICATORS (2 or more required)		
Surface Water (A1) <u>X Yes</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>X 100</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>—</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>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:				
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>6</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): (includes capillary fringe) <u>Y</u>		Depth (in): <u>Ø</u>		EC: <u>16</u>				
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106 HT 008

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>30</u> Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>10</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>40</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u> Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____		
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <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) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope <u>X</u> Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ 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.) _____ 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>5.02</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 _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) <u>X</u> 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 of Wetland (M): Small (<10 acres) _____ Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106H T008 Field Target: 208 Date: 6-8-16

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)?

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

X

Kaleny Volper

Wetland Scientist (print)

X

Kaleny Volper

Signature / Date


6-8-16

X

JBrownlee

Field Crew Chief (print)

X



Signature / Date

6.12.16

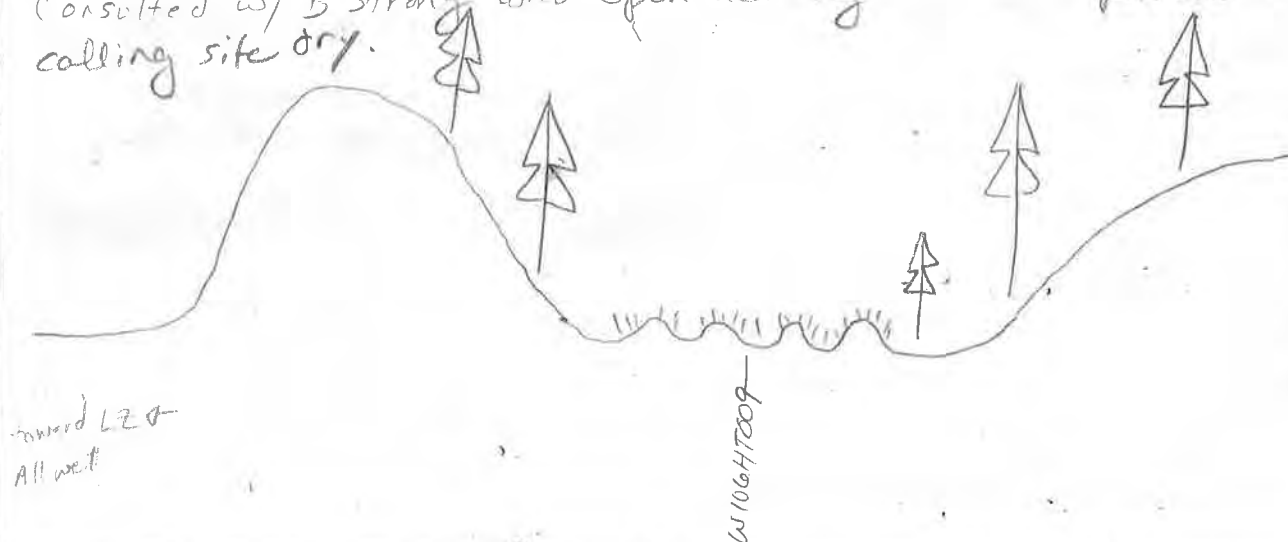
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>20</u>	Map #: <u>95</u> Map Date: <u>5-27-16</u>
Date: <u>6-8-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106HT009</u>
Investigators: <u>Jessie Brannlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>600</u>	
Latitude: <u>68° 3' 21.9977" N</u>	Longitude: <u>149° 30' 39.0" W</u>		Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>33</u>	Picture No.: <u>P-W106HT009_001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Depression</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>Concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1/EM1B</u>	Evidence of Wildlife Use: <u>olive-sided flycatcher calls</u> <u>ingulate, poop</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 <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> <u>4/3</u>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> <u>4/3</u> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>IIIA2, IIC2</u>

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

Hills in a trough
Site in between 2 troughs. Local Low spot with hummocks & depressions. Soil is dry Andic material. Hummock features found prolifically throughout area in dry mountain ridges to valley bottoms. ~~Cannot infer that they are water related~~
Consulted w/ B Strong who upon hearing site description advised calling site dry.



JB changed to positive Hydrology based on Hummocks and landform. changed soil to a NO based on Low chroma being parent material related and otherwise dry well drained soil. A repeat site visit is advised. Site is marginal but appears to be non-wetland except for wetter signature in upper right which has higher hummocks & depressions and thicker Calamagrostis canadensis.

WETLAND DETERMINATION DATA FORM

W106HT009

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>W106 polygon</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>250'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium uliginosum</i>	35	Y	FAC
2. <i>Picea Canadensis</i>	T		FACU
3. <i>Salix pulchra</i>	T		
4. <i>Betula nealaskana</i>	T		FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

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: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: — X 1 = —

FACW species: 8 X 2 = 16

FAC species: 77 X 3 = 231

FACU species: 45 X 4 = 180

UPL species: — X 5 = —

Column Totals: 130 (A) 427 (B)

PI = B/A = 3.28

<i>Calamagrostis canadensis</i>	35	Y	FAC
<i>Juncus Canadensis</i>	T		FACW
<i>Chamerion angustifolium</i>	T		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (<u>250'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Heracleum maximum</i>	30	Y	FACU
2. <i>Mertensia paniculata</i>	5		FACU
3. <i>Ceranium erianthum</i>	117		FACU
4. <i>Pyrola grandiflora</i>	3		FAC
5. <i>Rubus chamaemorus</i>	5		FACW
6. <i>Rubus arcticus</i>	4		FAC
7. <i>Cornus</i> (bunch) ^{No seed here found. Notable to ID}	10		
8. <i>Delphinium glaucum</i>	3		FACW
9. <i>Veratrum viride</i>	T		FAC
10. <i>pea sp</i>	2		

Total Cover: 107

50% of total cover: 53.5 20% of total cover: 21.4

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.

5 % Bare Ground
0 % Cover of Wetland Bryophytes
70 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

* Veg estimates are made difficult by the late growing season this far north. Estimates are made to reflect what site might look like in peak growing season.

WETLAND DETERMINATION DATA FORM

W106HT009

6.8.15

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
Oi 0-2								Dry organics
A 2-5	10YR 2/2	100	7.5YR 4/4	158	can	m	Silt loam	
Bw1 5-12	2.5Y 3/2	85					Silt loam	concentrations in large pockets of matrix
Bw2 12-24	2.5Y 3/2	100					gravelly silt	~15% gravels
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>X</u> <u>N</u> <u>4/15</u>								
Notes: <u>* 2.5Y 3/2 color is likely due to parent material color</u> <u>Still considering soil to be hydric - to give benefit of doubt but it does not meet Hydric soil criteria</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>X</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>X</u> <u>4/13</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>X</u> <u>Y</u> <u>4/13</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: <u>2 weak secondary indicators.</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106H1009


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 _____	

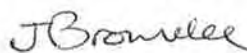
SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

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: W106HT009 Field Target: 210 Date: 6-8-16

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

X

Kalery Volper

Wetland Scientist (print)

X

Kalery Volper 6-8-16

Signature / Date

X

J Browne

Field Crew Chief (print)

X

[Signature] 6-8-16

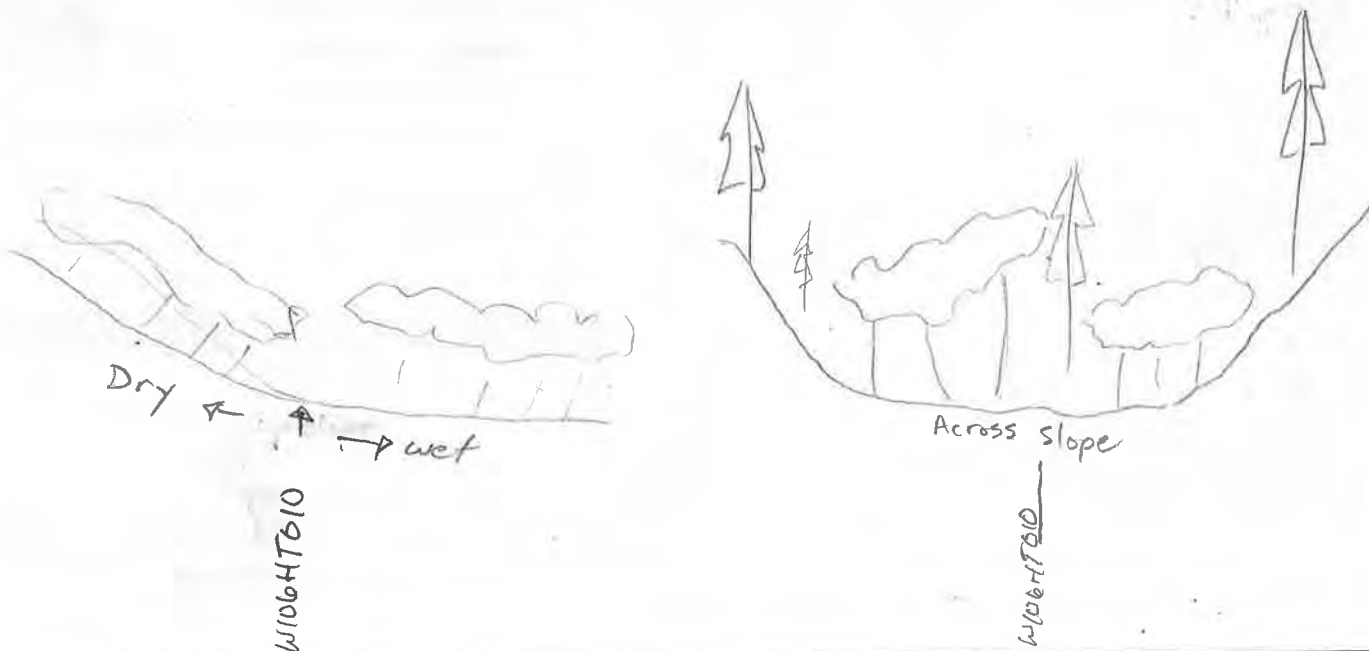
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>211</u>	Map #: <u>95</u> Map Date: <u>5-27-16</u>
Date: <u>6-8-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106HT010</u>
Investigators: <u>Jessie Bannister, Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>599.9</u>	
Latitude: <u>63° 31' 22.59" N</u>	Longitude: <u>149° 30' 22.77" W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>33</u>	Picture No.: <u>P-W106HT010-001 4mm, 0024</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Swale</u>
Slope (%): <u>5-8</u>	Local relief (concave, convex, none): <u>Concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</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 <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PSS1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>11B1.1</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

W106 HTO10

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>	8	Y	FACW
2.			
3.			
4.			

Total Cover: 8

50% of total cover: 4 20% of total cover: 1.6

Sapling/Shrub Stratum (<u>76</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Ribes friste</i>	7		FAC
2. <i>Spiraea Stevenii</i>	3		FACU
3. <i>Salix pulchra</i> X	105	Y	FACW
4. <i>Alnus Fruticosa</i>	8		FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 76

50% of total cover: 38 20% of total cover: 15.2

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: 74 X 2 = 148

FAC species: 37 X 3 = 111

FACU species: 26 X 4 = 104

UPL species: _____ X 5 = _____

Column Totals: 137 (A) 363 (B)

PI = B/A = 2.65

<i>Aster</i> sp	T	
<i>Equisetum sylvaticum</i>	T	FAC
<i>Calamagrostis lapponica</i>	10	Y FAC
<i>Mertensia paniculata</i>	T	FACU
<i>Coeraniam erianthum</i>	T	FACU
<i>Carex bigelowii</i>	5	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Streptopus amplexifolius</i>	4		FACU
2. <i>Veratrum viride</i>	5		FAC
3. <i>Viola palustris</i>	1		FAC
4. <i>Gymnocarpium dryopteris</i>	15	Y	FACU
5. <i>Sanguisorba canadensis</i>	1		FACU
6. <i>Trientalis europaea</i>	1		FACU
7. <i>Dryopteris expansa</i>	3		FACU
8. <i>Chamaenerion angustifolium</i>	7		FACU
9. <i>Poa</i> sp <i>Polemonium acutiflorum</i>	7		FAC
10. <i>Anemone richardsonii</i>	8	Y	FAC

Total Cover: 53

50% of total cover: 26.5 20% of total cover: 10.6

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.

0 % Bare Ground
15 % Cover of Wetland Bryophytes
30 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

W106H T010

10.8.14

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								
A 2-5	10YR 2/2	100					Silt + loam	
B ₁ 5-7	10YR 3/2	100					gravelly fine sandy loam	
B ₂ 7-12	2.5Y 3/2	90	2.5YR 4/4	10	con		gravelly fine sandy loam	
B ₃ 12+	2.5Y 5/3	90	2.5YR 4/4	10	con		gravelly 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>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>Yes</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: <u>Negative & X</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>X Yes</u>		Inundation Visible on Aerial Imagery (B7) <u>N</u>		Drainage Patterns (B10) <u>N</u>		Geomorphic Position (D2) <u>Yes</u>		
Saturation (A3) <u>Y</u>		Sparsely Vegetated Concave Surface (B8) <u>Y</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>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>Yes</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>Y</u>		Depth (in): <u>11</u>						
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u>7</u>						
EC: <u>30</u>				Notes:				

AQUATIC SITE ASSESSMENT DATA FORM

W106 HT 010

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 X
 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) 8 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 100 Short shrub (0.5-2m) 8
 Dwarf shrub (<0.5m) 0 Tall herb (>1m) 0 Short herb (<1m) 0 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 1 Evenness of Wetland Type Distribution (M): Even X 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%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <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) X High (>25) _____

Presence of Islands (M): Absent (none) X 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 X

Dead Woody Material (P): Low Abundance (0-25% of surface) X Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings) X Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____

HGM Class (P): Slope X 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 X 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 X 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 X
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____

Microlief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) X Pronounced (>18in.) _____

Frequency of Overbank Flooding (P): No Overbank Flooding X 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 X

Water pH (P): No surface water _____ Circumneutral (5.5-7.4) X Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading 5.57

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits X
 Glacial Till/Not Pemeable _____

Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) X

Evidence of Seeps and Springs (P): No Seeps or Springs X 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 X Unknown _____

Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____

Size: Small (<10 acres) X Medium (10-100 acres) _____ Large (>100 acres) _____

Crew Chief QA/QC check:

GPS Technician QA/QC check: ✓

J Brumwell

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WLOGHTO10 Field Target: 211 Date: 6-8-16

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

X Haley Volper
Wetland Scientist (print)

X Haley Volper 6-10-16
Signature / Date

X J Brownlee
Field Crew Chief (print)

X [Signature] 6-8-16
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: <u>219</u>	Map #: <u>87</u> Map Date: <u>5-27</u>
Date: <u>6-9-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106HT011</u>
Investigators: <u>Jessie Brownlee, Katelyn Volker</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>592.9</u>	
Latitude: <u>63° 8' 37.9175" N</u>	Longitude: <u>149° 25' 9.0921" W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>37</u>	Picture No.: <u>P-W106HT011-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1B</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 <input type="checkbox"/> (if no, explain in Notes)	
Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>705 741B 11B1, III A2</u>

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

Mapped veg signature is a closed willow shrub community w/ diverse forb, grass understory. Walked in from SW corner of mapped polygon area shows no signs of Hydrology or wet soil. Change area to upland

WETLAND DETERMINATION DATA FORM

W106 HT 011

VEGETATION (use scientific names of plants)

Polygon size Tree Stratum (Plot sizes: <u>100'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Cana</i>		10	Y	FACU
2.				
3.				
4.				

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>		70	Y	FACU
2. <i>Viburnum edule</i>		1		FACU
3. <i>Picea glauca</i>		7		FACU
4. <i>Ribes fruticosum</i>		5		FAC
5.				
6.				
7.				
8.				
9.				

Total Cover: 76

50% of total cover: 38 20% of total cover: 15.2

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 70 X 2 = 140

FAC species: 32 X 3 = 96

FACU species: 22 X 4 = 88

UPL species: 0 X 5 = 0

Column Totals: 124 (A) 304 (B)

PI = B/A = 2.45

Pic. Can. % based on mapped polygon not surrounding open forest which has a much higher num %

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>		20	Y	FAC
2. <i>Dryopteris expansa</i>		3		FACU
3. <i>Equisetum sylvaticum</i>		5	N	FAC
4. <i>Chamaenerion angustifolium</i>		4		FACU
5. <i>Mertensia paniculata</i>		2		FACU
6. <i>Rubus Arcticus</i>		2		FAC
7. <i>Cornus canadensis</i>		7		FACU
8. <i>Viola</i>		7		
9. <i>Rubus pedatus</i>		7		FAC
10. <i>Gymnocarpium dryopteris</i>		2		FACU

Total Cover: 38

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

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.

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

W106HT011

6.9.16

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	
O: 0-1						Dry organics
A 1-2	10YR 3/2	100				Silt loam
Bw 2-15	10YR 3/1	58	7.5YR 3/4	38	con M	fine sandy loam
	2.5Y 4/1	2	7.5YR 4/6	2	con M	
C 15-24	10YR 3/2	100				very coarse 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: High concentrations in Bw Horizon likely due to textural difference between it and the C horizon resulting in seasonal water purchasing before full saturating Bw before draining into lower 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): <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>				
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		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 (≥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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HTO11

Field Target: 219

Date: 6-9-16

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

X Kaley Volper

Wetland Scientist (print)

X Kaley Volper 6-11-16

Signature / Date

X J Brownlee

Field Crew Chief (print)

X [Signature] 6.9.16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain) <input checked="" type="checkbox"/>	Other (explain)	Field Target: 218
Date: 6-9-16	Project Name: Alaska LNG	Feature Id: W10CHT012	Map #: 87 Map Date: 5-27
Investigators: Jessie Brownlee, Kaley Volper	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 593	
Latitude: 63.142552	Longitude: -149.415829	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 37	Picture No.: P-W106HT012-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 3-5	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1B	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: PSS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): 11B1, 11A2

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

Closed willow shrub community. Swaling feature draining wetland from the SE up slope pond of water 9" deep with pockets of standing H₂O throughout. Polygon made smaller on map. The South is not wet starting at the veg change from willows to cal can meadow

wetland up here

Small Swale down slope

W10CHT012

upland boundary is correct already

SE ←

NW →

The swale that drains water from the upper wet land to this FT 218 goes subsurface for the steeper slope but expresses again at slope break. Water table is likely within 12-24" of soil surface to connect the two wetlands

WETLAND DETERMINATION DATA FORM

W106HT012

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>	3		FACU
2. <i>L. moved to shrub layer</i>			
3.			
4.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	70	Y	FACW
2. <i>Spiraea stenophylla</i>	T		FACU
3. <i>Picea Canadensis</i>	T		FACU
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>73</u> 50% of total cover: <u>36.5</u> 20% of total cover: <u>14.6</u>			

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

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: — X 1 = —
 FACW species: 71 X 2 = 142
 FAC species: 105 X 3 = 195
 FACU species: 11 X 4 = 44
 UPL species: — X 5 = —
 Column Totals: 147 (A) 381 (B)
 PI = B/A = 2.59

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	55	Y	FAC
2. <i>Equisetum sylvaticum</i>	10		FAC
3. <i>Mertensia paniculata</i>	8		FACU
4. <i>Rumex Arcticus</i>	T		FAC
5. <i>Sanguisorba canadensis</i>	T		FACW
6. <i>Viola palustris</i>	1		FACW
7. <i>Veronica sp</i>	2		—
8. <i>Petasites Frigidus</i>	T		FACW
9. <i>Poa sp</i> <i>Polygonum acutiflorum</i>	T		FAC
10.			
Total Cover: <u>76</u> 50% of total cover: <u>38</u> 20% of total cover: <u>15.2</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.

Not recorded in field
 0 % Bare Ground
 0 % Cover of Wetland Bryophytes
 0 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

W106HT012

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						Saturated organics
Bul 3-4	10YR 3/2	80	5YR 2.5/2	20	con m/RC	Silt/loam Strong band of con @ interface w/ Oab
Oab 4-6	Black	100				loam
Bul 6-8	2.5Y 4/1	80	7YR 4/1	20	con m	Silt

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>Y</u>
	Alaska Gleyed without 5Y Hue or Redder Underlying Layer <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: negative OX

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>X Yes</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>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>9</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>3</u>	
Saturation Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
		EC: <u>17 uS</u>

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W106 HTO12

VEGETATION VARIABLES	
P = Plot, M = Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>70</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>30</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ 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 <u>X</u> Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <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 _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet <u>X</u> Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.88</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 _____ Only Connected Above <u>X</u> Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

J Brownlee

GPS Technician QA/QC check:

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W100H1012 Field Target: 218 Date: 6-9-16

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

X

Wetland Scientist (print)

Kaley Volper

X

Signature / Date

Kaley Volper

6-11-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

[Signature]

6.12.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/>		Field Target: 204	Map #: 99 Map Date: 5-27
Date: 6-10-16	Project Name: Alaska LNG		Feature Id: W106HT013
Investigators: Jessie Brownlee, Kaley Xolper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 617.5	
Latitude: 62° 52' 23.8054" N	Longitude: 149° 50' 34.674" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 38	Picture No.: P-W106HT013-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace(?) lowland
Slope (%): 3-5	Local relief (concave, convex, none): Flat, hummocky
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: Squirrel BPs
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): 1A2.11 B2

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

Tall mature. Pic Cola open forest w/ Salix & Betula understorey w/ a very diverse Forb community. Dry Andre soils w/ slight E & Bs properties. Hummocky features are present throughout area. Walk in from Road to 013-OP to here is dry.

WETLAND DETERMINATION DATA FORM

W106HT013

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>	35	Y	FACU
2. <i>Betula neolascana</i>	6		FACU
3.			
4.			

Total Cover: 41

50% of total cover: 20.5 20% of total cover: 8.2

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium uliginosum</i>	35	Y	FAC
2. <i>Vaccinium vitis-idaea</i>	T		FAC
3. <i>Viburnum edule</i>	2		FACU
4. <i>Salix pulchra</i>	25	Y	FACU
5. <i>Empetrum nigrum</i>	T		FAC
6. <i>Betula neolascana</i>	3		FACU
7. <i>Picea glauca</i>	3		FACU
8. <i>Sorbus scopulina</i> Mountain Ash	T		FACU
9.			

Total Cover: 68

50% of total cover: 34 20% of total cover: 13.6

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: _____ X 1 = _____

FACW species: 25 X 2 = 50

FAC species: 41 X 3 = 123

FACU species: 108 X 4 = 272

UPL species: 1 X 5 = 5

Column Totals: 135 (A) 450 (B)

PI = B/A = 3.33

<i>Fraxinus Neottia</i> sp	T		
<i>Trientalis europaea</i>	2		FACU
<i>Viola</i> sp	T		
<i>Delphinium glaucum</i>	T		FACU
<i>Coarctum borealis</i>	T		
<i>Sanguisorba canadensis</i>	T		FACW
<i>Aster</i> sp.	T		

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Geranium eranthum</i>	8	Y	FACU
2. <i>Rubus Arcticus</i>	4	Y	FAC
3. <i>Cornus canadensis</i>	4	Y	FACU
4. <i>Pyrola asariflora</i> <i>grandiflora</i>	2		FACU
5. <i>Iris setosa</i>	T		FAC
6. <i>Lupinus Arcticus</i>	2		FACU
7. <i>Achillea millefolium</i>	T		FACU
8. <i>Chamerion angustifolium</i>	1		FACU
9. <i>Juniperus horizontalis</i> <i>horizontalis</i>	1		UPL
10. <i>Calamagrostis leppanica</i>	2		FAC

Total Cover: 26

50% of total cover: 13 20% of total cover: 5.2

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

90 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

W106HT013

6.10.16

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		
0-1	—						Dry organics
E 1-2	10YR 4/2	100				Silt loam	
B _s 2-8	7.5YR 3/3	5				Silt	
	10YR 4/6	95					
B _{ws} 8-24	10YR 3/4	92				Silt	
	10YR 4/4	8					
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): (includes capillary fringe) <u>N</u>		Depth (in): <u>—</u>		EC: <u>—</u>			
Notes:							

AQUATIC SITE ASSESSMENT DATA FORM

W106 #T013

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: *KV*

J. Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT013 Field Target: 204 Date: 6-10-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper

Signature / Date

6-11-16

X

J Brownlee

Field Crew Chief (print)

X

Jessie Brownlee

Signature / Date

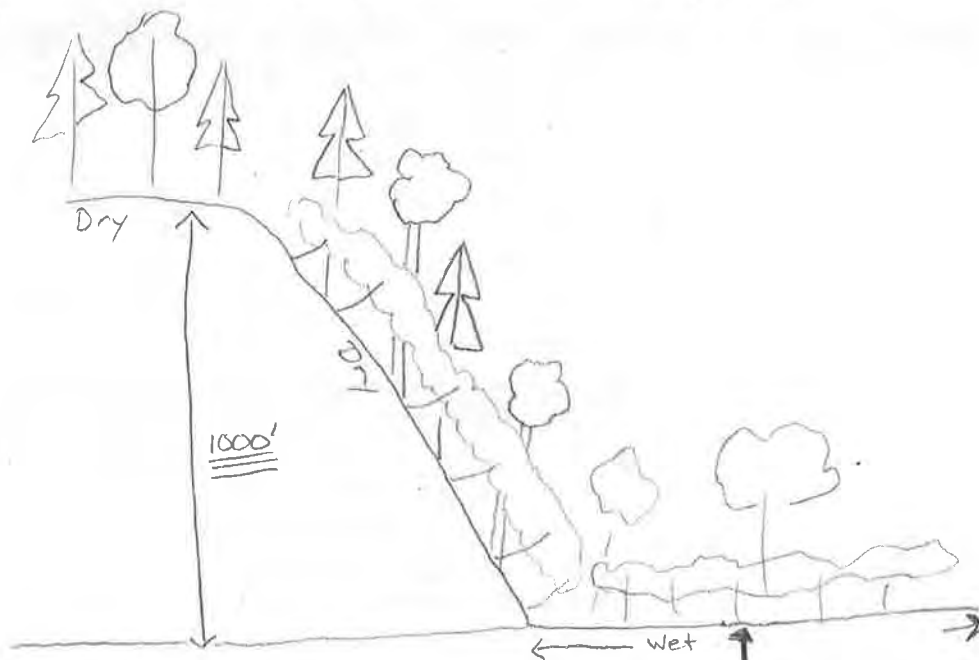
6-11-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/>		Field Target: 205	Map #: 98 Map Date: 5.27
Date: 6-10-16	Project Name: Alaska LNG		Feature Id: W106HT014
Investigators: Jessie Brownlee, Kaley Volper			Team No.:
State: Alaska	Region: Alaska	Milepost: 617.2	
Latitude: 62° 52' 47.1914" N	Longitude: 149° 50' 14.0463" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 39	Picture No.: P-W106HT014-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Flood plain
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U1C2, 11B2	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: PSSIE
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11B1, 11B2

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

W106HT014

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	10	Y	FACU
2.			
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus tenuifolia</i>	55	Y	FAC
2. <i>Salix pulchra</i>	13		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 58

50% of total cover: 29 20% of total cover: 11.6

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 15 X 1 = 15

FACW species: 31 X 2 = 62

FAC species: 92 X 3 = 276

FACU species: 13 X 4 = 52

UPL species: - X 5 = -

Column Totals: 151 (A) 405 (B)

PI = B/A = 2.68

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	10	Y	OBL
2. <i>Calamagrostis canadensis</i>	18	Y	FAC
3. <i>Rumex arcticus</i>	9		FAC
4. <i>Viola palustris</i>	8		FACU
5. <i>Equisetum palustre</i>	20	Y	FACU
6. <i>Chrysosplenium tetrandrum</i>	5		OBL
7. <i>Polemonium acutiflorum</i>	10	Y	FAC
8. <i>Forb sp</i>	7		-
9. <i>Dryopteris expansa</i>	13		FACU
10.			

Total Cover: 83

50% of total cover: 41.5 20% of total cover: 16.6

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.

0 % Bare Ground
20 % Cover of Wetland Bryophytes
40 Total Cover of Bryophytes
30 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WS106HT014

6.10.15

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106HT014

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>0</u> Tall shrub (2-6m) <u>80</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>15</u> Moss-Lichen <u>0</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 <u>X</u> Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric <u>X</u> 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 _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <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>6.0</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 <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:

Jessie Browne

GPS Technician QA/QC check:

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT014 Field Target: 205 Date: 6-10-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper 6-11-16

Signature / Date

X

J Brownlee

Field Crew Chief (print)

X

J Brownlee 6-12-16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline <u> </u> Access Road (explain) <u>X</u> Other (explain) <u>\</u>			Field Target: <u>220</u>	Map #: <u>85</u> Map Date: <u>5.27</u>
Date: <u>6-10-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106HTD15</u>	
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>	
State: Alaska	Region: Alaska	Milepost: <u>588.5</u>		
Latitude: <u>63° 11' 25.58"</u>		Longitude: <u>-149° 21' 19.95"</u>	Datum: WGS84	
Logbook No.: <u>1</u>	Logbook Page No.: <u>39</u>	Picture No.: <u>P-W106HTD15-001 thru 004</u>		

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Back side of mound</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>undulating</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS1B</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 <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PSS1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Viereck): <u>1A3, 11B2</u>

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

Location of FT ^{was} ~~is~~ on only dry to marginal ground around at a scale we do not map at, and am considering it a 50' x 25' upland inclusion in an otherwise very wet site. Uhole dug in upland inclusion and it ~~has~~ was saturated just below 12" and possibly wet long enough. Location of ~~corridors are on up inclusion while~~ ~~gib~~ surrounding is all wet PSSIB.



WETLAND DETERMINATION DATA FORM

W106 HT 015

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>	20	Y	FACU
2.			
3.			
4.			

Total Cover: 20

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

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Empetrum nigrum</i>	T		FAC
2. <i>Betula nana</i>	2		FAC
3. <i>Vaccinium uliginosum</i>	T		FAC
4. <i>Rhododendrum tomentosum</i>			FACU
5. <i>Salix pulchra</i>	18	Y	FACU
6. <i>Vaccinium vitis-idaea</i>	T		FAC
7. <i>Spiraea stevenii</i>	6		FACU
8. <i>Picea Canadensis</i>	T		FACU
9. <i>Alnus incana</i>	40	Y	FAC

Ribes triste T Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 39 X 2 = 78

FAC species: 59 X 3 = 177

FACU species: 28 X 4 = 112 kv

UPL species: 0 X 5 = 0

Column Totals: 169 (A) 369 (B) kv

PI = B/A = 2.9

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	I		FACW
2. <i>Phemerion angustifolium</i>			FACU
3. <i>Cornus canadensis</i>	T		FACU
4. <i>Sanguisorba canadensis</i>	T		FACW
5. <i>Equisetum palustre</i>	20	Y	FACW
6. <i>Sparganium angustifolium</i>	2		FACU
7. <i>Equisetum sylvaticum</i>	15		FAC
8. <i>Rubus arcticus</i>	T		FAC
9. <i>Carex bigelowii</i>	T		FAC
10. <i>Calamagrostis lapponica</i>	2		FAC

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

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.

2 % Bare Ground

25 % Cover of Wetland Bryophytes

50 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WIGHTS

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106HT015

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>20</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>70</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>10</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>✓</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>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 _____ Histosol: Sapric _____ Mineral: Gravelly <u>X</u> Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent <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) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.85</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:

J. Brownlee

LV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT015 Field Target: 220 Date: 6-10-16

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

X

Kaley Volper

Wetland Scientist (print)

X

Kaley Volper

Signature / Date

6-11-16

X

J. Brantley

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-10-16

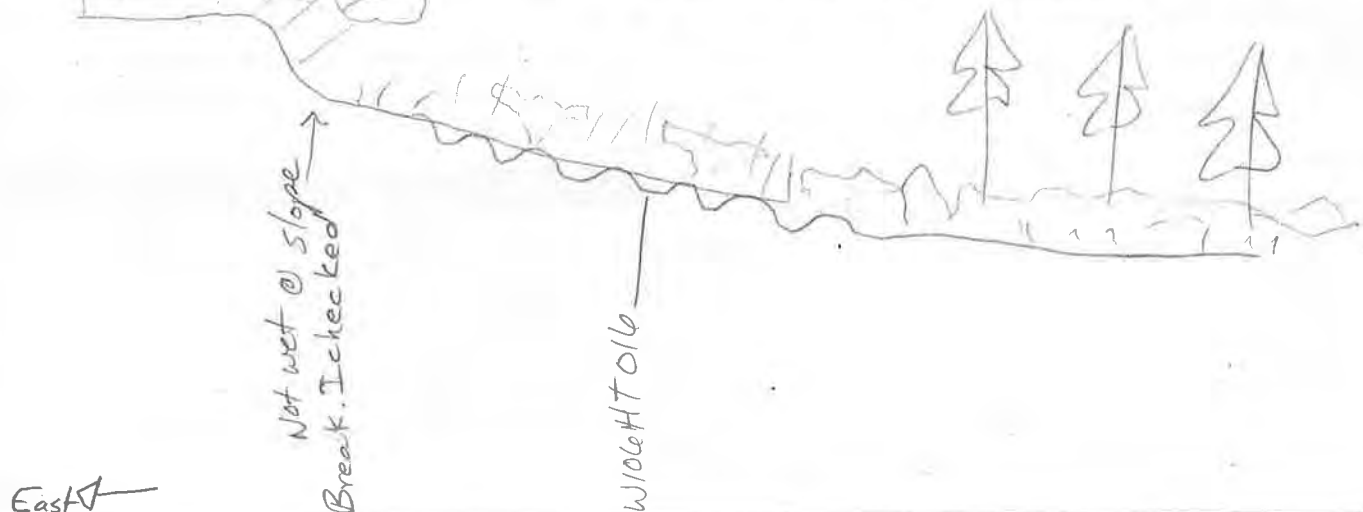
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain):	Other (explain): <i>Facility</i>
Field Target: <i>214</i>		Map #: <i>91</i> Map Date: <i>5.27.16</i>	
Date: <i>6-11-16</i>	Project Name: Alaska LNG		Feature Id: <i>W106HT016</i>
Investigators: <i>Jessie Brownlee, Kaley Volper</i>			Team No.: <i>W106</i>
State: Alaska	Region: Alaska	Milepost: <i>596</i>	
Latitude: <i>63° 6' 39.001" N</i>	Longitude: <i>149° 28' 39.8977" W</i>	Datum: WGS84	
Logbook No.: <i>1</i>	Logbook Page No.: <i>41</i>	Picture No.: <i>P-W106HT016-001 thru 004</i>	

SITE PARAMETERS	
Subregion: <i>Alaska Range</i>	Landform (hillslope, terrace, hummocks, etc.): <i>hillside</i>
Slope (%): <i>15</i>	Local relief (concave, convex, none): <i>convex/undulating</i>
Pre-mapped Alaska LNG/NWI classification: <i>PEMI/SSIB</i>	Evidence of Wildlife Use: <i>moose beds & droppings</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 checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <i>U</i>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): <i>III A Z III B Z</i>

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

Diverse forb & cal can meadow. Same veg and soil for W106HT016-0P3 which is another dry forb meadow to the North East. Same strange hummocks found through out forests here were present @ This and all these forb uplands.



WETLAND DETERMINATION DATA FORM

W106HT016

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.				
2.				
3.				
4.				
Total Cover: _____		50% of total cover: _____ 20% of total cover: _____		
<u>Sapling/Shrub Stratum</u> (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Populus balsamifera</i>	T		FACU
2.	<i>Picea Canadensis</i>	T		FACU
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: 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: _____ X 1 = _____

FACW species: 4 X 2 = 8

FAC species: 92 X 3 = 276

FACU species: 21 X 4 = 84

UPL species: _____ X 5 = _____

Column Totals: 117 (A) 368 (B)

PI = B/A = 3.14

<i>Vida</i>	1		
<i>Geranium erianthum</i>	4		FACU
<i>Coalium boreale</i>	T		FACU

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>26</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Rubus arcticus</i>	25	Y	FAC
2.	<i>Chamerion angustifolium</i>	4		FACU
3.	<i>Heracleum maximum</i>	8		FACU
4.	<i>Veratrum viride</i>	25	Y	FAC
5.	<i>Equisetum sylvaticum</i>	T		FAC
6.	<i>Calamagrostis canadensis</i>	40	Y	FAC
7.	<i>Delphinium glaucum</i>	4		FACW
8.	<i>Polemonium acutiflorum</i>	2		FAC
9.	<i>Aster sp</i>	T		
10.	<i>Mertensia paniculata</i>	5		FACU
Total Cover: <u>118</u>		50% of total cover: <u>59</u> 20% of total cover: <u>23.6</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

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Veg was recorded only for this mapping signature AND Doesnt include willow or PIC Cola Veg signature around.

WETLAND DETERMINATION DATA FORM

W106HT016

6.11.16

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	
Di 0-2							Dry organics
A 2-3	10YR 2/2	100					loam
Bw1 3-10	10YR 3/1	100					very gravelly silt loam
Bw2 10-24	10YR 3/2	100					gravelly 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 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:							
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> <i>not due to water</i>	
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>					
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>-</u>					
EC: <u>-</u>				Notes:			

AQUATIC SITE ASSESSMENT DATA FORM

W1064T016

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:

J. Brando

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106 HTO 16 Field Target: 214 Date: 6-11-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Valper 6-12-16

Signature / Date

X

J Brownlee

Field Crew Chief (print)

X

John 6-12-16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>X Facility</u>
Field Target: <u>215</u>		Map #: <u>91</u> Map Date: <u>5.27</u>	
Date: <u>6.11.16</u>	Project Name: Alaska LNG		Feature Id: <u>W106HT017</u>
Investigators: <u>Jessie Bravlee Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>596</u>	
Latitude: <u>63° 6' 31.07"</u>		Longitude: <u>-149° 28' 5.72"</u>	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>40</u>	Picture No.: <u>P-W106HT017-001 thru -004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>8-10</u>	Local relief (concave, convex, none): <u>Slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>1A2, 11B2</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 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>1A2, 11C2</u>

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

Tall mature open forest of Picea Glauca with short shrub understory.
No signs of hydrology. Dry soils. From walk From Road via FT 214 all of area
has been Dry.



WETLAND DETERMINATION DATA FORM

W106HT017

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>Picea Glauca</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>			
<u>Sapling/Shrub Stratum</u> (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Spiraea stevenii</i>	10	Y	FACU
2. <i>Vaccinium uliginosum</i>	25	Y	FAC
3. <i>Linnaea borealis</i>	T		FACU
4. <i>Juniperus horizontalis</i>	1		UPL
5. <i>Picea Glauca</i>	2		FACU
6. <i>Empetrum nigrum</i>	4		FAC
7. <i>Betula nana</i>	T		FAC
8. <i>Vaccinium vitis-idaea</i>	T		FAC
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: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 17 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 3 X 2 = 6

FAC species: 33 X 3 = 99

FACU species: 47 X 4 = 188

UPL species: 1 X 5 = 5

Column Totals: 84 (A) 298 (B)

PI = B/A = 3.54

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus pedatus</i>	1		FAC
2. <i>Cornus canadensis</i>	3	Y	FACU
3. <i>Chamaenerion angustifolium</i>	T		FACU
4. <i>Rubus Arcticus</i>	2		FAC
5. <i>Trientalis Europaea</i>	T		FACU
6. <i>Calamagrostis lapponica</i>	1		FAC
7. <i>Cymnocarpium dryopteris</i>	3	Y	FACU
8. <i>grass sp</i>	2		
9. <i>sparganium angustifolium</i>	3	Y	FACU
10. <i>Streptopus amplexifolius</i>	T		FACU
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</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

95 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

W106HT017

6.11.16

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				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
O _i 0-3							Dry organic
F 3-10	10YR 5/3	100					Silt
B _{hs} 6-9	2.5YR 3/4	20					Silt
	2.5YR 2.5/2	80					
R _{ml} 9-12	2.5YR 2.5/1	100					extremely very gravelly 100% Black onstein properties
C 12-24	10YR 2/2	100					very gravelly 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>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): <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>					
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>—</u>		EC: <u>—</u>			
Notes:							

AQUATIC SITE ASSESSMENT DATA FORM

W106HT017

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/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:

J Brownlee

YV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT017

Field Target: 215

Date: 6-11-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper

Signature / Date

6-12-16

X

J Brownlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-11-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <u>216</u>	Map #: <u>91</u> Map Date: <u>5-27-16</u>
Date: <u>6-11-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106HT018</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>596</u>	
Latitude: <u>63° 6' 34.379" N</u>		Longitude: <u>149° 28' 20.772" W</u>	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>41</u>	Picture No.: <u>P-W106HT018-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Concave</u>
Slope (%): <u>5-8</u>	Local relief (concave, convex, none): <u>Swale</u>
Pre-mapped Alaska LNG/NWI classification: <u>1A2, 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 <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 <input checked="" type="checkbox"/> , Soil <input checked="" type="checkbox"/> , or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <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>PSS1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): <u>11B1, 11A2</u>

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

Closed Alder Shrub swale connecting upper wetland to lower wetland
All wet from lower PSS1/EM113 to here. Abandoned additional 300' to target
given the very difficult walking and the obvious swaling feature visible
from contours on maps.

* While this site does not technically meet veg & soil indicators I am now the less
considering it a wetland given the many strong hydrology indicators & the
abundance of surface water & water table to 3"

Drier veg was preferentially growing on hummocky drier locals.
Soil reacted positive to XX only in a few spots but had an over
all depleted look to it. Site considered a wetland. J. Brownlee

WETLAND DETERMINATION DATA FORM

W106H T018

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>	8	Y	FACU
2.			
3.			
4.			

Total Cover: 850% of total cover: 4 20% of total cover: 1.6

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Ribes fruticosum</i>	4		FAC
2. <i>Alnus viridis</i>	85	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 8950% of total cover: 44.5 20% of total cover: 17.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)Total Number of Dominant Species Across All Strata: 3 (B)% Dominant Species that are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 7 X 2 = 14FAC species: 109 X 3 = 327FACU species: 59 X 4 = 236

UPL species: _____ X 5 = _____

Column Totals: 175 (A) 577 (B)PI = B/A = 3.29

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Sanguisorba canadensis</i>	1		FACW
2. <i>Streptopus amplexifolius</i>	3		FACU
3. <i>Equisetum sylvaticum</i>	10		FAC
4. <i>Dryopteris expansa</i>	45	Y	FACU
5. <i>Gymnocarpium dryopteris</i>	2		FACU
6. <i>Trientalis europaea</i>	1		FACU
7. Dock	1		—
8. <i>Viola palustris</i>	1		FACW
9. <i>Calamagrostis canadensis</i>	10		FAC
10. <i>Equisetum pratense</i>	5		FACW

Total Cover: 7950% of total cover: 39.5 20% of total cover: 15.8

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 Ground1 % Cover of Wetland Bryophytes20 Total Cover of Bryophytes2 % Cover of WaterHydrophytic Vegetation Present (Y/N): Y

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

upland veg was growing preferentially on higher/drier ground.

WETLAND DETERMINATION DATA FORM

W106H T018

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
0-2							Saturated organics
Bw1 2-8	10YR 4/2	100					very gravelly loamy sand w/ cobbles
Bw2 8-10	10YR 4/2	100					grayish gray 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 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> — </u> Depth (inches): <u> — </u>							
Hydric Soil Present (Y/N): <u> Y </u> <i>see note on front</i>							
Notes: <i>Spotty positive XX reaction throughout. Woody Debris throughout</i>							
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> Y </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> Y </u>		Geomorphic Position (D2) <u> Y </u>	
Saturation (A3) <u> Y </u>		Sparsely Vegetated Concave Surface (B8) <u> Y </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> spotty </u>		Microtopographic Relief (D4) <u> X </u> <u> Y </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> Y </u>		Depth (in): <u> 4 </u>		Wetland Hydrology Present (Y/N): <u> Y </u>			
Water Table Present (Y/N): <u> N </u>		Depth (in): <u> 3 </u>					
Saturation Present (Y/N): <u> Y </u> (includes capillary fringe)		Depth (in): <u> Ø </u>		EC: <u> 19 </u> pH <u> 5.29 </u>			
Notes:							

AQUATIC SITE ASSESSMENT DATA FORM

W106HT018

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>8</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>85</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>3</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>4</u> Moss-Lichen <u>0</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) _____	
HGM Class (P): Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy <u>X</u> 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.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>5.29</u>	
Surficial 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 _____ Only Connected Above _____ Connected Upstream & Downstream <u>X</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>X</u>	
Watershed Land Use: 0-5% Rural <u>X</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <u>X</u> Medium (10-100 acres) <u>X</u> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Jessie Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W10G HTO19 Field Target: 216 Date: 6-11-16

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

X

Kately Valper

Wetland Scientist (print)

X

Kately Valper

Signature / Date

6-12-16

X

JBrowlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-11-16

WETLAND DETERMINATION DATA FORM

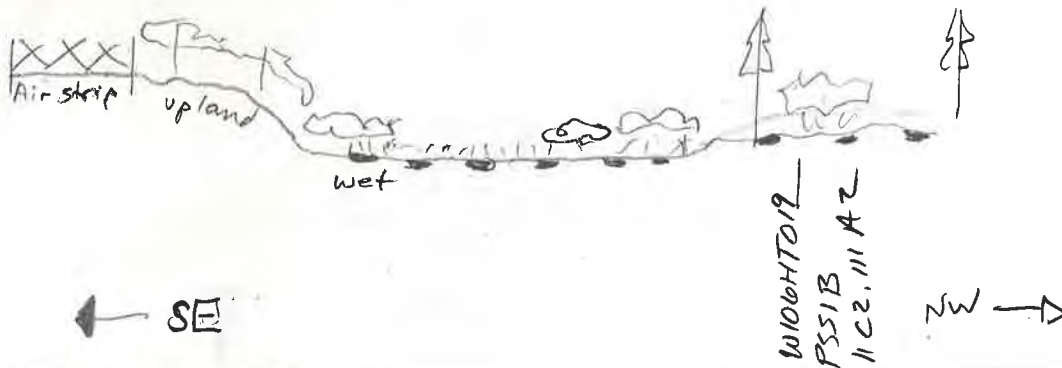
SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>226</u>	Map #: <u>83</u> Map Date: <u>5-27-16</u>
Date: <u>6-11-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106HT019</u>
Investigators: <u>Jessie Brownlee, Karen Volper</u>		Team No.: <u>W106</u>	
State: Alaska	Region: Alaska	Milepost: <u>575.6</u>	
Latitude: <u>63° 19' 59.771" N</u>		Longitude: <u>149° 8' 7.0704" W</u>	Datum: WGS84
Logbook No.: <u>1</u>	Logbook Page No.: <u>41</u>	Picture No.: <u>P-W106HT019-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat hummocky</u>
Pre-mapped Alaska LNG/NWI classification: <u>U:11C2111A1</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 <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: <u>PSS1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11C2, 111A2</u>

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

on transect from airstrip to FT Location 226 the entire area was wet except for the correctly mapped upland bordering the Air Field.

Site is a dwarf birch dwarf shrub wetland w/ large Pockets of deep standing water in between hummock mounds.



WETLAND DETERMINATION DATA FORM

W106HT019

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Colauca</i>	<u>3</u>		<u>FACU</u>
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>Betula nana</i>	<u>45</u>	<u>Y</u>	<u>FAC</u>
2. <i>Vaccinium uliginosum</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>
3. <i>Rhododendrum tomentosum</i>	<u>15</u>		<u>FACW</u>
4. <i>Salix pulchra</i>	<u>T</u>		<u>FACW</u>
5. <i>Empetrum nigrum</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
6. <i>Vaccinium vitis-idaea</i>	<u>T</u>		<u>FAC</u>
7. <i>Andromeda polifolia</i>	<u>T</u>		<u>FACW</u>
8. <i>Picea Glauca</i>	<u>T</u>		<u>FACU</u>
9.			

Total Cover: 108

50% of total cover: 54 20% of total cover: 21.6

Dominance Test worksheet:

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 15 X 2 = 30
 FAC species: 125 X 3 = 375
 FACU species: 3 X 4 = 12
 UPL species: 0 X 5 = 0
 Column Totals: 143 (A) 417 (B)
 PI = B/A = 2.916

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex bigelowii</i>	<u>35</u>	<u>Y</u>	<u>FAC</u>
2. <i>Rubus chamaemorus</i>	<u>T</u>		<u>FACU</u>
3. <i>Petasites Frigidus</i>	<u>T</u>		<u>FACW</u>
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

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.

_____ % Bare Ground
20 % Cover of Wetland Bryophytes
100 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

W1064T019

6.11.15

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
0i 0-3								Damp organics
0a 3-6							MUCK	Saturated organics
Bg 6-12	2.5Y 4/1	80	5Y 5/1	5	Dep	M	gravelly Fine Sandy loam	
			7.5YR 5/6	15	con	M		
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 (A8) <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)		
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> <u>NO FROST WITHIN 24"</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>A10 MUCK</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>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>—</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>Y</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>Y</u>		Depth (in): <u>6</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>to point of active seepage</u>						
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u>3</u>						
Notes:				EC: <u>20</u> pH <u>4.6</u>				

AQUATIC SITE ASSESSMENT DATA FORM

W104HT019

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>3</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>40</u> Dwarf shrub (<0.5m) <u>40</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>15</u> Moss-Lichen <u>2</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ 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 <u>X</u> Continuous Cover <u>X</u>	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

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

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ 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>4.4</u>	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable <u>X</u>	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ 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:

J Brownlee

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106H1019 Field Target: 226 Date: 6-11-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper

Signature / Date

6-12-16

X

J Brownlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-11-16

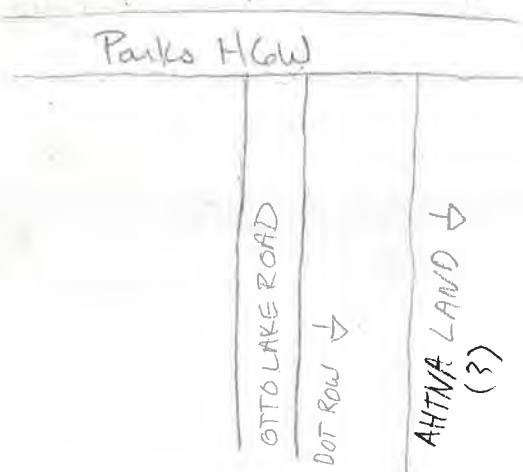
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: 242	Map #: 77 Map Date: 5-27-16
Date: 6-12-16	Project Name: Alaska LNG		Feature Id: W106HTOZO
Investigators: Jessie Brownlee, Kalen Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 526	
Latitude: 63°50'48.8078"N		Longitude: 149°1'9.4788"W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 42	Picture No.: P-W106HTOZO-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: <input checked="" type="checkbox"/>	Evidence of Wildlife Use: ungulate hair and 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 _____ 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): 11C1, 1A3

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

on Dot Row. Can't explore site due to trespassing concerns. Site reviewed from Road side ~15' off Road. Closed Bet hybrid shrub layer w/ spruce increasing outside of plot. Soil is thixotropic but not dry & therefore only showing slight properties. Soil is expressing Redox features in same way that most ^{moist} dry thix soils do. No primary hydrology seen.



Site, soils in 15' from road may have been disturbed and/or compacted.

WETLAND DETERMINATION DATA FORM

W106HT020

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Cana</i>	4		FACU
2.			
3.			
4.			
Total Cover: <u>4</u> 50% of total cover: <u>2</u> 20% of total cover: <u>0.8</u>			
Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Dasiphora fruticosa</i>	5%		FAC
2. * <i>Betula nana/glandulosa</i> *	55	Y	FAC
3. <i>Vaccinium uliginosum</i>	20	Y	FAC
4. <i>Picea Cana</i>	15		FACU
5. <i>Populus balsamifera</i>	T		FACU
6. <i>Salix pulchra</i>	45	Y	FACW
7. <i>Salix Cana</i>	8		FAC
8. <i>Salix</i> 3 <i>Salix as pulchra</i>			
9. <i>Vaccinium vitis-idaea</i>	T		FAC
Total Cover: <u>152</u> 50% of total cover: <u>76</u> 20% of total cover: <u>30.4</u>			

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of: 111 Multiply by: 4.55

OBL species: 0 X 1 = 0

FACW species: 46 X 2 = 92

FAC species: 89 X 3 = 267

FACU species: 24 X 4 = 96

UPL species: 0 X 5 = 0

Column Totals: 111 (A) 455 (B)

PI = B/A = 4.09

*Many of the *Betula* have undergone much hybridizing. *Betula nana/glandulosa/Alaskan*

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	5	Y	FACU
2. <i>Sanguisorba canadensis</i>	1		FACW
3. <i>Calamagrostis canadensis</i>	1		FAC
4. <i>Carex</i> sp	T		
5. <i>grass</i> sp	2		
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>9</u> 50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</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.

2 % Bare Ground → large cobbles

0 % Cover of Wetland Bryophytes

55 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

W106HT020

6.12.16

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
De 0-3								1/2 way through horizon is thin sediment
E 3-4	10YR 4/1	100						V. Fine Sandy loam deposit likely from Road
B _{all} 4-11	10YR 4/2	30	7.5YR 4/6	20	con	matrix	Gravelly silt loam	Gravels ~5%
	2.5Y 5/a	30	7.5YR 3/4	20	con	matrix		
B _N 2 11-24	10YR 4/2	90	10YR 5/4	10	con (faint)	matrix	extremely gravelly	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>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>—</u>								
Notes: Soil is fixotrophic (slightly) Negative && throughout. Sediment observed in organic layer come from road run off. (Because its Dry)								
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> <u>Y</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>						
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106H T020

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/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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT020

Field Target: 242

Date: 6.12.16

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

X

Wetland Scientist (print)

Kalery Valper

X

Signature / Date

Kalery Valper 6-12-16

X

Field Crew Chief (print)

J. Brownlee

X

Signature / Date

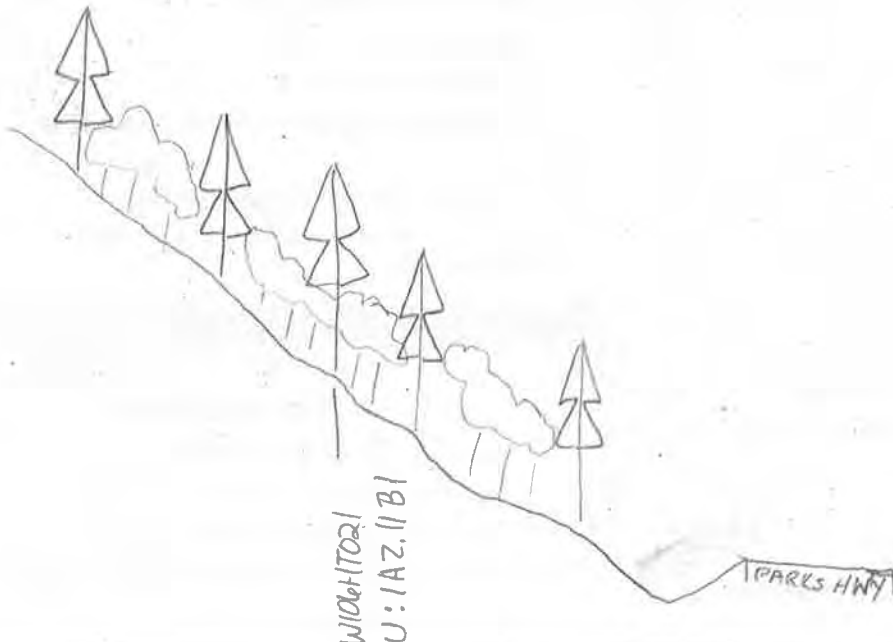
6.12.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>239</u>	Map #: <u>78</u> Map Date: <u>5.27.16</u>
Date: <u>6-12-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106H1021</u>
Investigators: <u>Jessie Brownlee, Kaley Vohrer</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>533</u>	
Latitude: <u>63° 47' 34.89" N</u>		Longitude: <u>148° 55' 10.547" W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>42</u>	Picture No.: <u>W106H1021-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>25%</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</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>1A2, 1B1</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

W106HT021

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>	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>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus viridis</i>	55	Y	FAC
2. <i>Linnaea borealis</i>	5		FACU
3. <i>Picea Canadensis</i>	7		FACU
4. <i>Rosa acicularis</i>	3		FACU
5. <i>Dasiphora fruticosa</i>	8		FAC
6. <i>Vaccinium vitis-idaea</i>	3		FAC
7. <i>Ribes triste</i>	1		FAC
8. <i>Rhododendrum groenlandicum</i>	7		FAC
9. <i>Vaccinium uliginosum</i>	2		FAC
Total Cover: <u>107</u> 50% of total cover: <u>53.5</u> 20% of total cover: <u>21.4</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: 15 X 2 = 30
 FAC species: 104 X 3 = 312
 FACU species: 38 X 4 = 152
 UPL species: _____ X 5 = _____
 Column Totals: 157 (A) 494 (B)
 PI = B/A = 3.14

<i>Moneses uniflora</i>	F	T		FACU
<i>Empetrum nigrum</i>	S	8		FAC
<i>Salix arbusculoides</i>	S	15		FACU
<i>Arctostaphylos alpina</i>	S	T		FACU
<i>Spinulum annotinum</i>	F	T		FACU
<i>Boschniakia rossica</i>	F	T		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum pratense</i>	3		FAC
2. <i>Rubus Arcticus</i>	2		FAC
3. <i>Valeriana capitata</i>	7		FAC
4. <i>Corass sp</i>	3		
5. <i>Viola sp</i>	1		
6. <i>Delphinium glaucum</i>	7		FACW
7. <i>Calamagrostis lapponica</i>	15	Y	FAC
8. <i>Carex sp</i>	3		
9. <i>Cheucaula lundium</i>	7		FACU
10. <i>Mertensia paniculata</i>	7		FACU
Total Cover: <u>54</u> 50% of total cover: <u>27</u> 20% of total cover: <u>10.8</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.

1 % Bare Ground & under spruce tree
0 % Cover of Wetland Bryophytes
50 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W10441021

6.12.16

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		
O _i 0-7								Dry Feather moss
O _a 7-11								Moist Organics - Not Mucky - just decomposed
AP 11-15	10YR 2/1	100						Frozen
B _w F 15-20	10YR 3/1	100						Frozen. Ice lenses
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)		
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>permafrost @ 13"</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>O_a is not mucky but is highly decomposed. Not calling A10</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>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) _____		
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

W106HT021

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:

J Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1064T021 Field Target: 239 Date: 6-12-16

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

X

Maley Volper

Wetland Scientist (print)

X

Maley Volper

Signature / Date

6-12-16

X

J. Brownlee

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-12-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 225	Map #: 84 Map Date: 5-27-16
Date: 6-12-16	Project Name: Alaska LNG		Feature Id: W106HT022
Investigators: Jessie Brownlee, Kelley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 577.9	
Latitude: 63° 18' 41.3562" N	Longitude: 149° 11' 0.697" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 42	Picture No.: P-W106HT022-001 thru 004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): mound
Slope (%): 5-8%	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: V	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 _____ 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): 11C1

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

Closed Bet Nana mound on glacial till. Soils dry + thixotropic w/ few Redox features, very gravelly soil. No signs of hydrology.

Mound drops in elevation just 20' away and turns wet.

See map for boundary and coding updates

OP W106HT022 - OP was in similar veg signature ~20' away and wet



W106HT022
U: 11C2

W106HT022-0P2
PSS1B: 11C2

WETLAND DETERMINATION DATA FORM

W10641T022

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>	T		FACU
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>Betula nana</i>	60	Y	FAC
2. <i>Vaccinium uliginosum</i>	15		FAC
3. <i>Empetrum nigrum</i>	5		FAC
4. <i>Vaccinium vitis-idaea</i>	2		FAC
5. <i>Rhododendron tomentosum</i>	20	Y	FACW
6. <i>Salix pulchra</i>	1		FACW
7. <i>salix</i> sp	T		
8.			
9.			
Total Cover: <u>106</u> 50% of total cover: <u>53</u> 20% of total cover: <u>21.2</u>			

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

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: 0 X 1 = 0
 FACW species: 21 X 2 = 42
 FAC species: 84 X 3 = 252
 FACU species: _____ X 4 = _____
 UPL species: _____ X 5 = _____
 Column Totals: 105 (A) 294 (B)
 PI = B/A = 2.8

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

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

☐ % Bare Ground
☐ % Cover of Wetland Bryophytes
☒ 95 Total Cover of Bryophytes + Lichen
☐ % Cover of Water

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

WETLAND DETERMINATION DATA FORM

W1060H TOZZ

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	
0i 0-2							Dry mass organics
0e 2-4							Dry organics
A 4-5	10YR 3/2						1/2 cor. v. sandy loam
Bw1 5-12	10YR 4/3	96	5Y 6/1	3	Dep	RC	
			7.5YR 5/4	1	com	M	Fine sandy loam
Bw2 12-24	10YR 5/2	100					extremely gravelly 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: <u>Thixotropic soil but it's dry so not displaying the properties.</u> <u>Very few Redox features.</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>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>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

W10611022

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:

JBrownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106H1022

Field Target: 225

Date: 6.12.16

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?

3. 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)

Kalery Volper

X

Signature / Date

Kalery Volper 6-12-16

X

Field Crew Chief (print)

JBrownlee

X

Signature / Date

JBrownlee 6.12.16

WETLAND DETERMINATION DATA FORM

→ New Contwell 1

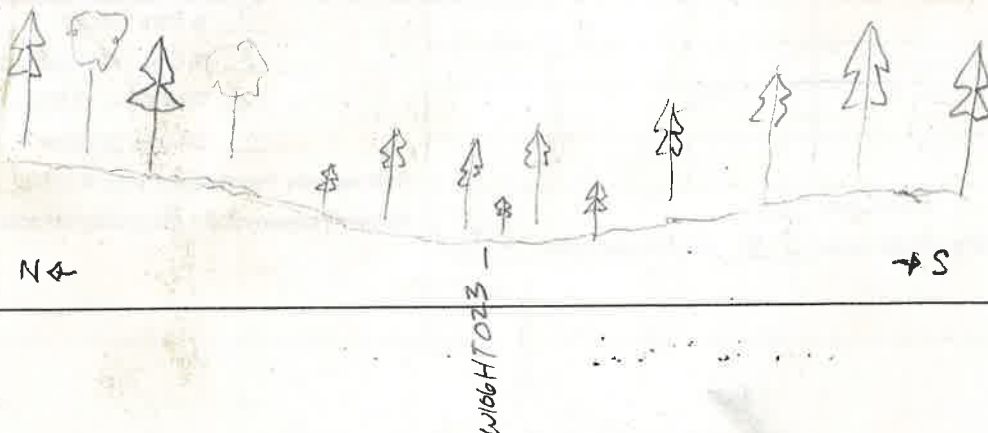
SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <input type="checkbox"/>	Map #: 16 Map Date: 7, 15, 16
Date: 7.27.16	Project Name: Alaska LNG		Feature Id: W106HT023
Investigators: Jessie Brownlee, Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 525	
Latitude: 63°51'21.393"		Longitude: 149°00'38.25"	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 40	Picture No.: P-W106HT023-001 thru -004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1B 11B2, 11C1	Evidence of Wildlife Use: NONE
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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input 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.

Open Pic Cola Forest. Majority of trees are 10-20' but healthy & not stunted. Bet Nan dominates the shrub community. Thick Feather moss abounds. Soil was saturated and sluffing off into hole from the 8-10" layer. Positive && reaction through out the Bw1 horizon but it was faint.

Site was chosen to avoid 'No go' area all around. We were unable to walk entire polygon due to Access restrictions. While this site had marginal wetland indicators the mapped polygon looked like it was getting wetter from what was visible from site here.



WETLAND DETERMINATION DATA FORM

W100H1023

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>	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</u>			
Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendron tomentosum</i>	25	Y	FACW
2. <i>Betula nana</i>	45	Y	FAC
3. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
4. <i>Vaccinium uliginosum</i>	30	Y	FAC
5. <i>Picea glauca</i>	30	Y	FACU
6. <i>Salix bebbiana</i>	1		FAC
7. <i>Salix glauca</i>	7		
8.			
9.			
Total Cover: <u>151</u> 50% of total cover: <u>75.5</u> 20% of total cover: <u>30.2</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 7 (A)
Total Number of Dominant Species Across All Strata: 9 (B)
% Dominant Species that are OBL, FACW, or FAC: 77 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
OBL species: _____ X 1 = _____
FACW species: 28 X 2 = 56
FAC species: 104 X 3 = 312
FACU species: 35 X 4 = 140
UPL species: _____ X 5 = _____
Column Totals: 167 (A) 308 (B)
PI = B/A = 3.04

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Potamogeton amplifolius</i>	3	Y	FACW
2. <i>Equisetum sylvaticum</i>	3	Y	FAC
3. <i>Carex bigelowii</i>	5	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>			

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
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):

WETLAND DETERMINATION DATA FORM

W1044 T023

7.27.16

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
0-4 O ₁							Dry Feather moss
4-6 O ₂							Dry Feather moss
O ₃ A 6-7							Damp organic/mineral
Bw1 7-19	7.5YR 3/2	95	10YR 3/3	3	can	m	silt/loam concentrations are faint + hard to pull out
Bw2 19-24	2.5Y 4/3	100					very 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>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>Yes</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>Yes</u>							
Notes: <u>Positive X X in the Bw1 horizon, somewhat faint though.</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>M</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>M</u> <i>see notes</i>		
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>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>8-10"</u>		EC: <u>—</u>			
Notes: <u>Seep/sluffing soil from 8-10". Soil gets drier with depth. Site is relative Lowland in relation to higher ground to North & South but not in true definition for D2</u>							

AQUATIC SITE ASSESSMENT DATA FORM

W1064T023

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>5</u> Sapling (<5 dbh, <6m tall) <u>30</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>35</u> Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) <u>10</u> Moss-Lichen <u>20</u> 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 _____ 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 _____	
Microlief 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 <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 <input checked="" type="checkbox"/> Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) <input checked="" type="checkbox"/> Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106HT023

Field Target: ^{New}Cantwell 1

Date: 7.27.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Signature / Date

7.27.16

WETLAND DETERMINATION DATA FORM

W106/LH001

6.13.16

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)	%				
01 0-4								Dry feather moss
02 4-6								damp organic s
A 6-9	10YR 3/1	100					Silt loam	
B ₁ 9-11.5	10YR 4/2	80	10YR 4/3	20	com	m	fine sandy loam	Con are a interface w/upper hor
B ₂ 11.5-14	10YR 4/1	100					Silt loam	
B ₃ 14-20	10YR 4/3	80	7.5YR 4/4	20	com	m	loamy sand	Con are a interface w/upper B ₂ hor
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)		
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>9 in</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Negative OX throughout</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>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>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>8</u>		EC: <u>-</u>				
Notes:								

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/> Facility		Field Target: <u>245</u>	Map #: <u>74</u> Map Date: <u>5-27-16</u>
Date: <u>6-13-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH001</u>
Investigators: <u>Jessie Braumlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>517.8</u>	
Latitude: <u>63° 56' 7.3852" N</u>		Longitude: <u>149° 5' 39.6785" W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>43</u>	Picture No.: <u>P-W106LH001</u>	

SITE PARAMETERS	
Subregion: <u>Alaska Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hill side</u>
Slope (%): <u>5-8%</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>U</u>	Evidence of Wildlife Use: <u>Langomys p. 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 <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>1A3, 11C1</u>

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/ ~20% Pic Cola trees & saplings.
Low diversity.
Soils have seasonal frost starting @ 9 inches and shows signs of being saturated between 11-14 inches long enough during the growing season for concentrations to translocate above & interface w/ A and below as frost melts away. Soils did not react to XX. Current saturation likely due to day & 1/2 of rain yesterday. After ~30 minutes the pit had a little water in it but not much @ all in contrast to W106LH001-OP3 that immediately started to fill in w/ From 2" depth + ^{with} good flow.
Site is transition zone and is wetland by ^{W106}LH001-OP3. Recommend site revisit.

WETLAND DETERMINATION DATA FORM

W106LH001

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>1m</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Glauca</i>	15	Y	FACU
2.			
3.			
4.			
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	65	Y	FAC
2. <i>vaccinium uliginosum</i>	15		FAC
3. <i>vaccinium vitis-idaea</i>	20	Y	FAC
4. <i>Picea glauca</i>	3		FACU
5. <i>Betula hybrid</i>	3		FAC
6.			
7.			
8.			
9.			
Total Cover: <u>106</u> 50% of total cover: <u>53</u> 20% of total cover: <u>21.2</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: _____ X 2 = _____
 FAC species: 110 X 3 = 330
 FACU species: 18 X 4 = 72
 UPL species: _____ X 5 = _____
 Column Totals: 128 (A) 402 (B)
 PI = B/A = 274

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	T		FAC
2. <i>Calamagrostis lapponica</i>	2	Y	FAC
3. <i>Petasites Frigidus</i>	T		FACW
4. <i>Rhododendrum groenlandicum</i>	T		FAC
5. <i>Mertensia paniculata</i>	T		FACU
6. <i>Carex bigelowii</i>	5	Y	FAC
7. <i>Trientalis europaea</i>	T		FACU
8. <i>Stellaria sp</i>	T		
9.			
10.			
Total Cover: <u>7</u> 50% of total cover: <u>3.5</u> 20% of total cover: <u>1.4</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.

☐ % 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):

AQUATIC SITE ASSESSMENT DATA FORM

W1062H001

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:

J Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH001

Field Target: 245

Date: 10.13.16

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

X

Naley Volper

Wetland Scientist (print)

X

Naley Volper 6-13-16

Signature / Date

X

J Browlee

Field Crew Chief (print)

X

J Browlee 6-13-16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>Facility</i>
Field Target: <i>249</i>		Map #: <i>72</i> Map Date: <i>5-27-16</i>	
Date: <i>6-13-16</i>	Project Name: Alaska LNG		Feature Id: <i>W106LH002</i>
Investigators: <i>Jessie Brownlee, Kaley Volper</i>			Team No.: <i>W106</i>
State: Alaska	Region: Alaska	Milepost: <i>507.4</i>	
Latitude: <i>64° 5' 55.2678" N</i>	Longitude: <i>149° 13' 29.5685" W</i>	Datum: WGS84	
Logbook No.: <i>1</i>	Logbook Page No.: <i>44</i>	Picture No.: <i>P-W106LH002-001 through 004</i>	

SITE PARAMETERS	
Subregion: <i>Tanana-Kuskokwim Lowlands</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Lowland</i>
Slope (%): <i>3-5</i>	Local relief (concave, convex, none): <i>Flat/hummocky</i>
Pre-mapped Alaska LNG/NWI classification: <i>U</i>	Evidence of Wildlife Use: <i>bear scat</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 checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <i>U</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): <i>1A2, 11C2</i>

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

Open Pic Mar Forest w/ thick moss cover & frost @ 9". Organics are ^{only} damp @ 6-8" even after rain the day before. Cryoturbation present in the upper frost layer. Lower 2.5' color is parent material related & therefore ^{not} calling "2.5' w/ Redox"

W106LH002-OP overlooking PubH that's too small to map. Border is between Paper point & OP. PSS4/1F.

WETLAND DETERMINATION DATA FORM

W106 LH002

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> "30"	30	Y	FACW
2.			
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
2. <i>Rhododendron groenlandicum</i>	15	Y	FAC
3. <i>Vaccinium uliginosum</i>	1		FAC
4. <i>Picea mariana</i>	20	Y	FACW
5. <i>Salix pulchra</i>	3		FACW
6. <i>Empetrum nigrum</i>	1		FAC
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: 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: _____ X 1 = _____

FACW species: 43 X 2 = 86

FAC species: 58 X 3 = 174

FACU species: _____ X 4 = _____

UPL species: _____ X 5 = _____

Column Totals: 101 (A) 260 (B)

PI = B/A = 2.57

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	8	Y	FACW
2. <i>Carex bigelowii</i>	20	Y	FAC
3. <i>Calamagrostis lapponica</i>	1		FAC
4. <i>Aster</i> sp	T		
5. <i>Carex lasiocarpa</i>	T		FACW
6. <i>Petasites frigidus</i>	T		FACW
7. <i>Equisetum pratense</i>	T		FAC
8.			
9.			
10.			

Total Cover: 29

50% of total cover: 14.5 20% of total cover: 5.8

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.

0 % Bare Ground

15 % 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

W106LH002

6.13.16

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	
0-6								Dry Feather moss	
6-8								Damp organics	
A BwF 8-12	10YR 3/2	75	7.5YR 3/4	10	con	matrix	very fine sandy loam		
	10YR 2/1 organic	15							
BwF	2.5Y 5/1	90	7.5YR 4/6	10	con	matrix	Silt	very dry, likely	
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 (not saturated)</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>8</u>									
Hydric Soil Present (Y/N): <u>N</u>									
Notes: <u>see notes on front</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>Y</u> (Due to ice)			
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>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>N</u>		Depth (in): <u>-</u>		Wetland Hydrology Present (Y/N): <u>Y</u> (secondary indicators)					
Water Table Present (Y/N): <u>N</u>		Depth (in): <u>-</u>							
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>-</u>							
Notes: <u>Frost started melting @ interface after hole was open for while</u>									

AQUATIC SITE ASSESSMENT DATA FORM

W106LH002

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:

J Browlee

GPS Technician QA/QC check:

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH002

Field Target: 249

Date: 6.13.16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper 6-13-16

Signature / Date

X

J Brounlee

Field Crew Chief (print)

X

[Signature] 6-13-16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 255	Map #: 666 Map Date: 5.27.16
Date: 6.20.16	Project Name: Alaska LNG		Feature Id: W106LH003
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 468.1	
Latitude: 64°37'47.830"N	Longitude: 149°4'21.856"W	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 0	Picture No.: P-W106LH003-001 thru 004	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 0-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SSIC	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: PEMIF
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): III A 3

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

Swaling feature with Cal Can and Car Utr + Compel. Standing water > 12" deep
 Surrounding forest is mosaic of Predominantly wetlands w/ upland inclusions.
 Ponds & swales pot mark the walk in with vegetation clustering on hummocky drier spots. Calla Palustris is growing in most water bodies.
 Surrounding forest is PF01/SSIB



*Tablet stopped working after this point & was unable to get OP's.
 on a straight line from this point walking to car, all area
 was wet w/ dry inclusions up until: 64.62851 -149.06970 which was a V:1C2,11C2
 forest & Dry all way to car (Highway).

WETLAND DETERMINATION DATA FORM

W106LH003

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)

	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 (26)

	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neoalaskana</i>	T		FACW
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: 61 X 1 = 61

FACW species: — X 2 = —

FAC species: 5 X 3 = 15

FACU species: — X 4 = —

UPL species: — X 5 = —

Column Totals: 166 (A) 76 (B)

PI = B/A = 1.15

Plot size adjusted to match Wetland Polygon & not the surrounding Forest

VEGETATION (use scientific names of plants)

Herb Stratum (26)

	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Comarum palustre</i>	10		OBL
2. <i>Calamagrostis canadensis</i>	5		FAC
3. <i>Galium trifidum</i>	T		FACW
4. <i>Carex utriculata</i>	50	Y	OBL
5. <i>Carex sp</i>	4		—
6. <i>Calla palustris</i>	1		OBL
7.			
8.			
9.			
10.			

Total Cover: 70

50% of total cover: 35 20% of total cover: 14

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.

0 % Bare Ground

5 % Cover of Wetland Bryophytes

5 Total Cover of Bryophytes

25 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

W106LH003

6-20-16

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

^aOne indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

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

Notes:

Surface Water Present (Y/N): <u>Y</u>	Depth (in): <u>12 + "</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0</u>	EC: <u>71</u> <u>pH 5.34</u>

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

LH003
W106

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) <input type="checkbox"/> Sapling (<5 dbh, <6m tall) <input type="checkbox"/> Tall shrub (2-6m) <input type="checkbox"/> Short shrub (0.5-2m) <input type="checkbox"/> Dwarf shrub (<0.5m) <input type="checkbox"/> Tall herb (≥1m) <input type="checkbox"/> Short herb (<1m) <input checked="" type="checkbox"/> Moss-Lichen <input type="checkbox"/> Floating <input type="checkbox"/> Submerged <input type="checkbox"/>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <input checked="" type="checkbox"/> Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <input checked="" type="checkbox"/> Very High Density (80-100%) <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 <input checked="" type="checkbox"/> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine 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/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 _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>5.34</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:

J. Brownlee

WV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH003 Field Target: 255 Date: 6/20/16

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

X Haley Valper

Wetland Scientist (print)

X Haley Valper

Signature / Date

6/22/16

X JTBrownlee

Field Crew Chief (print)

X JTBrownlee

Signature / Date

6-22-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 254	Map #: 67 Map Date: 5.27.16
Date: 6-20-16	Project Name: Alaska LNG		Feature Id: W106LH004
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 471.9	
Latitude: 64.58475		Longitude: 149.11446	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 6	Picture No.: P-W106LH004-001 thru 004	

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: PEMIB	Evidence of Wildlife Use: browse vegetation
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): IIIA 2, IIB 2

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

Area is much drier than currently mapped. Imagery for area must have been flown during a very wet year & time.

Soil shows consistent saturation & watertable to a depth of 12-15"

Watertable ¹⁵ was expected to rise to 15" @ time of visit.

This wet/dry boundary to east is not that far from this point.

On walk back to truck we came across a few small 12" deep ponds that should be PEMIF but most other areas should turn to PEMIB

At location of site there was a lot higher % of willows shrubs than in most of other area.

Cal Can was hummocking throughout site.

*GPS tablet wasn't working so no ops were collected

WETLAND DETERMINATION DATA FORM

W106L4004

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 (100 <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix glauca</i>	20	Y	FAC
2. <i>Salix pulchra</i>	T		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 20

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

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: 55 X 1 = 55

FACW species: 0 X 2 = 0

FAC species: 55 X 3 = 165

FACU species: 0 X 4 = 0

UPL species: 0 X 5 = 0

Column Totals: 110 (A) 220 (B)

PI = B/A = 2.0

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	30	Y	FAC
2. <i>Equisetum fluviale</i>	30	Y	OBL
3. <i>Carex macrophyllum</i>	5		FAC
4. <i>Galium trifidum</i>	T		FACW
5. <i>Achillea millefolium</i>	T		FACU
6. <i>Equisetum Arvense</i>	T		FAC
7. <i>Rumex</i> sp	T		
8. <i>Stellaria</i> sp	T		
9. <i>Carex utriculata</i>	25	Y	OBL
10. <i>Comarum palustre</i>	T		OBL

Total Cover: 90

50% of total cover: 45 20% of total cover: 18

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.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106LH004

6.20.16

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/Bw 0-10	10YR 7/2	75					Silt/loam	2 horizons have much mixing
	2.5Y 4/2	20	7.5YR 4/4	5	con	RC M		
Rg 10-24	2.5Y 3/1	75	7.5YR 4/4	25	con	M RC	Silt	Thixotropic & bulging
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>-</u>			Alaska Gleyed (A13) <u>-</u>			Alaska Color Change (TA4) ⁴ <u>-</u>		
Histic Epipedon (A2) <u>-</u>			Alaska Redox (A14) <u>-</u>			Alaska Alpine Swales (TA5) <u>-</u>		
Black Histic (A3) <u>-</u>			Alaska Gleyed Pores (A15) <u>-</u>			Alaska Redox with 2.5Y Hue <u>Y</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)		
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: Soil high in mica. I believe the soil Parent Material already starts out on the 2.5Y page but still calling hydric soils given presence of water & OBL species.								
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>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>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>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>See Note</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>10</u>		EC: <u>192</u> pH <u>5.94</u>				
Notes: water has seeped in to a depth of 2" after 30 minutes. Seeping starts from a depth of 15" and I expect the water table to rise to this height.								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH004

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) <input type="radio"/> Sapling (<5 dbh, <6m tall) <input type="radio"/> Tall shrub (2-6m) <input type="radio"/> Short shrub (0.5-2m) <u>15</u> Dwarf shrub (<0.5m) <input type="radio"/> Tall herb (>1m) <input type="radio"/> Short herb (<1m) <u>85</u> Moss-Lichen <input type="radio"/> Floating <input type="radio"/> Submerged <input type="radio"/>		
Number of Wetland Types (M): <u>1</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) _____ 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 _____ 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 _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.94</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 <input checked="" type="checkbox"/> Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <input checked="" type="checkbox"/>	
Watershed Land Use: 0-5% Rural <input checked="" type="checkbox"/> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J. Browner

4V

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH004 Field Target: 254 Date: 6-20-16

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

X

Haley Volper

Wetland Scientist (print)

X

Haley Volper

Signature / Date

6/22/16

X

J. Brantley

Field Crew Chief (print)

X

[Signature]

Signature / Date

6-22-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline _____ Access Road (explain) _____ Other (explain) <u>Facility</u>		Field Target <u>258</u>	Map #: <u>63</u> Map Date: <u>5.27</u>
Date: <u>6-21-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH005</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>457</u>	
Latitude: <u>64.75605</u>		Longitude: <u>148.81113</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>1</u>	Picture No.: <u>P-W106LH005_001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Yukon Tanana Uplands</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>PFO4/SS1B 1A2 11C1</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 <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PFO4/SS1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Viereck): <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.

Open Pic Mar forest w/ diverse shrub understory & thick feather moss. small scattered pockets of surface water & water table @ ~3". Permafrost @ 10" w/ organic soil 10+."

* no tablet today. Spot on map is approximate

WETLAND DETERMINATION DATA FORM

W106LH005

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>	28	Y	FACU
2. <i>Betula Neolaskana</i>	2		FACU
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium uliginosum</i>	20	Y	FAC
2. <i>Arctostaphylos rubra</i>	10		FAC
3. <i>Salix pulchra</i>	3		FACU
4. <i>Rhododendrum groenlandicum</i>	10		FAC
5. <i>Betula glandulosa</i>	2		FAC
6. <i>Vaccinium vitis-idaea</i>	15	Y	FAC
7. <i>Rosa acicularis</i>	4		FACU
8. <i>Betula neolaskana</i>	7		FACU
9. <i>Picea glauca</i>	15	Y	FACU

Betula nana FAC Total Cover: 79

50% of total cover: 39.5 20% of total cover: 15.8

Empetrum nigrum 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: — X 1 = —

FACW species: 31 X 2 = 62

FAC species: 69 X 3 = 207

FACU species: 39 X 4 = 156

UPL species: — X 5 = —

Column Totals: 139 (A) 425 (B)

PI = B/A = 3.05

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum scirpoides</i>	8	Y	FACU
2. <i>Equisetum arvense</i>	12	Y	FAC
3. <i>Calamagrostis lapponica</i>	T		FAC
4. <i>Cornus canadensis</i>	3		FACU
5. <i>Valeriana capitata</i>	T		FAC
6. <i>Petasites frigidus</i>	T		FACU
7. <i>Geocaulon lividum</i>	7	Y	FACU
8. <i>Pedicularis sp</i>	T		—
9. <i>Mertensia paniculata</i>	T		FACU
10.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

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

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106LH005

6-21-14

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		
0i 0-3								Saturated organics
0e 3-10								"
0ef 10-t								Frozen 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 SOILS ³		
Histosol or Histel (A1) <u>-</u>			Alaska Gleyed (A13) <u>-</u>			Alaska Color Change (TA4) ⁴ <u>-</u>		
Histic Epipedon (A2) <u>Y</u>			Alaska Redox (A14) <u>-</u>			Alaska Alpine Swales (TA5) <u>-</u>		
Black Histic (A3) <u>-</u>			Alaska Gleyed Pores (A15) <u>-</u>			Alaska Redox with 2.5Y Hue <u>-</u>		
Hydrogen Sulfide (A4) <u>-</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>-</u>		
Thick Dark Surface (A12) <u>-</u>						Other (Explain in Notes) <u>-</u>		
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>Permafrost</u> Depth (inches): <u>10</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
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>-</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>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</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>3</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>0</u>						
EC: <u>58</u> <u>4.9</u>								
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH005

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>15</u> Tall shrub (2-6m) <u>6</u> Short shrub (0.5-2m) <u>30</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>15</u> Moss-Lichen <u>20</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>		Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>X</u> N/A _____ <i>tiny amount of water</i>		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ 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 _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.9</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:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH005

Field Target: 258

Date: 6-21-15

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)

X

Signature / Date

X

JBrownlee

Field Crew Chief (print)

X

fBrown 6.21.16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>Facility</i>
Field Target: <i>259</i>		Map #: <i>62</i> Map Date: <i>5.27.16</i>	
Date: <i>6-21-16</i>	Project Name: Alaska LNG		Feature Id: <i>W106LH006</i>
Investigators: <i>Jessie Brownee, Kaley Volper</i>			Team No.: <i>W106</i>
State: Alaska	Region: Alaska	Milepost: <i>450</i>	
Latitude: <i>64.84195</i>		Longitude: <i>-148.78056</i>	Datum: WGS84
Logbook No.: <i>2</i>	Logbook Page No.: <i>2</i>	Picture No.: <i>P-W106LH006-001 thru 004</i>	

SITE PARAMETERS	
Subregion: <i>Tanana Kuskokwim Lowlands</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Lowland/terrace</i>
Slope (%): <i>3-5</i>	Local relief (concave, convex, none): <i>undulating</i>
Pre-mapped Alaska LNG/NWI classification: <i>P554/F0413</i>	Evidence of Wildlife Use: <i>Bear scat, Moose hair</i>
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 (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: <i>PE04/SS1B</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): <i>1A2, 11C2</i>

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

* Note: tablet was broken. GPS points taken on garmin. Points on map are approximate.
 Dry to here. This is boundary.
 On transect from LZ the areas we explored were dry.
 This point marks the wet Dry boundary with the N + NE being dry.

WETLAND DETERMINATION DATA FORM

W106LH006

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>5</u> (A)
1.	<i>Picea Mariana</i>	<u>35</u>	<u>Y</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
2.					% Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
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>83</u> X 2 = <u>166</u> FAC species: <u>86</u> X 3 = <u>258</u> FACU species: <u>3</u> X 4 = <u>12</u> UPL species: _____ X 5 = _____ Column Totals: <u>97</u> (A) <u>241</u> (B) PI = B/A = <u>2.48</u>
Sapling/Shrub Stratum (<u>20</u>)					
		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1.	<i>Rhododendrum groenlandicum</i>	<u>45</u>	<u>Y</u>	<u>FAC</u>	
2.	<i>Rosa acicularis</i>	<u>3</u>		<u>FACU</u>	
3.	<i>Betula nroalaskana</i>	<u>3</u>		<u>FAC</u>	
4.	<i>Vaccinium uliginosum</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>	
5.	<i>Empetrum nigrum</i>	<u>7</u>		<u>FAC</u>	
6.	<i>Vaccinium vitis-idaea</i>	<u>10</u>		<u>FAC</u>	
7.	<i>Picea Mariana</i>	<u>15</u>		<u>FACW</u>	
8.	<i>Salix sp</i>	<u>7</u>			
9.					
Total Cover: <u>101</u> 50% of total cover: <u>50.5</u> 20% of total cover: <u>20.2</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>20</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1.	<i>Equisetum pratense</i>	<u>7</u>		<u>FACW</u>	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2.	<i>Calamagrostis lapponica</i>	<u>3</u>	<u>Y</u>	<u>FAC</u>	
3.	<i>Rubus chamaemorus</i>	<u>3</u>	<u>Y</u>	<u>FACW</u>	
4.	<i>Cornus canadensis</i>	<u>7</u>		<u>FACU</u>	
5.	<i>Cornus sp</i>	<u>1</u>			
6.					
7.					
8.					
9.					
10.					
Total Cover: <u>7</u> 50% of total cover: <u>3.5</u> 20% of total cover: <u>1.4</u>					% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>50</u> Total Cover of Bryophytes: <u>100</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):

W106LH/CX12

6-21-16

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106LH006

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) <u>40</u> Sapling (<5 dbh, <6m tall) <u>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>30</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>10</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 <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 _____ 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 _____ Fluvaquent Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent <u>X</u> Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.5</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:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH006

Field Target: 259

Date: 6.21.16

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)?
- ☒ 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

J. Browlee

J. Browlee 6.21.16

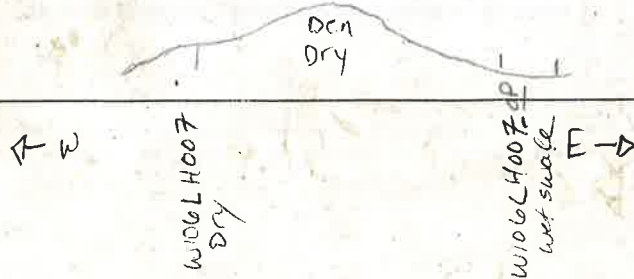
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>256</u>	Map #: <u>64</u> Map Date: <u>5.27.16</u>
Date: <u>6-21-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH007</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>461.7</u>	
Latitude: <u>64.70283° N</u>	Longitude: <u>148.9528° W</u>	Datum: WGS84	
Logbook No.: <u>2</u>	Logbook Page No.: <u>3</u>	Picture No.: <u>P-W106LH007-001 thru 003</u>	

SITE PARAMETERS	
Subregion: <u>Tanana Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland</u>
Slope (%): <u>0.2</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4/FO4B 1A2</u>	Evidence of Wildlife Use: <u>Wolf Den</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>J</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): <u>1A 2, 1C2</u>

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

Tall Pic Mar open forest ~ 40' tall w/ shrub community
Thick Feather moss cover everything. Seasonal frost starting @
9 AM. Raine today & yesterday resulting in pit filling up but not calling a
water table because ^{water is} surface run off. Neg $\alpha\alpha$ through out and lacks soil indicators.
Plot on back side of higher, drier ground that appears to be a wolf den.
This point marks the boundary between wet to the NW and Dry to
the south abng a slightly higher ground compared to surrounding wetland
site revisit is recommended
W106LH007-OP has active flow & issuing feature on the East side of Den



WETLAND DETERMINATION DATA FORM

W106LH007

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>	30	Y	FACW
2. <i>Betula neoalaskana</i>	2		FAC
3.			
4.			
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>85.7</u> (A/B)			
Prevalence Index worksheet: Total % Cover of: <u>32</u> Multiply by: <u>64</u> 50% of total cover: <u>16</u> 20% of total cover: <u>6.4</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendrum groenlandicum</i>	20	Y	FAC
2. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
3. <i>Linnæa borealis</i>	7		FACU
4. <i>Arctostaphylos</i>	4		FAC
5. <i>Betula glandulosa</i>	2		FAC
6. <i>Picea canadensis mariana</i>	4.5	Y	FACW
7. <i>Betula neoalaskana</i>	1		FAC
8. <i>Salix glauca</i>	10		FAC
9. <i>Empetrum nigrum</i>	5		FAC
Total Cover: <u>83</u> 50% of total cover: <u>41.5</u> 20% of total cover: <u>16.6</u>			

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species: <u>—</u>	X 1 = <u>—</u>
FACW species: <u>46</u>	X 2 = <u>92</u>
FAC species: <u>73</u>	X 3 = <u>219</u>
FACU species: <u>12</u>	X 4 = <u>48</u>
UPL species: <u>—</u>	X 5 = <u>—</u>
Column Totals: <u>131</u>	(A) <u>359</u> (B)
PI = B/A = <u>2.74</u>	

Vaccinium uliginosum 5 H Y FAC
Rosa acicularis T H Y FACU

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum scirpoides</i>	1		FACU
2. <i>Equisetum pratense</i>	1		FACW
3. <i>Carex lasiocarpa</i>	5	Y	FACU
4. <i>Cornus canadensis</i>	1		FACU
5. <i>Pedicularis sp</i>	1		—
6. <i>Fern sp</i>	1		—
7. <i>Calamagrostis hyperborea</i>	5	Y	FAC
8.			
9.			
10.			
Total Cover: <u>10</u> 50% of total cover: <u>5</u> 20% of total cover: <u>2</u> <u>8</u> <u>3.2</u>			

Hydrophytic Vegetation Indicators:	
<u>Y</u> Dominance Test is > 50%	
<u>Y</u> Prevalence Index is ≤ 3.0	
<u>—</u> Morphological Adaptations ¹ (Provide supporting data in Notes)	
<u>—</u> 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>00</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

W106LH007

6-25-14

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 0-5								
02 5-6								
A 6-7	10YR 2/1	100						silt loam
Bud 7-8	10YR 4/2	90	7.5YR 4/4	10	con	M		silt loam
Bud 9-10	10YR 4/2	95	10YR 5/3	5	con	M		silt loam
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS				INDICATORS FOR PROBLEMATIC HYDRIC SOILS³				
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> </u>		Alaska Gleyed Pores (A15) <u> </u>		Alaska Redox with 2.5Y Hue <u> </u>				
Hydrogen Sulfide (A4) <u> </u>				Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>				
Thick Dark Surface (A12) <u> </u>				Other (Explain in Notes) <u> </u>				
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>Seasonal Frost</u> Depth (inches): <u>9</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Neg. D.O.</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 see note</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>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: Not calling water table despite water in p.t. It's rained hard the past few days and it's run off in.						
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 see note</u>		Depth (in): <u> </u>						
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u> </u>		EC: <u>76</u> pH <u>5.3</u>				
Notes: <u>Didn't record depth in field but noted presence of saturation</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH007

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:

J. Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH007

Field Target: 256

Date: 6.21.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

J. Brainlee

X

Signature / Date

J. Brainlee 6.20.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>262</u>	Map #: <u>160</u> Map Date: <u>5-27-16</u>
Date: <u>6-22-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH008</u>
Investigators: <u>Jessie Brownlee Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>441.8</u>	
Latitude: <u>64° 56' 28.865"</u>		Longitude: <u>-148° 41' 22.550"</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>4</u>	Picture No.: <u>P-W106LH008-001 thru -004</u>	

SITE PARAMETERS

Subregion: <u>Tanana Kuskokwim Lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hillside / lowland</u>
Slope (%): <u>5-8</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PFOY/554B</u>	Evidence of Wildlife Use: <u>squirrel highway</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>J</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2, 11A2</u>

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

Open Pic Mar forest w/ low diversity & thick Peat moss.
Almost all of Transect from L2 to here was wet. It dries up just to the west (see map update) at ^{slight} elevation gain.
Continued to walk the center line to 008-OP which was still dry.

WETLAND DETERMINATION DATA FORM

W106LH008

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>	30	Y	FACW
2.			
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendrum groenlandicum</i>	3		FAC
2. <i>Vaccinium uliginosum</i>	5		FAC
3. <i>Rosa acicularis</i>	T		FACU
4. <i>Alnus viridis</i>	5		FAC
5. <i>Picea Mariana</i>	20	Y	FACW
6. <i>Vaccinium uliginosum</i>	2		FAC
7. <i>Salix sp</i>	T		
8.			
9.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

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: _____ X 1 = _____

FACW species: 53 X 2 = 106

FAC species: 17 X 3 = 51

FACU species: _____ X 4 = _____

UPL species: _____ X 5 = _____

Column Totals: 70 (A) 157 (B)

PI = B/A = 2.24

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	1		FACW
2. <i>Equisetum pratense</i>	2	Y	FACW
3. <i>Mertensia paniculata</i>	T		FACU
4. <i>Cornus canadensis</i>	T		FACU
5. <i>Petasites Frigidus</i>	T		FACW
6. <i>Calamagrostis canadensis</i>	2	Y	FAC
7.			
8.			
9.			
10.			

Total Cover: 5

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%
Y Prevalence Index is ≤ 3.0
- Morphological Adaptations¹ (Provide supporting data in Notes)

Y 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):

WETLAND DETERMINATION DATA FORM

W106LH008

6.22.16

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	0-6							Dry Feather moss
6-11	6-11							Damp organics
Bw1f 11-15	10YR 4/2	30	10YR 3/4	5	Con	M	Silt/loam	Dark color is O/A material
	10YR 2/2	25						Being cryotested
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>-</u>			Alaska Gleyed (A13) <u>-</u>			Alaska Color Change (TA4) ⁴ <u>-</u>		
Histic Epipedon (A2) <u>-</u>			Alaska Redox (A14) <u>-</u>			Alaska Alpine Swales (TA5) <u>-</u>		
Black Histic (A3) <u>-</u>			Alaska Gleyed Pores (A15) <u>-</u>			Alaska Redox with 2.5Y Hue <u>-</u>		
Hydrogen Sulfide (A4) <u>-</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>-</u>		
Thick Dark Surface (A12) <u>-</u>						Other (Explain in Notes)		
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>Frost</u> Depth (inches): <u>11</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Not calling A2 despite Feather Moss thickness. Being</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>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):						
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: <u>Weak Secondary Indicators only</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106L4008

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:

CV

J. Browlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH008

Field Target: 262

Date: 8-22-16

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

X Haley Volper X Haley Volper 6-27-16
Wetland Scientist (print) Signature / Date

X J Brainerd X J Brainerd 6-22-16
Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>265</u>	Map #: <u>51</u> Map Date: <u>5-27-16</u>
Date: <u>6-22-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH009</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>440.2</u>	
Latitude: <u>64.962975° N</u>		Longitude: <u>-148.683889°</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>4</u>	Picture No.: <u>P-W106LH009-001 thru 004</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>PSS1/EM1B</u>	Evidence of Wildlife Use: <u>moose browse</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>PSS1B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11C1</u>

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

Shrub Community of Bet Nara, Bet Glen, Cha Cal, & Vac Oli.

All wet from LZ to here. All wet from here to LZ via different route.

Helicopter came a little early & couldn't land easily due to wetness so we couldn't do any OP's.

WETLAND DETERMINATION DATA FORM

W106LH009

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Larix laricina</i>	1		FACW
2. <i>Picea Glauca</i>	8	Y	FACU
3. <i>Betula neoalastana</i>	1		FAC
4.			
Total Cover: <u>10</u>			
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>			
Sapling/Shrub Stratum (<u>25</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Chamaecyparis calycodonta</i>	30	Y	FACW
2. <i>Salix fuscescens</i>	3		FACW
3. <i>Betula nana</i>	15		FAC
4. <i>Larix laricina</i>	3		FACW
5. <i>Picea Glauca</i>	2		FACU
6. <i>Betula neoalastana</i>	2		FAC
7. <i>Vaccinium ciliatum</i>	20	Y	FAC
8. <i>Rhododendron groenlandicum</i>	1		FAC
9. <i>Betula glandulosa</i>	10		FAC
Total Cover: <u>85</u>			
50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 % Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
 OBL species: - X 1 = _____
 FACW species: 37 X 2 = 74
 FAC species: 55 X 3 = 165
 FACU species: 10 X 4 = 40
 UPL species: _____ X 5 = _____
 Column Totals: 102 (A) 279 (B)
 PI = B/A = 2.73

VEGETATION (use scientific names of plants)

Herb Stratum (<u>25</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	5	Y	FAC
2. <i>Panicum sp</i>	1		
3. <i>Equisetum arvense</i>	1		FAC
4. <i>Potamogeton frigidus</i>	1		FACW
5. <i>Comarostaphylis palustris</i>	1		OBL
6. <i>Carex bigelowii</i>	1		FAC
7.			
8.			
9.			
10.			
Total Cover: <u>8</u>			
50% of total cover: <u>4</u> 20% of total cover: _____			

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.

0 % Bare Ground
25 % Cover of Wetland Bryophytes
45 Total Cover of Bryophytes
3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106LH009

6-22-16

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								Saturated organics							
4-16															
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															
Histosol or Histel (A1) <u>X</u>			Alaska Gleyed (A13) <u> </u>			INDICATORS FOR PROBLEMATIC HYDRIC SOILS³									
Histic Epipedon (A2) <u> </u>			Alaska Redox (A14) <u> </u>			Alaska Color Change (TA4) ⁴ <u> </u>									
Black Histic (A3) <u> </u>			Alaska Gleyed Pores (A15) <u> </u>			Alaska Alpine Swales (TA5) <u> </u>									
Hydrogen Sulfide (A4) <u> </u>						Alaska Redox with 2.5Y Hue <u> </u>									
Thick Dark Surface (A12) <u> </u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u> </u>									
						Other (Explain in Notes)									
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>Frost</u> Depth (inches): <u>11</u>															
Hydric Soil Present (Y/N): <u>Y</u>															
Notes:															
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)															
Surface Water (A1) <u>Y</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>Y</u>		Inundation Visible on Aerial Imagery (B7) <u> </u>		Drainage Patterns (B10) <u> </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>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> </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> </u>															
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>Surface Water Present (Y/N): <u>Y</u></td> <td>Depth (in): <u>4</u></td> <td rowspan="3">Wetland Hydrology Present (Y/N): <u>Y</u></td> </tr> <tr> <td>Water Table Present (Y/N): <u>Y</u></td> <td>Depth (in): <u>3</u></td> </tr> <tr> <td>Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)</td> <td>Depth (in): <u>Ø</u></td> </tr> </table>									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>3</u>	Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>Ø</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>3</u>														
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>Ø</u>														
EC: <u>65</u> pH <u>5.81</u> Notes:															

AQUATIC SITE ASSESSMENT DATA FORM

W106LH009

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 X
 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) 10 Sapling (<5 dbh, <6m tall) 4 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 30
 Dwarf shrub (<0.5m) 0 Tall herb (>1m) 0 Short herb (<1m) 11 Moss-Lichen 5 Floating 0 Submerged 0

Number of Wetland Types (M): 3 Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) X

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 X N/A _____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X 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 X

Dead Woody Material (P): Low Abundance (0-25% of surface) X 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) X

HGM Class (P): Slope X Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X 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 X
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____

Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) X Pronounced (>18in.) _____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____

Degree of Outlet Restriction (P): No Outflow X Restricted Outflow _____ Unrestricted Outflow _____

Water pH (P): No surface water _____ Circumneutral (5.5-7.4) X Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading 5.81

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits 1
 Glacial Till/Not Permeable _____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%) _____

Evidence of Seeps and Springs (P): No Seeps or Springs X 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 X Unknown _____

Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____

Size: Small (<10 acres) _____ Medium (10-100 acres) X Large (>100 acres) _____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J. Brownlee

CV

W106L#009

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106L#009

Field Target: 265

Date: 6-22-16

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

X Haley Volper X Haley Volper 6-27-16
Wetland Scientist (print) Signature / Date

X J Brownlee X J Brownlee 6.22.16
Field Crew Chief (print) Signature / Date

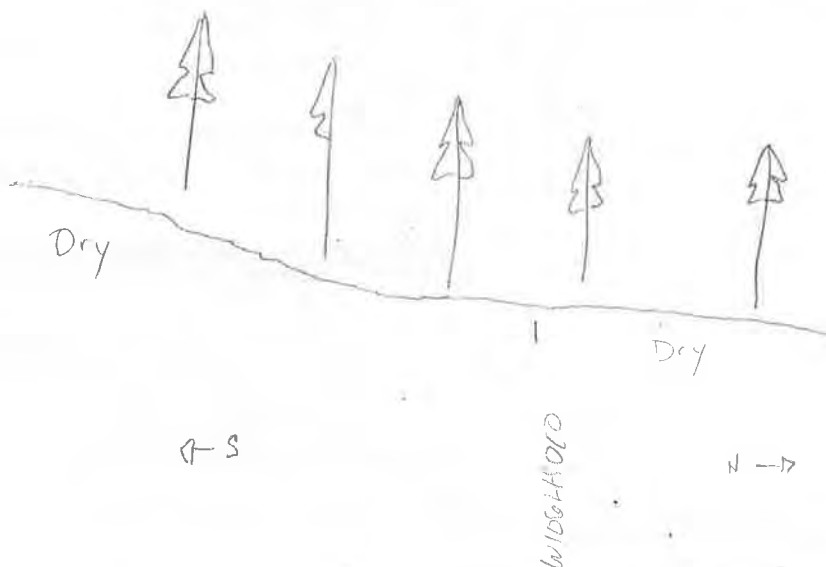
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <u>Facility</u>	Field Target: <u>260</u>
Date: <u>6.22.2016</u>	Project Name: Alaska LNG		Map #: <u>61</u> Map Date: <u>5.27.16</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Feature Id: <u>W106LH010</u>
State: Alaska	Region: Alaska	Milepost: <u>445.2</u>	Team No.: <u>W106</u>
Latitude: <u>64.892749</u>	Longitude: <u>-148.683006</u>		Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>5</u>	Picture No.: <u>P-W106LH010-001 Thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Yukon-Tanana Uplands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>5-8</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PFOY/SS4B 1A2</u>	Evidence of Wildlife Use: <u>moose tracks</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>11 A 1</u>

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

stunted
Dry Spruce forest ~20' tall with thick feather moss & low diversity.
Frost @ 10"



WETLAND DETERMINATION DATA FORM

W106LH010

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>	1		FACU
2. <i>Picea Mariana</i>	1		FACU
3. (move to shrub layer)			
4.			
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rhododendrum groenlandicum</i> 4			FAC
2. <i>Vaccinium vitis-idaea</i>	1		FAC
3. <i>Vaccinium uliginosum</i>	T		FAC
4. <i>Picea Mariana</i>	30	Y	FACU
5. <i>Picea Glauca</i>	20	Y	FACU
6.			
7.			
8.			
9.			
Total Cover: <u>57</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: 3 (B)
 % Dominant Species that are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: 31 X 2 = 62
 FAC species: 10 X 3 = 30
 FACU species: 21 X 4 = 84
 UPL species: _____ X 5 = _____
 Column Totals: 62 (A) 176 (B)
 PI = B/A = 2.83

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus Canadensis</i>	T		FACU
2. <i>Equisetum sylvaticum</i>	5	Y	FAC
3. <i>grass sp</i>	T		
4. <i>Geocaulon lividum</i>	T		FACU
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</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.

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):

WETLAND DETERMINATION DATA FORM

W106LH010

6-22-16

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								Damp organics
Bw 7-10	10YR 4/2	85	10YR 4/4	10	con	m	Silt loam	
			7.5YR 3/3	5	con	m		
Bw 10-15	10YR 4/2	85	10YR 4/4	10	con	m	Silt loam	
			7.5YR 3/3	5	con	m		
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>Frost (seasonal)</u> Depth (inches): <u>10</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Negative & X throughout</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>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>N</u> (includes capillary fringe)		Depth (in): <u>-</u>		EC: <u>-</u>				
Notes: <u>Frost was melting @ point of pictures. Did not call Saturation.</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH010

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:

J. Brownlee

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH010 Field Target: 260 Date: 6-22-16

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

X

Kaley Volper

Wetland Scientist (print)

X

Kaley Volper

Signature / Date

6-24-16

X

J Brownlee

Field Crew Chief (print)

X

J Brownlee

Signature / Date

6-24-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>Facility</i>
Field Target: <i>257</i>		Map #: <i>65</i> Map Date: <i>5-27-16</i>	
Date: <i>6-23-16</i>	Project Name: Alaska LNG		Feature Id: <i>W106LH011</i>
Investigators: <i>Jessie Brownlee, Kaley Vesper</i>			Team No.: <i>W106</i>
State: Alaska	Region: Alaska	Milepost: <i>467.1</i>	
Latitude: <i>64.63961°</i>	Longitude: <i>-149.0507716°</i>		Datum: WGS84
Logbook No.: <i>2</i>	Logbook Page No.: <i>60</i>	Picture No.: <i>P-W106LH011-001 thru 004</i>	

SITE PARAMETERS	
Subregion: <i>Tanana Kuskokwim Lowlands</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Lowland (?)</i>
Slope (%): <i>4-12 0-3</i>	Local relief (concave, convex, none): <i>Flat</i>
Pre-mapped Alaska LNG/NWI classification: <i>U:1C2</i>	Evidence of Wildlife Use: <i>Moose droppings</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 checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <i>U</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <i>1C2</i>

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

Open mature Pic Cola forest ~40-60' tall. Diverse shrub understory with thick Feather moss Blanketing floor. All dry from walk in. Coding veg 1C2 after including the very tall willow & alder and higher % of Bet Neo that is out side plot. Site is marginal, site revisit recommended.

Seasonal Frost at 13" w/ saturation at 7" but dry site.

Area gets progressively wetter to the North w/ thermocarsting, surface water & hydric soil. mopping to the North East side of road walked & coding/line work was confirmed.

W106LH011-0P : PFO1B, 1C2; 11B2

WETLAND DETERMINATION DATA FORM

W106LH011

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neoalaskana</i>	5		FACU
2.	<i>Picea glauca</i>	40	Y	FACU
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>20</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Rhododendrum groenlandicum</i>	15	Y	FAC
2.	<i>Vaccinium vitis-idaea</i>	3		FAC
3.	<i>Rosa acicularis</i>	T		FACU
4.	<i>Linnaea borealis</i>	4		FACU
5.	<i>Alnus incana</i>	8	Y	FAC
6.	<i>Salix glauca</i>	12	Y	FAC
7.	<i>Shepherdia canadensis</i>	2		FACU
8.	<i>Empetrum nigrum</i>	1		FAC
9.	<i>Alnus viridis fruticosa</i>	T		FAC
Total Cover: <u>55</u>				
50% of total cover: <u>27.5</u>		20% of total cover: <u>11</u>		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 0 X 2 = 0

FAC species: 49 X 3 = 147

FACU species: 162 X 4 = 648

UPL species: 0 X 5 = 0

Column Totals: 111 (A) 395 (B)

PI = B/A = 3.55

<i>Arctostaphylos</i>	5	5	FAC
<i>Picea glauca</i>	5	5	FACU
<i>Betula glandulosa</i>	T	5	FAC

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>20</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Geocaulon lividum</i>	2		FACU
2.	<i>Cornus canadensis</i>	8	Y	FACU
3.	<i>Chamerion angustifolium</i>	1		FACU
4.	<i>Mertensia paniculata</i>	T		FACU
5.	<i>Rubus Arcticus</i>	T		FAC
6.	<i>Equisetum sp</i>	T		
7.				
8.				
9.				
10.				
Total Cover: <u>11</u>				
50% of total cover: <u>5.5</u>		20% of total cover: <u>2.2</u>		

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): Y

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

WETLAND DETERMINATION DATA FORM

W106LH01

6.23.16

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			
Di 0-7							Dry Feather moss	
Bwl 7-8	10YR 3/2	100				Silt loam		
A 8-10	10YR 2/1	100				Loam	Black	
BwB 10-13	10YR 4/2	70	10YR 4/4	30	con	m	Silt loam	
Bwaf 13-24	10YR 4/2	70	10YR 4/4	30	con	m	Silt loam	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³		
Histosol or Histel (A1) <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>Seasonal Frost</u> Depth (inches): <u>13</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>4 Y 703</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>4 Y</u>		Depth (in): <u>7</u>		EC: <u>-</u>				
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH011

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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH011

Field Target: 257

Date: 6.23.16

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?

3. 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 Valper

Wetland Scientist (print)

X

Naley Valper

Signature / Date

6-27-16

X

J. Brownlee

Field Crew Chief (print)

X

J. Brownlee

Signature / Date

6.23.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>Facility</u>
Field Target: <u>250</u>		Map #: <u>71</u> Map Date: <u>5.27.16</u>	
Date: <u>6.23.16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH012</u>
Investigators: <u>Jessie Brownlee, Kaley Valper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>505.5</u>	
Latitude: <u>64.1239813702°</u>	Longitude: <u>-149.2438293702°</u>	Datum: WGS84	
Logbook No.: <u>2</u>	Logbook Page No.: <u>6</u>	Picture No.: <u>P-W106LH012_001 thru 004</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>PSS1/4B 11C2, 11A3</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 <u> </u> (if no, explain in Notes)	Are "Normal Circumstances" present? Yes <u>X</u> No <u> </u> (If no, explain in Notes.)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Hydric Soil Present? Yes <u>X</u> No <u> </u>	Wetland Type: <u>PSS1/4B</u>
Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Alaska Vegetation Classification (Viereck): <u>11C2, 11A3</u>

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

Stunted dwarf Fir-Mar woodland w/ dense & diverse Tussock & shrub communities. Tussocks up to 2' tall w/ pockets of water in between tussocks.



WETLAND DETERMINATION DATA FORM

W106LH012

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>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	15		FAC
2. <i>Myrica gale</i>	18	Y	OBL
3. <i>Dasiphora fruticosa</i>	4		FAC
4. <i>Vaccinium uliginosum</i>	20	Y	FAC
5. <i>Picea mariana</i>	20	Y	FACU
6. <i>Rhododendrum groenlandicum</i>	8		FAC
7. <i>Salix herbiflora</i>	1		FAC
8. <i>Andromeda polifolia</i>	T		FACU
9. <i>Salix reticulata</i>	T		FAC
Total Cover: <u>88</u> 50% of total cover: <u>44</u> 20% of total cover: <u>17.6</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: 18 X 1 = 18
 FACW species: 41 X 2 = 82
 FAC species: 54 X 3 = 162
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 113 (A) 262 (B)
 PI = B/A = 2.32
Vaccinium vitis-idaea 2 FAC
Salix pulchra T

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex bigelowii</i>	4		FAC
2. <i>Eriophorum vaginatum</i>	20	Y	FACW
3. <i>Rubus chamaemorus</i>	1		FACW
4. <i>Calamagrostis canadensis</i>	T		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>25</u> 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</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.

% Bare Ground: 0
 % Cover of Wetland Bryophytes: 5
 Total Cover of Bryophytes: 20
 % Cover of Water: 5

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

W106LH012

6.23.14

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106LH012

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): 3 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 7.18

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:

J Browne

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LN012

Field Target: 250

Date: 6.23.16

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

X

Wetland Scientist (print)

Haley Volper

X

Signature / Date

Haley Volper 6-27-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

J. Brownlee

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain):	Other (explain): <u>Facility</u>
Field Target: <u>2660</u>		Map #: <u>57</u> Map Date: <u>5-27-16</u>	
Date: <u>6-24-16</u>	Project Name: Alaska LNG		Feature ID: <u>W106LH013</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>404</u>	
Latitude: <u>65° 26' 55.941" N</u>		Longitude: <u>148° 14' 50.788" W</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>7</u>	Picture No.: <u>P-W106LH013-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Ray Mountains</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>5-8</u>	Local relief (concave, convex, none): <u>Flat to slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSS4/B 1A2</u>	Evidence of Wildlife Use: <u>small animal runways</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, 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 type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>Upland</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>11A2</u>

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

Open Pic Mar forest w/ stunted trees ~15' tall and under 3" DBH. Low diversity otherwise with thick feather moss & reindeer lichen. Trees not stunted due to water but likely from other harsh growing conditions such as extreme cold winters & Frost @ 11".



WETLAND DETERMINATION DATA FORM

W106LH013

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	45	Y	FACW
2. <i>Rosa acicularis</i>	1		FACU
3. <i>Vaccinium vitis-idaea</i>	8		FAC
4. <i>Vaccinium uliginosum</i>	8		FAC
5. <i>Spiraea stempflii</i>	1		FACU
6. <i>Rhododendrum groenlandicum</i>	3		FAC
7. <i>Rhododendrum groenlandicum</i>	1		FACU
8.			
9.			

Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 45 X 2 = 90

FAC species: 24 X 3 = 72

FACU species: 2 X 4 = 8

UPL species: 0 X 5 = 0

Column Totals: 71 (A) 170 (B)

PI = B/A = 2.4

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	T		FACU
2. <i>Equisetum sylvaticum</i>	3	Y	FAC
3. <i>Calamagrostis lapponica</i>	2		FAC
4. <i>Petasites frigidus</i>	T		FACU
5. <i>Pyrola grandiflora</i>	T		FAC
6. <i>grass sp</i>	T		
7.			
8.			
9.			
10.			

Total Cover: 5

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

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.

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):

WETLAND DETERMINATION DATA FORM

W106LH013

6.24.16

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
0-5								Dry feather moss
5-7								Damp organics
Bul 7-11	10YR 4/2	90	10YR 4/4	10	con	M	silt loam	Damp but not saturated
Rul 11-15	10YR 4/3	95	10YR 4/4	5	con	M	silt loam	very dry + platy
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)		
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>Frost</u> Depth (inches): <u>11</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Thixotropic soils</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> <i>see front note</i>		
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 (Damp only)</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):						
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)		Depth (in):		EC: <u>-</u>				
Notes: <u>only Secondary Indicators</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH03

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:

Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106L4013

Field Target: 266

Date: 6.24.20

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)

Haley Volper

X

Signature / Date

Haley Volper

6-27-16

X

Field Crew Chief (print)

J Browlee

X

Signature / Date

J Browlee

6-24-16

WETLAND DETERMINATION DATA FORM

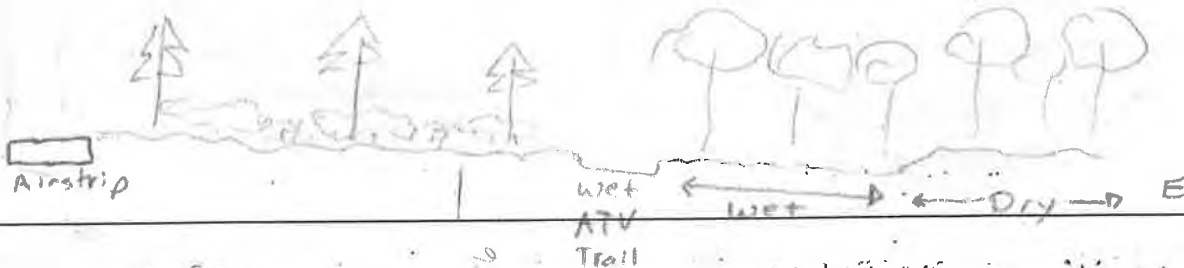
New FT Fairbanks 10

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target:
Date: 7-19-16	Project Name: Alaska LNG	Feature Id: W106LH014	Map #: 6 Map Date: 7-15-16
Investigators: Jessie Brownlee	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 402	
Latitude: 65.468947	Longitude: 148.657168	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 38	Picture No.: W106LH014-001 thru -004	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Low land
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: NA, not pre-mapped	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/F04B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	Alaska Vegetation Classification (Viereck): 1A3, 11C2

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

Pic Marsh woodland (trees ~30') with dense Bet Nan & Rho gro shrub community. Thick sphagnum & feathermoss. Water table @ 5'. Wetland extends into the Birch forest (see map) But ends abruptly. to the south of the Birch is a large PUBH ringed by Cal Can. Other "holes" in the canopy on Imagery may also be PUBHs or wet depressions. Contours would help answer that question.



WETLAND DETERMINATION DATA FORM

W106LH014

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>	10	Y	FACW
2. <i>Betula neoalaskana</i>	2		FACW
3.			
4.			

Total Cover: 12

50% of total cover: 6 20% of total cover: 2.4

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	50	Y	FAC
2. <i>Rhododendron groenlandicum</i>	40	Y	FAC
3. <i>Chamaedaphne calyculata</i>	2		FACW
4. <i>Betula nana</i>	45	Y	FAC
5. <i>Rhododendron tomentosum</i>	15		FACW
6. <i>Siphoeca stevensii</i>	2		FACW
7. <i>Salix pulchra</i>	3		FACW
8. <i>Vaccinium uliginosum</i>	3		FAC
9. <i>Salix herbacea</i>	7		FAC

Total Cover: 168

50% of total cover: 84 20% of total cover: 33.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (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: 68 X 2 = 136

FAC species: 145 X 3 = 435

FACU species: 4 X 4 = 16

UPL species: 1 X 5 = 5

Column Totals: 217 (A) 587 (B)

PI = B/A = 2.70

<i>Picea mariana</i>	S	5		FACW
<i>Betula neoalaskana</i>	S	3		FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	25	Y	FACW
2. <i>Eriophorum vaginatum</i>	8	Y	FACW
3. <i>Calamagrostis canadensis</i>	7		FAC
4. <i>Calamagrostis lecontei</i>	7		FAC
5. <i>Carex bigelowii</i>	4		FAC
6.			
7.			
8.			
9.			
10.			

Total Cover: 37

50% of total cover: 18.5 20% of total cover: 7.4

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.

0 % Bare Ground

45 % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

0 % Cover of Water & water in trail on edge of plot

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106LH014

7.19.16

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
01 0-5	-						-	Saturated organics
02 5-8	-						-	" "
Bg 8-12	2.5Y 3/1	90	10YR 4/4	10	com	m RC	Silt loam	
Bgf 12-+	same as above		but frozen					
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>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>Y</u> <u>X</u> <u>X</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>Permafrost</u> Depth (inches): <u>12</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>Positive & X in mineral</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>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>-</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>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 - Seepage</u> Depth (in): <u>-</u>				Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u> Depth (in): <u>5</u>								
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe) Depth (in): <u>2</u>								
Notes: <u>Surface water just on edge of plot in an ATV trail & soils eroded & disturbed. not cutting surface water</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W1061H014

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>10</u> Sapling (<5 dbh, <6m tall) <u>5</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>90</u> Dwarf shrub (<0.5m) <u>30</u> Tall herb (>1m) _____ Short herb (<1m) <u>15</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 _____ 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 _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.86</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:

J. Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1064014

Field Target: ^{New}Fairbanks

Date: 7.19.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

 7.19.16

Signature / Date

WETLAND DETERMINATION DATA FORM

New Fairbanks 4

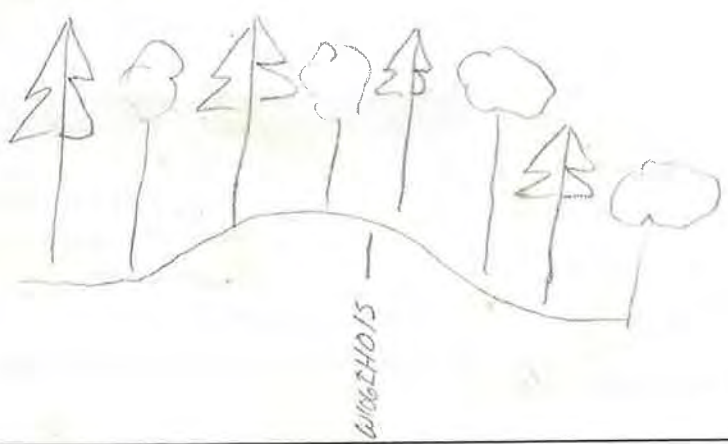
SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <input type="checkbox"/>	Map #: 14 Map Date: 7.15.16
Date: 7.22.16	Project Name: Alaska LNG		Feature Id: W106LH015
Investigators: Jessie Brownlee Kim Holmes		Team No.: W106	
State: Alaska	Region: Alaska	Milepost: 460	
Latitude: 64.68354	Longitude: -148.846988	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 38	Picture No.: P-W106LH015-001 thru -004	

SITE PARAMETERS	
Subregion: Yukon-Tanana Uplands	Landform (hillslope, terrace, hummocks, etc.): Mound
Slope (%): 5-8	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: U: 1C2, 11C2	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 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
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	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.

Dry mature mixed forest w/ Aspen, Bet Neo & Pic Cla all ~100' tall. Site is on a slight mound but surrounding forest has been dry also. No signs of hydrology. Soil is dry silt. It has rained off an on ~3 days, one side of pit is damp and thixotropic. Soil is sluffing off. The 10-21 horizon is dry and fluffy and not thixotropic. From Road to this point is all dry.



WETLAND DETERMINATION DATA FORM

W106LH015

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>	<u>30</u>	<u>Y</u>	<u>FACU</u>
2. <i>Populus tremuloides</i>	<u>10</u>	<u>Y</u>	<u>FACU</u>
3. <i>Betula neolacina</i>	<u>20</u>	<u>Y</u>	<u>FACU</u>
4.			

Total Cover: 60

50% of total cover: 30 20% of total cover: 12

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum edule</i>	<u>45</u>	<u>Y</u>	<u>FACU</u>
2. <i>Rosa acicularis</i>	<u>2</u>		<u>FACU</u>
3. <i>Linnæa borealis</i>	<u>2</u>		<u>FACU</u>
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 49

50% of total cover: 24.5 20% of total cover: 9.8

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: _____ X 2 = _____

FAC species: 1 X 3 = 3

FACU species: 116 X 4 = 464

UPL species: _____ X 5 = _____

Column Totals: 117 (A) 467 (B)

PI = B/A = 3.97

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Lycopodium complanatum</i> T			<u>OPL</u>
2. <i>Chamaenerion angustifolium</i>	<u>5</u>	<u>Y</u>	<u>FACU</u>
3. <i>Coccoloba lividum</i>	<u>1</u>		<u>FACU</u>
4. <i>Mertensia paniculata</i>	<u>1</u>		<u>FACU</u>
5. <i>Cornus canadensis</i>	<u>1</u>		<u>FACU</u>
6. <i>Calamagrostis canadensis</i>	<u>1</u>		<u>FACU</u>
7. <i>Galium boreale</i>	<u>1</u>		<u>FACU</u>
8. <i>Equisetum repens</i>	<u>1</u>		<u>FACU</u>
9.			
10.			

Total Cover: 8

50% of total cover: 4 20% of total cover: 1.6

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.

5 % Bare Ground (leaf litter)

0 % Cover of Wetland Bryophytes

40 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

W106LH015

7.22.16

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						Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture	
0i 0-2								Dry organics
Bw1 2-6	2.5YR 3/3	100					Silt loam	Depth varies around pit, above average
Bw2 6-10	10YR 4/3	90	10YR 4/4	10	con	m	Silt loam	
Bw3 10-21	10YR 4/3	95	10YR 4/4	5	con	m	Silt loam	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS ³		
Histosol or Histel (A1) <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>No</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> see note		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>μ</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: Slight saturation from 1 area of pit that was thixotropic and sluffing off. But not calling saturation due to minimal amount and several days of rain.								

AQUATIC SITE ASSESSMENT DATA FORM

W0611015

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:

J. Brunk

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106 LHOIS

Field Target: ^{New} Fairbanks

Date: 7.22.16

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

X

Wetland Scientist (print)

X


Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

 7.22.16

Signature / Date

WETLAND DETERMINATION DATA FORM

→ New Fairbanks 3

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>
Field Target:		Map #: 13 Map Date: 7-13-16	
Date: 7-22-16	Project Name: Alaska LNG		Feature Id: W106LH016
Investigators: Jessie Brownlee & Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 441	
Latitude: 64.946748	Longitude: -148.644106	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 38	Picture No.: P-W106LH016-001 thru -004	

SITE PARAMETERS	
Subregion: Yukon-Tanana Uplands	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 10-15	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: not applicable	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 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.

Mature open Pic Mar forest w/ thick feather moss & Rhodora shrub community. Hillside quickly transitions into a swaling type feature. Walked down slope & popped holes, thicker organics, water table @ ~ 6". Soil is thixotropic & appears damp/saturated when dug up/disturbed but peds are dry when broken open. small pockets of sphagnum moss are present & increase down slope.

WETLAND DETERMINATION DATA FORM

W106-LH016

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>	<u>25</u>	<u>Y</u>	<u>FACW</u>	
2. <i>Picea glauca</i> 4B			<u>FACU</u>	
3. <i>Betula neoalaskana</i>	<u>5</u>		<u>FACU</u>	
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>30</u> X 2 = <u>60</u> FAC species: <u>85</u> X 3 = <u>255</u> FACU species: <u>28</u> X 4 = <u>112</u> UPL species: _____ X 5 = _____ Column Totals: <u>143</u> (A) <u>427</u> (B) PI = B/A = <u>2.98</u>
Sapling/Shrub Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rhododendrum groenlandicum</i>	<u>45</u>	<u>Y</u>	<u>FAC</u>	
2. <i>Spiraea stevenii</i>	<u>18</u>	<u>Y</u>	<u>FACU</u>	
3. <i>Rosa acicularis</i>	<u>4</u>		<u>FACU</u>	
4. <i>Vaccinium vitis-idaea</i>	<u>10</u>		<u>FAC</u>	
5. <i>Picea mariana</i>	<u>5</u>		<u>FACW</u>	
6. <i>Alnus viridis fruticosa</i>	<u>2</u>		<u>FAC</u>	
7.				
8.				
9.				
Total Cover: <u>84</u> 50% of total cover: <u>42</u> 20% of total cover: <u>16.8</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Equisetum sylvaticum</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>	
2. <i>Carex lasiocarpa</i>	<u>1</u>		<u>FACU</u>	
3. <i>Cornus canadensis</i>	<u>1</u>		<u>FAC</u>	
4. <i>Calamagrostis canadensis</i>	<u>2</u>		<u>FAC</u>	
5.				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>10</u> Total Cover of Bryophytes: <u>100</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6.				
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

W106LH016

7.22.16

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		
0i 0-5								Dry feather moss
0e 5-7								Damp organics
A 7-8	10YR 2/2	100					Silt loam	
Bw1 8-14	10YR 4/3	87	7.5YR 4/4	5			Silt loam	someurbation throughout
	10YR 4/1	8						
Bw2 14-24	10YR 4/2	100					gravelly silt loam	good 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 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)		
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>N</u>								
Notes: <u>very thixotropic</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):						
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>Not calling saturation B/C it's thix soil & once you break a clod instead of digging it out which gizzles water to the surface, the broken clod is not saturated on the undisturbed face.</u>								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH016

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:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH016

Field Target: ^{New}Fairbanks

Date: 7.22.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Signature / Date

7.22.16

WETLAND DETERMINATION DATA FORM

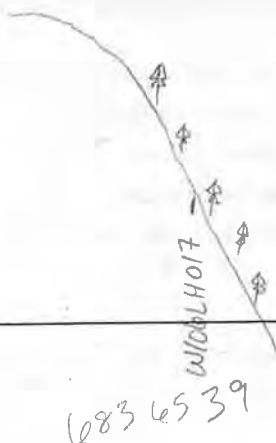
← New Fairbanks 1

SITE DESCRIPTION			
Survey Type: Centerline _____ Access Road (explain) _____ Other (explain) <u>X</u> _____		Field Target: _____	Map #: <u>7</u> Map Date: <u>7-15-16</u>
Date: <u>7.23.16</u>	Project Name: Alaska LNG		Feature Id: <u>W106LH017</u>
Investigators: <u>Jessie Browne Kim Holmes</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>407</u>	
Latitude: <u>65.398704</u>		Longitude: <u>-148.4585708</u>	Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>39</u>	Picture No.: <u>P-W106LH017.001 thru -004</u>	

SITE PARAMETERS	
Subregion: <u>Ray mountains</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>50+</u>	Local relief (concave, convex, none): <u>slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>not mapped</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 <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	Wetland Type: <u>PSS4/1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Vioreck): <u>IIA3, IIC2</u>

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

Stunted Pic/Mar woodland on ^{very} steep slope
water table @ 12" with thick organics over very gravelly silt loam
on walk from the trail, it gets wet very soon on transect
to here.



WETLAND DETERMINATION DATA FORM

W106LH017

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>5</u>	<u>Y</u>	<u>FACW</u>
2.			
3.			
4.			

Total Cover: 5

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

Sapling/Shrub Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea mariana</i>	<u>13</u>		<u>FACW</u>
2. <i>Spirea stevensii</i>	<u>1</u>		<u>FACU</u>
3. <i>Vaccinium uliginosum</i>	<u>15</u>	<u>Y</u>	<u>FAC</u>
4. <i>Rhododendrum tomentosum</i>	<u>10</u>		<u>FACW</u>
5. <i>Vaccinium vitis-idaea</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>
6. <i>Vaccinium oxycoccus</i>	<u>T</u>		<u>OBL</u>
7. <i>Betula nana</i>	<u>2</u>		<u>FAC</u>
8. <i>Andromeda polifolia</i>	<u>T</u>		<u>FACW</u>
9.			

Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
 OBL species: - X 1 = -
 FACW species: 33 X 2 = 66
 FAC species: 57 X 3 = 171
 FACU species: 1 X 4 = 4
 UPL species: - X 5 = -
 Column Totals: 91 (A) 241 (B)
 PI = B/A = 2.64

VEGETATION (use scientific names of plants)

Herb Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex bigelowii</i>	<u>15</u>	<u>Y</u>	<u>FAC</u>
2. <i>Rubus chamaemorus</i>	<u>5</u>	<u>Y</u>	<u>FACW</u>
3. <i>Acunogenon alaskana</i>	<u>T</u>		<u>FAC</u>
4. <i>Drosera rotundifolia</i>	<u>T</u>		<u>OBL</u>
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 20

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

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.

0 % Bare Ground
40 % 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

W106LH017

7-23-16

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								Damp Feather moss
5-10								Saturated organics
10-15	10YR 3/2	100						gravelly 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>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>NO</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>Y</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>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>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>—</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>Y</u>		Depth (in): <u>12</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>7</u>						
EC: <u>33</u> PH: <u>6.06</u>								
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106LH017

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>5</u> Sapling (<5 dbh, <6m tall) <u>15</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>30</u> Tall herb (≥1m) _____ Short herb (<1m) <u>20</u> Moss-Lichen <u>10</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%) <u>X</u> Very High Density (80-100%) <u>3</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 <u>X</u> 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.) _____ 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>6.06</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 _____ 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:

JB rownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH017 Field Target: New Fairbanks | Date: 7-23-16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date



7.23.16

WETLAND DETERMINATION DATA FORM

→ New Fairbanks 8

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <input type="checkbox"/>	Map #: 7 Map Date: 7/5/16
Date: 7.23.16	Project Name: Alaska LNG		Feature Id: W106LH018
Investigators: Jessie Brownlee Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 407	
Latitude: 65.400099		Longitude: -148.458482	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 39	Picture No.: PLW106 LH0018-001 thru 004	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Hill side
Slope (%): 50+	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: NA	Evidence of Wildlife Use: none
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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 11A3, 11C2

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

Stunted Peat Mar woodland with thick moss layer. Permafrost @ 14 with water perching above saturating the Oe horizon. Site likely does not get much weather as is evident by the thick Oi sphagnum layer.



WETLAND DETERMINATION DATA FORM

W106LH018

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>	5	Y	FACW
2.			
3.			
4.			
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>2</u>			
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	15	Y	FACW
2. <i>Vaccinium oxycoccus</i>	1		OBL
3. <i>Vaccinium uliginosum</i>	8		FAC
4. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
5. <i>Chamaedaphne calyculata</i>	2		FACW
6. <i>Rhododendrum tomentosum</i>	7		FACW
7. <i>Andromeda polifolia</i>	2		FACW
8. <i>Alnus incana</i>	1		FAC
9. <i>Spiraea stevenii</i>	7		FACU
Total Cover: <u>58</u> 50% of total cover: <u>29</u> 20% of total cover: <u>11.6</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____
 OBL species: 1 X 1 = 1
 FACW species: 35 X 2 = 70
 FAC species: 50 X 3 = 150
 FACU species: 1 X 4 = 4
 UPL species: - X 5 = -
 Column Totals: 87 (A) 225 (B)
 PI = B/A = 2.58

<i>Empetrum Nigrum</i>	S	T	FAC
<i>Betula nana</i>	3	2	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Acanthogon alaskanum</i>	4		FAC
2. <i>Rubus chamaemorus</i>	3		FACW
3. <i>Carex bigelowii</i>	5	Y	FAC
4. <i>Carex lasiocarpa</i>	1		FACU
5. <i>Eriophorum vaginatum</i>	1		FACW
6. <i>Equisetum sylvaticum</i>	10	Y	FAC
7. <i>Proserpinaca rotundifolia</i>	7		OBL
8.			
9.			
10.			
Total Cover: <u>24</u> 50% of total cover: <u>12</u> 20% of total cover: <u>4.8</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.

0 % Bare Ground
10 % 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

W106LH018

7/23/16

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			
0-11									Damp organics (sphagnum)
11-13			10YR 5/2	5	Dep	M			Saturated organics
Bwl 13-14	10YR 4/2	95	10YR 4/4	5	Con	M			very gravelly silt loam
Bwl F 14-+	Same as Bwl but 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>	Alaska Color Change (TA4) <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) <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: permafrost Depth (inches): 14

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>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</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u>+</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>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): <u>Y</u> (includes capillary fringe)	Depth (in): <u>11</u>	EC: <u>22</u> <u>5.7 pH</u>

Notes:

water slowly seeping in from Oc/Bwl interface

AQUATIC SITE ASSESSMENT DATA FORM

W106LH018

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>5</u> Sapling (<5 dbh, <6m tall) <u>15</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>25</u> Tall herb (≥1m) _____ Short herb (<1m) <u>25</u> Moss-Lichen <u>10</u> 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 _____ 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 <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.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.7</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.) _____ 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:

W. Brown

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH018 Field Target: ^{New} Fairbanks Date: 7.23.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

 7.23.16

Signature / Date

WETLAND DETERMINATION DATA FORM

↗ New Fairbanks 9

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>
Field Target:		Map #: 7	Map Date: 7.15.16
Date: 7.23.16	Project Name: Alaska LNG		Feature Id: W106LH019
Investigators: Jessie Browne, Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 407	
Latitude: 65.397166	Longitude: -148.469244	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 39	Picture No.: P-W106LH019-001 thru -004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 50+	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: Not pre mapped	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: PSS4/1B
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.

Stunted Pic Mar woodland with thick sphagnum moss and permafrost at ~12". Water is actively seeping in from under organic layer & above frost. on walk over from North side of hill, most all of area was wet. What was dry had mixed forest signature



WETLAND DETERMINATION DATA FORM

W106LH019

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>5</u>	<u>Y</u>	<u>FACW</u>
2.			
3.			
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</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	<u>2</u>		<u>FAC</u>
2. <i>Vaccinium vitis-idaea</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
3. <i>Vaccinium uliginosum</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
4. <i>Rhododendrum tomentosum</i>	<u>15</u>		<u>FACW</u>
5. <i>Picea mariana</i>	<u>20</u>	<u>Y</u>	<u>FACW</u>
6. <i>Vaccinium oxycoccus</i>	<u>T</u>		<u>OBL</u>
7. <i>Alnus viridis fruticosa</i>	<u>2</u>		<u>FAC</u>
8. <i>Andromeda polifolia</i>	<u>T</u>		<u>FACW</u>
9. <i>Chamaedaphne calyculata</i>	<u>T</u>		<u>FACW</u>
Total Cover: <u>79</u> 50% of total cover: <u>39.5</u> 20% of total cover: <u>15.8</u>			

Dominance Test worksheet:
 No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 % Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: 75 X 2 = 150
 FAC species: 53 X 3 = 159
 FACU species: _____ X 4 = _____
 UPL species: _____ X 5 = _____
 Column Totals: 128 (A) 309 (B)
 PI = B/A = 2.41

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Aconogonon alaskanum</i>	<u>4</u>		<u>FAC</u>
2. <i>Eriophorum vaginatum</i>	<u>35</u>	<u>Y</u>	<u>FACW</u>
3. <i>Rubus chamaemorus</i>	<u>T</u>		<u>FACW</u>
4. <i>Drosera rotundifolia</i>	<u>T</u>		<u>OBL</u>
5. <i>Carex bigelowii</i>	<u>5</u>		<u>FAC</u>
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>44</u> 50% of total cover: <u>22</u> 20% of total cover: <u>8.8</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: 0
 % Cover of Wetland Bryophytes: 100
 Total Cover of Bryophytes: 100
 % Cover of Water: 0
Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W106LH019

7-23-16

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		
0i 0-6								Damp sphagnum
0e 6-12								Saturated organics
BwF 12- + 10YR 3/2								gravelly silt/clay
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) <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>Permafrost</u> Depth (inches): <u>12</u>								
Hydric Soil Present (Y/N): <u>Y</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>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>N</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>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>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>Y</u>		Depth (in): <u>Active flow in from 12" (above frost)</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>6</u>						
EC: <u>23</u> pH: <u>4.09</u>								
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W100LH019

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>5</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>5</u> Tall herb (>1m) _____ Short herb (<1m) <u>30</u> Moss-Lichen <u>20</u> 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 _____ 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 <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.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>9.09</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.) _____ 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:

J. Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W10644019 Field Target: ^{New} Fairbanks 9 Date: 7.23.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Browlee

X

Signature / Date



7.23.16

WETLAND DETERMINATION DATA FORM

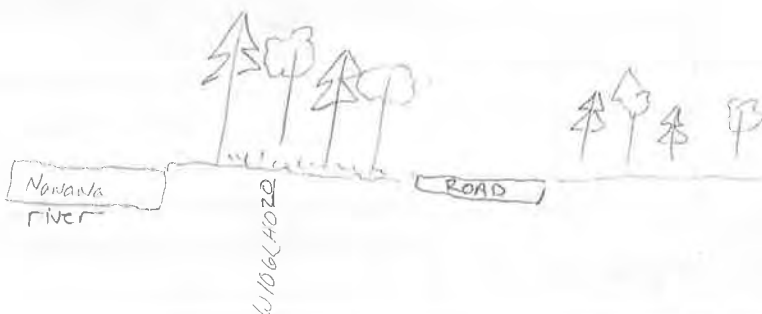
↗ New Fairbanks S

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <input type="checkbox"/>	Map #: 15 Map Date: 7-15-16
Date: 7-24-16	Project Name & No.: Alaska LNG 60418403		Feature Id: W106LH020
Investigators: Jessie Brownlee, Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 473.8	
Latitude: 64.55621	Longitude: -149.118677		Datum: WGS84
Logbook No.: 2	Logbook Page No.: 39	Picture No.: P-W106LH020-001 thru 004	

SITE PARAMETERS	
Subregion: Tanana Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): River Terrace
Slope (%): 8-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: not pre-mapped	Evidence of Wildlife Use: None
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: U
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IC2, IIB2

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

Dry River Terrace along the Nanana River. Water is very High currently but site is still Dry. Open mixed canopy of Pic 6la, Bet Neo & very tall tree like Sal Goh Thick (nearly 100% cover) of Ego Pra but little else in way of shrub & Forb communities. Soil is dry & sandy w/ few concentrations through out.



WETLAND DETERMINATION DATA FORM

W106LH020

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>4</u> (A)	
1. <i>Picea Canadensis</i>	<u>35</u>	<u>Y</u>	<u>FACU</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)	
2. <i>Betula Neodulacensis</i>	<u>10</u>	<u>Y</u>	<u>FAC</u>	% Dominant Species that are OBL, FACW, or FAC: <u>80</u> (A/B)	
3.					
4.					
Total Cover: <u>45</u>				Prevalence Index worksheet:	
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: _____ X 1 = _____	
1. <i>Alnus Viridis Fruticosa</i>	<u>15</u>	<u>Y</u>	<u>FAC</u>	FACW species: <u>85</u> X 2 = <u>170</u>	
2. <i>Viburnum edule</i>	<u>1</u>		<u>FACU</u>	FAC species: <u>50</u> X 3 = <u>150</u>	
3. <i>Rosa acicularis</i>	<u>5</u>		<u>FACU</u>	FACU species: <u>41</u> X 4 = <u>164</u>	
4. <i>Salix glauca</i>	<u>25</u>	<u>Y</u>	<u>FAC</u>	UPL species: _____ X 5 = _____	
5.				Column Totals: <u>176</u> (A) <u>484</u> (B)	
6.				PI = B/A = <u>2.75</u>	
7.					
8.					
9.					
Total Cover: <u>46</u>					
50% of total cover: <u>23</u> 20% of total cover: <u>9.2</u>					

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<u>Y</u> Dominance Test is > 50%	
1. <i>Equisetum pratense</i>	<u>85</u>	<u>Y</u>	<u>FACW</u>	<u>Y</u> Prevalence Index is ≤ 3.0	
2.				_____ Morphological Adaptations ¹ (Provide supporting data in Notes)	
3.				_____ 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>85</u>				<u>20</u> % Bare Ground <u>leaf litter</u> <u>0</u> % Cover of Wetland Bryophytes <u>35</u> Total Cover of Bryophytes <u>0</u> % Cover of Water	
50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>				Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

W10606H020

7-24-14

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 0-4								
C 4-24	10YR 5/2	95	7.5YR 4/6	5	con	M RC	very fine sandy loam w/ pockets of silt loam	Dry 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>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:

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>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

W106LH020

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:

JBrowner

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH020

Field Target: ^{New}Fairbanks 5 Date: 7.24.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date



7.24.16

WETLAND DETERMINATION DATA FORM


→ New Fairbanks 6

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <u>A</u>	Field Target:
Date: <u>7.24.16</u>	Project Name & No.: <u>Alaska LNG 60418403</u>		Map #: <u>11</u> Map Date: <u>7.15.16</u>
Investigators: <u>Jessie Brownlee, Kim Holmes</u>			Feature Id: <u>W106LH021</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>416.3</u>	Team No.: <u>W106</u>
Latitude: <u>65.2721</u>	Longitude: <u>-146.6027</u>		Datum: <u>WGS84</u>
Logbook No.: <u>2</u>	Logbook Page No.: <u>39</u>	Picture No.: <u>P_W106LH021_001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Ray Mountains</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>15-18</u>	Local relief (concave, convex, none): <u>convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>UICZ</u>	Evidence of Wildlife Use: <u>Moose browse</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>ICZ, IICZ</u>

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

Dry hillside of Bet Neo sapplings ~ 10' tall & thick Rho Coro shrub layer w/ few forbs present
Hillside from LZ to here was mostly all dry mixed forest.
Most Pic Mar are dead burned snags.
Site is on slight mound - Soil is very gravelly & slightly damp @ textural change
(not calling saturation) Site has alot of lichens & alot of Dead vac vit.



WETLAND DETERMINATION DATA FORM

W106LH021

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>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>60</u> (A/B)
1. <i>Betula Neolaskana</i>	10	Y	FACU	
2. <i>Picea mariana</i>	4	Y	FACW	
3. <i>Picea mariana</i> (snags)	~ 10		—	
4.				
Total Cover: <u>14</u> 50% of total cover: <u>7</u> 20% of total cover: <u>2.8</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species: <u>—</u> X 1 = <u>—</u> FACW species: <u>6</u> X 2 = <u>12</u> FAC species: <u>69</u> X 3 = <u>207</u> FACU species: <u>36</u> X 4 = <u>144</u> UPL species: <u>—</u> X 5 = <u>—</u> Column Totals: <u>111</u> (A) <u>363</u> (B) PI = B/A = <u>3.27</u>
Sapling/Shrub Stratum (<u>250</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rhododendrum Groenlandicum</i>	35	Y	FAC	
2. <i>Vaccinium vitis-idaea</i>	30	Y	FAC	
3. <i>Betula Neolaskana</i>	25	Y	FACU	
4. <i>Populus tremuloides</i>	1		FACU	
5. <i>Rhododendrum tomentosum</i>	2		FACW	
6. <i>Vaccinium uliginosum</i>	3		FAC	
7. <i>Salix</i> sp	1		—	
8.				
9.				
Total Cover: <u>98</u> 50% of total cover: <u>49.0</u> 20% of total cover: <u>19.6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>250</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 <u>—</u> Morphological Adaptations ¹ (Provide supporting data in Notes) <u>—</u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Calamagrostis leppica</i>	1		FAC	
2. grass sp	T		—	
3. <i>Pedicularis</i> sp	T		—	
4.				
5.				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>Did not record in field</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6.				
7.				
8.				
9.				
10.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				

while veg @ this site doesn't quite make it 2 but it fits the larger mapping polygon.

WETLAND DETERMINATION DATA FORM

W106LH021

7.24.16

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: 0-2							Dry organics
A 2-3	10YR 2/1	100				loam	
Bw ¹ 3-8	10YR 4/4	98	10YR 4/1	2	Dep	silt loam	
Bw ² 8-20	10YR 4/2	100				extremely gravelly 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) <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:

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>Marginal see note</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: Soil is slightly damp @ boundary break between Bw¹ & Bw² likely due to different textures

WETLAND DETERMINATION DATA FORM

W106LH021

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:

JTBrownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH021 Field Target: ^{New} Farrbanks Co Date: 7-24-16

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

X

Wetland Scientist (print)

X


Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X



Signature / Date

7.24.16

WETLAND DETERMINATION DATA FORM

New Fairbanks 2

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target:
Date: 7.24.16	Project Name & No.: Alaska LNG 60418403	Feature Id: W106LH022	Map #: 12 Map Date: 7.15.16
Investigators: Jessie Brownlee Kim Holmes	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 418.4	
Latitude: 65.24575	Longitude: 148.60170	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 39	Picture No.: P-W106LH022-001 thru -004	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 5-8	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: Not pre-mapped	Evidence of Wildlife Use: Moose droppings Bear 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 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): 1C2, 11B2

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

(Trees ~100' tall)

Dry mature mixed open forest of Pic Glau and Bet Nea with some Pic Mar mixed in.
FACU plants dominate shrub & forb communities such as Geo Lin, Ros Aci, Cor can
Soil: organic layer was damp but it's a dry rocky soil, with a higher clay pickup than other sites.

On transect from L2 here, all of the area is dry.



WETLAND DETERMINATION DATA FORM

W10644022

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>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</u> (A/B)
1. <i>Betula neoalastana</i>	<u>20</u>	<u>Y</u>	<u>FACU</u>	
2. <i>Picea canadica</i>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
3. <i>Picea mariana</i>	<u>5</u>		<u>FACW</u>	
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>-</u> X 1 = <u>-</u> FACW species: <u>5</u> X 2 = <u>10</u> FAC species: <u>33</u> X 3 = <u>99</u> FACU species: <u>103</u> X 4 = <u>412</u> UPL species: <u>-</u> X 5 = <u>-</u> Column Totals: <u>141</u> (A) <u>521</u> (B) PI = B/A = <u>3.69</u>
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rosa acicularis</i>	<u>18</u>	<u>Y</u>	<u>FACU</u>	
2. <i>Ribes fruticosum</i>	<u>4</u>		<u>FAC</u>	
3. <i>Linnaea borealis</i>	<u>T</u>		<u>FACU</u>	
4. <i>Alnus viridis fruticosa</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>	
5. <i>Vaccinium vitis-idaea</i>	<u>5</u>		<u>FAC</u>	
6.				
7.				
8.				
9.				
Total Cover: <u>47</u> 50% of total cover: <u>23.5</u> 20% of total cover: <u>9.4</u>				

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. <i>Geocodon lividum</i>	<u>12</u>	<u>Y</u>	<u>FACU</u>	
2. <i>Cornus canadensis</i>	<u>20</u>	<u>Y</u>	<u>FACU</u>	
3. <i>Calamagrostis canadensis</i>	<u>4</u>		<u>FAC</u>	
4. <i>Equisetum scirpoides</i>	<u>3</u>		<u>FACU</u>	
5. <i>Pyrula sp</i>	<u>2</u>		<u>-</u>	% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> % Total Cover of Bryophytes: <u>85</u> % Cover of Water: <u>0</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <i>Mertensia paniculata</i>	<u>T</u>		<u>FACU</u>	
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

7.21.16

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		
O ₁ 0-2	—							Damp Feather moss
O ₂ 2-6	—							Damp organics
A 6-7	10YR 3/2	100					loam	
C ₁ 7-10	ROCKS	100						
C ₂ 10-20	10YR 4/2	100					gravelly 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:

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:		

WETLAND DETERMINATION DATA FORM

W106LH022

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:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106L4022 Field Target: ^{New} Fairbanks 2 Date: 7.24.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Browner

Field Crew Chief (print)

X

Signature / Date

7.29.16

WETLAND DETERMINATION DATA FORM

→ New Fairbanks 7

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target:
Date: 7.25.16	Project Name & No.: Alaska LNG 60418403	Feature Id: W106LH023	Map #: 10 Map Date: 7.15.16
Investigators: Jessie Brownlee, Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 414	
Latitude: 65.3028	Longitude: -148.6073	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 39	Picture No.: P.W106LH023-001 thru 004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 10-15	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: Not pre-mapped	Evidence of Wildlife Use: Squirrel midden
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): 1A1

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

FT placed in narrow Pic Mar stand surrounded by Bet Neo dry forest. Veg species & percent are to represent the Pic Mar signature, not surrounding forest.
Dug hole in wettest looking spot and it's dry. Thick Feather & sphagnum moss cover ground.
Soil is dry sphagnum w/ thick A horizon over gravelly C material. No signs of Hydrology.
All dry on transect from LZ.



WETLAND DETERMINATION DATA FORM

W106LH023

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>50</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>	<u>30</u>	<u>Y</u>	<u>FACW</u>	
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: <u>-</u> X 1 = <u>-</u> FACW species: <u>70</u> X 2 = <u>140</u> FAC species: <u>12</u> X 3 = <u>36</u> FACU species: <u>5</u> X 4 = <u>20</u> UPL species: <u>-</u> X 5 = <u>-</u> Column Totals: <u>87</u> (A) <u>196</u> (B) PI = B/A = <u>2.25</u>
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rhododendron groenlandicum</i>	<u>3</u>		<u>FAC</u>	
2. <i>Spiraea stevenii</i>	<u>4</u>		<u>FACU</u>	
3. <i>Vaccinium vitis-idaea</i>	<u>5</u>		<u>FAC</u>	
4. <i>Picea mariana</i>	<u>40</u>	<u>Y</u>	<u>FACW</u>	
5. <i>Vaccinium uliginosum</i>	<u>7</u>		<u>FAC</u>	
6.				
7.				
8.				
9.				
Total Cover: <u>52</u> 50% of total cover: <u>26</u> 20% of total cover: <u>10.4</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum (<u>24</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 type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <i>Calamagrostis canadensis</i>	<u>4</u>	<u>Y</u>	<u>FAC</u>	
2. <i>Rubus chamaemorus</i>	<u>7</u>		<u>FACW</u>	
3. <i>Geocaulon lividum</i>	<u>1</u>	<u>Y</u>	<u>FACU</u>	
4.				
5.				<u>0</u> % Bare Ground <u>20</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):
6.				
7.				
8.				
9.				
10.				
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>				

WETLAND DETERMINATION DATA FORM

W106L1023

7.25.16

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	
0i 0-4	-						Dry sphagnum
0e 4-6	-						Dry organics
A 6-12	10YR 3/2	100					gravelly loam
C 12-24	10YR 5/2	100					gravelly 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: N.O 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>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>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

W106 L1023

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: W106LH023 Field Target: ^{New} Fairbanks Date: 7.25.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Signature / Date

7.25.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 247	Map #: 74 Map Date: 5.27.16
Date: 7.26.16	Project Name: Alaska LNG		Feature Id: W106LH024
Investigators: Jessie Brownlee, Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 517.9	
Latitude: 63.760457	Longitude: -149.1256109		Datum: WGS84
Logbook No.: 2	Logbook Page No.: 46	Picture No.: P-W106LH024-001 thru -009	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 5-8	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PFOY/S#B 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 <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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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.

Pic Mar stunted open forest w/ most trees under 20' but larger spruce are outside of plot. Eri vag tussocks + Cor Big create tussocks + hummocks through out plot. Water table @ 8" & permafrost @ 12" & 12" of Saturated organics.

Walked around mapped polygon. small upland inclusions are found throughout site. Several large ponds are present. unsure if they are natural or man made.

Area was largely wet for most part

WETLAND DETERMINATION DATA FORM

W106LH024

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>	5	Y	FACW
2. <i>Picea glauca</i>	5	Y	FACU
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	20	Y	FAC
2. <i>Rhododendrum groenlandicum</i>	8		FAC
3. <i>Vaccinium vitis-idaea</i>	18	Y	FAC
4. <i>Vaccinium uliginosum</i>	8		FAC
5. <i>Picea mariana</i>	20	Y	FACW
6. <i>Alnus viridis fruticosa</i>	8		FAC
7. <i>Salix glauca</i>	4		FAC
8. <i>Salix pulchra</i>	1		FACW
9. <i>Dasiphora fruticosa</i>	1		FAC

Total Cover: 108

50% of total cover: 50.5 20% of total cover: 20.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 85 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 45 X 2 = 90

FAC species: 96 X 3 = 288

FACU species: 10 X 4 = 40

UPL species: _____ X 5 = _____

Column Totals: 151 (A) 418 (B)

PI = B/A = 2.76

<i>Salix reticulata</i>	5	2		FAC
<i>Arctostaphylos rubra</i>	5	6		FAC
<i>Picea glauca</i>	5	5		FACU
<i>Salix</i> sp	5	1		

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex bigelowii</i>	20	Y	FAC
2. <i>Eriophorum vaginatum</i>	15	Y	FACW
3. <i>Equisetum arvense</i>	1		FAC
4. <i>Petasites frigidus</i>	3		FACW
5. <i>Rubus chamaemorus</i>	1		FACW
6. <i>Grass</i> sp	1		
7.			
8.			
9.			
10.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

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.

0 % Bare Ground

5 % 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

W106LH024

7-26

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		
O _i 0-3							Saturated organics
O _e 3-6							
O _a 6-12							not much
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>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)	
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>Permafrost</u> Depth (inches): <u>12</u>							
Hydric Soil Present (Y/N): <u>Y</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>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>N</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>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>Y</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>Y</u>		Depth (in): <u>8</u>					
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>Ø</u>		EC: <u>142</u> <u>6.44</u> pH			
Notes:							

AQUATIC SITE ASSESSMENT DATA FORM

W1006LH024

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>10</u> Sapling (<5 dbh, <6m tall) <u>30</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>10</u> Tall herb (>1m) _____ Short herb (<1m) <u>20</u> Moss-Lichen <u>10</u> Floating _____ Submerged _____		
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 <input checked="" type="checkbox"/> 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 <u>3-10</u> Flat <input checked="" type="checkbox"/> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric <input checked="" type="checkbox"/> 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.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) <input checked="" type="checkbox"/>	
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>6.44</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.) _____ 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:

JBrownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH029

Field Target: 247

Date: 7.26.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date

Jessie Brownlee 7.26.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <input checked="" type="checkbox"/> Facility
Field Target: 246		Map #: 75 Map Date: 5.27.16	
Date: 7.26.16	Project Name: Alaska LNG		Feature Id: W106LH025
Investigators: Jessie Brownlee Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 518.6	
Latitude: 63.951167	Longitude: 149.120618		Datum: WGS84
Logbook No.: 2	Logbook Page No.: 40	Picture No.: P-W106LH025-001 thru -004	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Toe slope
Slope (%): ~15	Local relief (concave, convex, none): slightly convex
Pre-mapped Alaska LNG/NWI classification: U1C2	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 <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/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No	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.

Open Pie Mar forest @ toe slope of hills. Somewhat Low density of shrub & Emergent layer with thick feather moss around.

Soil is sandy under 9" of organics and shows signs of ^{regular} saturation from 9-11". Water was actively seeping into pit from upslope direction and filling the pit.



WETLAND DETERMINATION DATA FORM

W1062H025

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>	15	Y	FACW
2.			
3.			
4.			
Total Cover: <u>15</u> 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>			
Sapling/Shrub Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium uliginosum</i>	18	Y	FAC
2. <i>Vaccinium vitis-idaea</i>	16	Y	FAC
3. <i>Rhododendrum tomentosum</i>	5		FACW
4. <i>Rhododendrum groenlandicum</i>	4		FAC
5. <i>Betula nana</i>	5		FAC
6. <i>Picea mariana</i>	20	Y	FACW
7. <i>Spiraea stevenii</i>	7		FACU
8. <i>Salix glauca</i>	1		FAC
9.			
Total Cover: <u>69</u> 50% of total cover: <u>34.5</u> 20% of total cover: <u>13.8</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: _____ X 1 = _____
 FACW species: 40 X 2 = 80
 FAC species: 52 X 3 = 156
 FACU species: 3 X 4 = 12
 UPL species: _____ X 5 = _____
 Column Totals: 95 (A) 248 (B)
 PI = B/A = 2.61

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	2		FAC
2. <i>Calamagrostis lapponica</i>	2		FAC
3. <i>Carex bigelowii</i>	4	Y	FAC
4. <i>Carex lasiocarpa</i>	3	Y	FACU
5. <i>Petasites Frigidus</i>	7		FACU
6. <i>Equisetum arvense</i>	7		FAC
7.			
8.			
9.			
10.			
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>			

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

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

WETLAND DETERMINATION DATA FORM

W106LH025

7-26-16

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		
0i 0-3								Dry Feather moss
0e 3-9								Saturated organic s.w/mineral
Bw 9-11	7.5YR 4/4	50	7.5YR 3/3	50	con	M	loamy sand	organic material mixed into concentrations
C 11-17	10YR 4/2	100					loamy fine 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 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>Frost</u> Depth (inches): <u>17</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>spotty positive αα soil is thixotropic</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 X JB</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>M</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>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>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>9</u>						
EC: <u>35</u> <u>5.86</u>								
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W10624025

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>15</u> Sapling (<5 dbh, <6m tall) <u>20</u> Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) <u>25</u> Tall herb (>1m) _____ Short herb (<1m) <u>10</u> Moss-Lichen <u>30</u> Floating _____ Submerged _____		
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%) <input checked="" type="checkbox"/> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
Presence of Islands (M): Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <input checked="" type="checkbox"/> 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 _____ 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 _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.86</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.) _____ 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:

J Browlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106LH025 Field Target: 246 Date: 7-26-16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Browne

X

Signature / Date

Jessie Browne

8.9.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 3/2	Map #: 10 Map Date: 6.9.11
Date: 7-13-16	Project Name & No.: Alaska LNG 60418403		Feature Id: W106PA001
Investigators: Jessie Brawnlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 151.3	
Latitude: 68.37075		Longitude: -149.321232	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 32	Picture No.: P-W106PA001-001 thru 004	

SITE PARAMETERS	
Subregion: Brooks Range	Landform (hillslope, terrace, hummocks, etc.): mound, river terrace
Slope (%): 5	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: PEM/SS1B	Evidence of Wildlife Use: Passerines
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
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 11C2, 11D1

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

Short to Dwarf shrub community. Dry sandy soil w/out sign of saturation
No signs of hydrology. A Dry R4SB is to the north w/ very rocky soil.
All dry from OP-2.

WETLAND DETERMINATION DATA FORM

W106PA001

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	20	Y	FACW
2. <i>Salix reticulata</i>	15		FAC
3. <i>Oryza integrifolia</i>	20	Y	FACU
4. <i>Rhododendrum lepanicum</i>	3		FAC
5. <i>Salix richardsonii</i>	15		FACW
6. <i>Arctostaphylos rubra</i>	5		FAC
7.			
8.			
9.			
Total Cover: <u>78</u> 50% of total cover: <u>39</u> 20% of total cover: <u>15.6</u>			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: - X 1 = -

FACW species: 35 X 2 = 70

FAC species: 23 X 3 = 69

FACU species: 22 X 4 = 88

UPL species: 10 X 5 = 50

Column Totals: 90 (A) 277 (B)

PI = B/A = 3.07

Carex sp	T	N	-
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VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Pedicularis</i>	1		
2. <i>Gutierrezia Canadensis</i>	1		(UPL) NL
3. <i>Anthoxanthum monticola</i>	9	Y	UPL
4. <i>Equisetum arvense</i>	T		FAC
5. <i>Tofieldia pusilla</i>	T		FAC
6. <i>Hedysarum alpinum</i>	2		FACU
7. grass 2	T		
8. <i>Equisetum variegatum</i>	T		FACU
9. <i>Bistorta vivipara</i>	T		FAC
10. <i>Pedicularis capitata</i>	T		FACU
Total Cover: <u>13</u> 50% of total cover: <u>6.5</u> 20% of total cover: <u>2.6</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

30 Total Cover of Bryophytes + lichen

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

WETLAND DETERMINATION DATA FORM

W106PA001

7-13-16

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				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
0-2							Dry organics
A 2-4	10YR 3/2	100					Silt loam
Bw1 4-7	10YR 3/2	98	10YR 4/4	2	con	M	Sandy loam
Bw2 7-12	10YR 4/2	99	10YR 3/6	1	con	RC	Silt loam
Ab 12-13	10YR 3/2	100					
See note below							
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: Remaining 12 inches down to 24 are repeating bands of Bw1 & Bw2, silt loam & Sandy loam.							

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:			

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 (≥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 _____ 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:

J. Browlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA001

Field Target: 312

Date: 7.13.16

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

X

Naley Valper

Wetland Scientist (print)

X

Naley Valper

Signature / Date

7-17-16

X

JTBrounlee

Field Crew Chief (print)

X

JTBrounlee

Signature / Date

7-17-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 311	Map #: 11 Map Date: 6.9.16
Date: 7-13-16	Project Name: Alaska LNG		Feature Id: W106PA002
Investigators: Jessie Brannlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 156.2	
Latitude: 68.30332	Longitude: -149.35515		Datum: WGS84
Logbook No.: 2	Logbook Page No.: 32	Picture No.: R-W106PA002-001 thru 004	

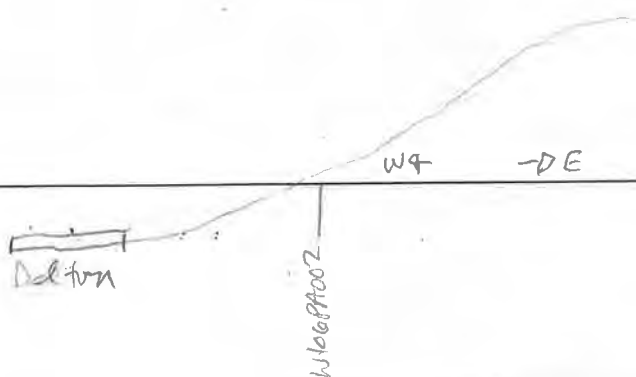
SITE PARAMETERS	
Subregion: Brooks Range	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): ~ 5-10	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SSIB 11A2 11C2	Evidence of Wildlife Use: None
Are climatic/hydrologic conditions on 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 checked="" 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"/> <i>see note below</i> No <input type="checkbox"/>	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): 11C2, 11A2

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

Short to Dwarf shrub community w/ diverse but not dense forb/herb community. packets of standing water as you move upslope. A small R4SB stream runs to the south of this plot. Soil does not make an indicator but using best prof judgement to still consider it hydric given the water table @ 3". Soil Likely Lacks indicator due to the high pH of the soil as inferred by the high water pH.

W106PA002-0P is ~30' to the North and is U: 11C1 w/ dry Rocky soil & NO signs of hydrology. it's ~4' higher in elevation than this paper plot.

68.30342 -149.35503



WETLAND DETERMINATION DATA FORM

WLOG PA 002

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>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	25	Y	FAC
2. <i>Empetrum nigrum</i>	15	Y	FAC
3. <i>Salix reticulata</i>	10		FAC
4. <i>Rhododendrum tomentosum</i>	20	Y	FACW
5. <i>Vaccinium vitis-idaea</i>	8		FAC
6. <i>Vaccinium uliginosum</i>	2		FAC
7. <i>Salix polaris</i>	15	Y	FACU
8. <i>Drum. integrifolia</i>	7		FACU
9. <i>Cassiope tetragyna</i>	4		FACU

Total Cover: 99

50% of total cover: 49.5 20% of total cover: 19.8

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: 35 X 2 = 70

FAC species: 78 X 3 = 234

FACU species: 4 X 4 = 16

UPL species: 0 X 5 = 0

Column Totals: 117 (A) 320 (B)

PI = B/A = 2.7

<i>Bistorta vivipara</i>	H	T		FAC
<i>Carex</i> 2	H	T		—
grass from 25 plot	H	T		—
<i>Valeriana capitata</i>	H	T		FAC
<i>Carex bigelowii</i>	H	6	Y	FAC
<i>Fofo sp</i>	H	T		—
<i>Chenarion latifolia</i>	H	T		FAC

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum arvense</i>	5	Y	FAC
2. <i>Papaver lapponicum</i>	+		FACU
3. <i>Saussurea angustifolia</i>	7	Y	FAC
4. <i>Stellaria longipes</i>	+		FAC
5. <i>Arnica lessingii</i>	T		NL
6. <i>Bistorta officinalis</i>	T		NL
7. <i>Carex</i> sp	T		—
8. <i>Peticularis frigida</i>	T		FAC
9. <i>Salifraga hirculus</i>	+		OBL
10. <i>Small Datura</i>	T		—

Total Cover: 18

50% of total cover: 9 20% of total cover: 3.6

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.

0 % Bare Ground

1 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes + lichen

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106PA002

7.13.16

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								Saturated organics
Bw1 3-10	10YR 5/2	100					silt loam	granular & soft & friable
Bw2 10-16	10YR 4/2	100					silty clay	
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)		
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 Permafrost</u> Depth (inches): <u>10</u>								
Hydric Soil Present (Y/N): <u>N but using BPS to pass soils so Yes (See note on front page)</u>								
Notes: <u>gravels present throughout</u> <u>Neg XX</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>Y</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>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>5</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>3</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>0</u>		EC: <u>1161</u> <u>8.78</u>				
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W10674 002

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 <input checked="" type="checkbox"/> 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) <u>70</u> Tall herb (≥1m) _____ Short herb (<1m) <u>20</u> Moss-Lichen <u>10</u> 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 _____ <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 _____ 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 _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet <input checked="" type="checkbox"/> 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 _____ 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) _____ Alkaline (>7.4) <input checked="" type="checkbox"/> Acid (<5.5) _____ pH Reading <u>8.79</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.) _____ 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:

J Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA002 Field Target: 311 Date: 7.13.18

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

Haley Volper

Wetland Scientist (print)

X

Haley Volper 7-17-16

Signature / Date

X

JBrownee

Field Crew Chief (print)

X

[Signature] 7-17-16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <input checked="" type="checkbox"/>		Field Target: 310	Map #: 12 Map Date: 6-9-16
Date: 7-13-16	Project Name: Alaska LNG		Feature Id: W106PA003
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 160.4	
Latitude: 68.24782 or 68°14'52.15"		Longitude: 149.41910 149°25'8.7"	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 32	Picture No.: P-W106PA003-001 thru 004	

SITE PARAMETERS	
Subregion: Brooks Range	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): ~10-15	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: PSS1/E MIB	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 (Viereck): 11 C 2

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

Dry Sal Pol Shrub community. Little diversity & low density.
Walked from road to the NW and area was all dry.
Several drainage Dry R4513 are around

Location of original FT 310: 68.24757 149.41774 where W106PA003-OP was conducted
W106PA003-OP U: 11 C 2, 11 A 2 Dry Rocky soil. Dry R4513 drainages.
veg is Salix & Hed Ser (pea)

W106PA003-OP2 U: 68.2495 -149.41599
U 11 C 2, 11 D 1

Sal Pol & Dryas community.
Soil Dry & Rock.

No sign of wetlands from Can to here.

Car GPS 68.24893 149.42142 (68°14'56.15" 149°25'17.11")

* Note on walk to road from OP2 site got wet @ 68.24493 149.41771

* No tablet. All points taken on Garmin (68°14'41.75" 149°25'03.76")

WETLAND DETERMINATION DATA FORM

W106 PA003

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>20'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Salix pulchra</i>	35	Y	FACW
2.	<i>Dryas octopetalis</i>	8		UPL
3.	<i>Salix reticulata</i>	6		FAC
4.				
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>49</u>				
50% of total cover: <u>24.5</u> 20% of total cover: <u>9.8</u>				

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>3</u> (B)	
% Dominant Species that are OBL, FACW, or FAC: <u>66.7</u> (A/B)	

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species: <u>0</u> X 1 = <u>0</u>	
FACW species: <u>35</u> X 2 = <u>70</u>	
FAC species: <u>9</u> X 3 = <u>27</u>	
FACU species: <u>4</u> X 4 = <u>16</u>	
UPL species: <u>9</u> X 5 = <u>45</u>	
Column Totals: <u>57</u> (A)	<u>158</u> (B)
PI = B/A = <u>2.77</u>	

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> (<u>20'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Pyrola asarifolia</i>	4	Y	FACU
2.	<i>Saussurea angustifolium</i>	2	Y	FAC
3.	<i>Carex bigelovii</i>	1		FAC
4.	<i>Oxytropis campestris</i>	1		NL(UPL)
5.	<i>Wassila</i>	1		
6.	<i>Stellaria longipes</i>	1		FAC
7.	<i>Pedicularis capitata</i>	1		FAC
8.	<i>Carex sp</i>	1		
9.				
10.				
Total Cover: <u>9</u>				
50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</u>				

Hydrophytic Vegetation Indicators:	
<u>Y</u> Dominance Test is > 50%	
<u>Y</u> Prevalence Index is ≤ 3.0	
<u>—</u> Morphological Adaptations ¹ (Provide supporting data in Notes)	
<u>—</u> 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>80</u> Total Cover of Bryophytes	
<u>0</u> % Cover of Water	<u>Y</u>

Hydrophytic Vegetation Present (Y/N):	
<u>Y</u>	

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

WETLAND DETERMINATION DATA FORM

W106PA003

7-13-16

SCIL _____		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		
Oe 0-2								
A 2-3	10YR 2/2	100					Loam	
Bw 3-5	10YR 3/2	100					Silt Loam	
Ab 5-5.5	10YR 2/2	100					Loam	
Bw2	10YR 3/2	100					gravelly & 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>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>NO</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>on edge</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

W106PA003

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:

SBrown

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA003

Field Target: 310

Date: 7.13.16

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

X

Wetland Scientist (print)

X


Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X



Signature / Date

7.13.16

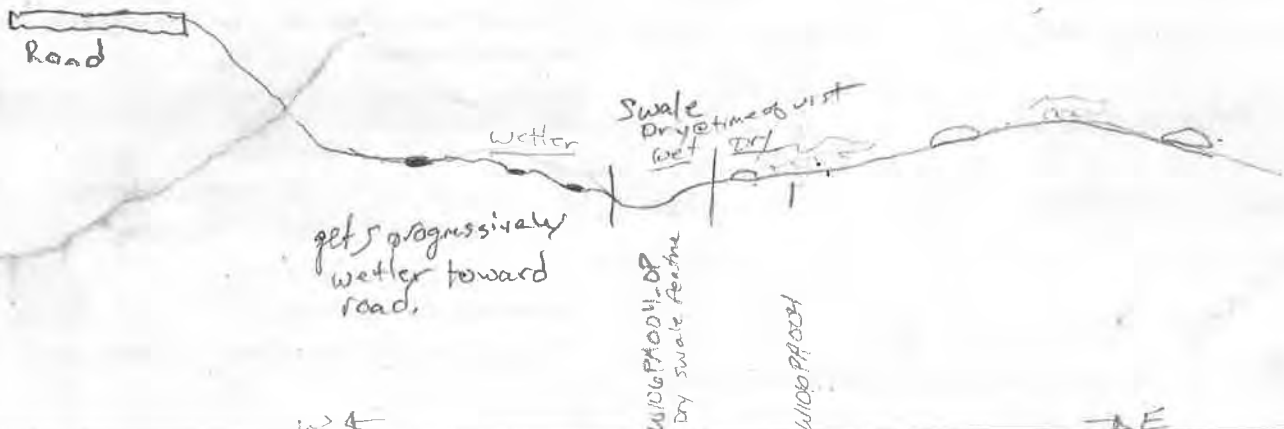
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <u>L</u>
Field Target: <u>313</u>		Map #: <u>9</u> Map Date: <u>6-9-16</u>	
Date: <u>7-14-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106PA004</u>
Investigators: <u>Jessie Browne Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>145</u>	
Latitude: <u>68.45748°</u>	Longitude: <u>-149.4909407°</u>	Datum: WGS84	
Logbook No.: <u>2</u>	Logbook Page No.: <u>33</u>	Picture No.: <u>P-W106PA004-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Brooks Range</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hillside</u>
Slope (%): <u>0-3</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEM1/SS1B</u>	Evidence of Wildlife Use: <u>ground squirrel sighting</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 (Viereck): <u>11C2.11D1</u>

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

Dwarf shrub community of *Dryas Int*, *Dwarf Vacc* and *Salix*.
Soil is thick organics but dry and rocky. This wetland boundary just to the west divides the swale wet feature from this dry rocky convex community to the east.
W106PA004-0P Swale PSS1/EM1B. >10" of organics not saturated but tussocks, algal crust, & drainage patterns.



WETLAND DETERMINATION DATA FORM

W106PAC004

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>1000</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: _____

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

Sapling/Shrub Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cassiope tetragona</i>	4		FACU
2. <i>Dryas integrifolia</i>	40	Y	FACU
3. <i>Rhododendrum lapponicum</i>	8		FAC
4. <i>Salix reticulata</i>	8		FAC
5. <i>Betula nana</i>	2		FAC
6. <i>Vaccinium uliginosum</i>	4		FAC
7. <i>Arctostaphylos</i>	2		FAC
8. <i>Shrub sp.</i>	T		
9. <i>Salix arctica</i>	4		FACU

Total Cover: 74

50% of total cover: 37 20% of total cover: 14.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: _____ X 1 = _____

FACW species: 1 X 2 = 2

FAC species: 26 X 3 = 78

FACU species: 50 X 4 = 200

UPL species: 2 X 5 = 10

Column Totals: 79 (A) 290 (B)

PI = B/A = 3.67

<i>Salix pulchra</i>	1		FACU
<i>Empetrum nigrum</i>	1		FAC
<i>Salix richardsonii</i>	1		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Bistorta officinalis</i>	2	Y	NL(U)
2. <i>Saussurea angustifolia</i>	1	Y	FAC
3. <i>Pedicularis capitata</i>	T		FACU
4. <i>Oxytropis campestris</i>	T		NL(U)
5. <i>Fork sp.</i>	T		
6. <i>Carex Scirpoidea</i>	2	Y	FACU
7. <i>Carex 2</i>	T		
8. <i>Papaver lapponicum</i>	T		FACU
9. <i>Carex 3</i>	T		
10.			

Total Cover: 5

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

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
Not recorded in field 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

W106PA009

7.14.11

Botanical mucky way

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
Oi 0-2							Dry feather mounds
De 2-7							Damp highly broken down (almost Oa)
Bw 7-13	10YR 3/3	90	10YR 4/6	3	con	m	very cobbly, silty & Dry very friable, great structure
	10YR 4/1 ash	5					
Bws 10-19	10YR 3/2	100					very cobbly, silty
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: Soil depths invariable around pit. I described the deepest organic side. Soil very gravelly in organics & very cobbly in mineral.							
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 _____ 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:

J. Brown

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA004

Field Target: 313

Date: 7.14.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X



Signature / Date

8.9.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline Access Road (explain) <u>X</u> Other (explain) _____		Field Target: <u>314</u>	Map #: <u>8</u> Map Date: <u>6-9-16</u>
Date: <u>7-15-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106PA005</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska <u>U</u>	Milepost: <u>136</u>	
Latitude: <u>68.5646260</u>		Longitude: <u>-149.5067670</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>34</u>	Picture No.: <u>P-W106PA005-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Brooks foothills</u>	Landform (hillslope, terrace, hummocks, etc.): <u>swale</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSSI/EMI B 11 C 2</u>	Evidence of Wildlife Use: <u>Birds</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 <u>X</u> , or Hydrology _____ Naturally Problematic?	No _____ (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> (See note below) No _____	Wetland Type: <u>PEMI/SSIC</u>
Wetland Hydrology Present? Yes <u>Y</u> No _____	Alaska Vegetation Classification (Viereck): <u>11 A 2, 11 C 2</u>

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Man made (winter trail?)

Swaling feature runs from road to the west connecting many numerous PUBH together. Swale strip is wetter than surrounding tundra w many pockets of standing water. Iron sheen & bare soil from surface RUSBS. This plot has algal/Bare ground, small pockets of standing water, saturated to the surface w/a diverse Emergent & Shrub community.

W106PA005-OP PEMIF connecting several PUBH ~7' standing water. Swaling feature 11 A 3 slope.

-While some drier areas are present in this signature, the majority of area is a B trending more to C. water modifier w/a few upland inclusions too small to pull out.

*Soil doesn't meet an indicator but using BPJ & strong hydrology to waive the need for an indicator. Surface water, watertable @ 2" & Fwater modifier just 15-25' away imply strong wetland classification.

WETLAND DETERMINATION DATA FORM

W106PA005

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	1		FAC
2. <i>Salix pulchra</i>	8	Y	FACW
3. <i>Vaccinium uliginosum</i>	3		FAC
4. <i>Vaccinium vitis-idaea</i>	T		FAC
5. <i>Oxycoccus integrifolia</i>	2		FACU
6. <i>Rhododendron tomentosum</i>	T		FACW
7. <i>Salix fuscescens</i>	1		FACW
8. <i>Salix alaxensis</i>	5	Y	FAC
9. <i>Empetrum nigrum</i>	1		FAC
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: 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: 9 X 2 = 18
 FAC species: 43 X 3 = 129
 FACU species: 2 X 4 = 8
 UPL species: _____ X 5 = _____
 Column Totals: 55 (A) 156 (B)
 PI = B/A = 2.83

Species	S	I	FAC
<i>Rhododendron Lapponicum</i>	S	I	FAC
<i>Salix reticulata</i>	S	I	FAC
<i>Stellaria longipes</i>	H	T	FAC
<i>Poa</i> sp	H	T	—
<i>Calamagrostis canadensis</i>	H	T	FAC
<i>Carex squarrelis</i>	H	I	OBL
<i>Pedicularis</i>	H	T	—

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Arnica lessingii</i>	T		NL
2. <i>Bistorta vivipara</i>	T		FAC
3. <i>Carex bigelovii</i>	30	Y	FAC
4. <i>Acrotium delphinifolium</i>	T		FAC
5. <i>Tofieldia pusilla</i>	T		FAC
6. <i>Tofieldia occidentalis</i>	T		FAC
7. <i>Carex</i> sp	T		—
8. <i>Forb</i> sp	T		—
9. <i>Saxifraga</i> sp	T		—
10. <i>Equisetum arvense</i>	1		FAC
Total Cover: <u>32</u>			
50% of total cover: <u>16</u> 20% of total cover: <u>6.4</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.

% Bare Ground: 0
 % Cover of Wetland Bryophytes: 10
 Total Cover of Bryophytes: 45
 % Cover of Water: 23
 Hydrophytic Vegetation Present (Y/N): Y
 Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

W106PA005

7.15.16

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				Notes
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	
O _i 0-2							Saturated organics
Bw 2-4	2.5Y 5/2	100					very gravelly, Sandy loam
C 4-15	— NA —						Sandy gravel
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>Y (see note on front)</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 (see note on front)</u>							
Notes: <u>Spotty Positive RXX in the BW section</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>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>Y</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>Marginal</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>Y</u>		Other (Explain in Notes):					
Iron Deposits (B5) <u>Y (on edge)</u>							
Surface Water Present (Y/N): <u>Y</u>		Depth (in): <u>2</u>		Wetland Hydrology Present (Y/N): <u>Y</u>			
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>2</u>					
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>0</u>		EC: <u>105</u> pH <u>6.45</u>			
Notes:							

AQUATIC SITE ASSESSMENT DATA FORM

W106 PA005

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) <input type="checkbox"/> Sapling (<5 dbh, <6m tall) <input type="checkbox"/> Tall shrub (2-6m) <input type="checkbox"/> Short shrub (0.5-2m) <input type="checkbox"/> Dwarf shrub (<0.5m) <u>30</u> Tall herb (≥1m) <input type="checkbox"/> Short herb (<1m) <u>30</u> Moss-Lichen <u>30</u> Floating <input type="checkbox"/> Submerged <input type="checkbox"/>		
Number of Wetland Types (M): <u>3</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <input checked="" type="checkbox"/> Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <input checked="" type="checkbox"/> Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <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 <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 _____ Histosol: Sapric _____ Mineral: Gravelly <input checked="" type="checkbox"/> 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 <input checked="" type="checkbox"/> 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 _____ 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>6.45</u>	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits <input checked="" type="checkbox"/> Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <input checked="" type="checkbox"/> 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.) _____ 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: LV

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA005 Field Target: 314 Date: 7.15.16

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)?
- ☒ 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

J Brownlee

Jessie Brownlee 8.9.16

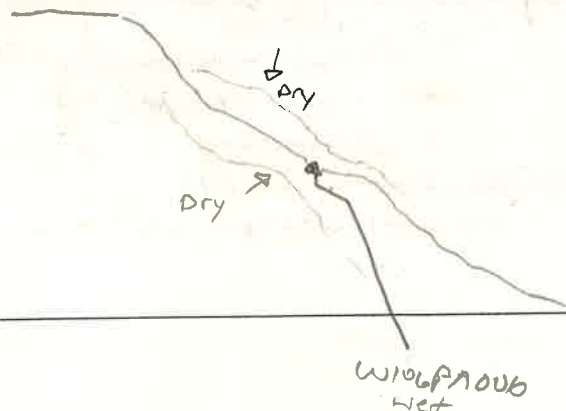
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline _____ Access Road (explain) _____ Other (explain) <u>X</u>		Field Target: <u>315</u>	Map #: <u>7</u> Map Date: <u>6-8-16</u>
Date: <u>7-15-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106PA006</u>
Investigators: <u>Jessie Brannlee, Kaley Vaper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>131</u>	
Latitude: <u>68.6179 6917°</u>	Longitude: <u>-149.3080 9749°</u>	Datum: WGS84	
Logbook No.: <u>2</u>	Logbook Page No.: <u>34</u>	Picture No.: <u>8-W106PA006-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Brooks Foothills</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hill side shoulder</u>
Slope (%): <u>10-15</u>	Local relief (concave, convex, none): <u>undulating flat to concave</u>
Pre-mapped Alaska LNG/NWI classification: <u>U 11-D, 11-A1</u>	Evidence of Wildlife Use: <u>caribou bones</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 <u>X</u> , or Hydrology _____ Naturally Problematic?	No _____ (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> see soil not on 3rd page No _____	Wetland Type: <u>PSS1/EM1B</u>
Wetland Hydrology Present? Yes <u>X</u> No _____	Alaska Vegetation Classification (Viereck): <u>11D2, 11A2</u>

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

Dwarf shrub community w/ diverse forbs. Site is near hill top. Extend wet boundary to here but Land scape is complex with many microridges that are rocky and dry & many micro swales that are wet. without ~~contour~~ contours its impossible to map each. I updated the map as I walked down slope.



WETLAND DETERMINATION DATA FORM

W1068A006

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>7.6'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Empetrum nigrum</i>	4		FAC
2. <i>Salix reticulata</i>	18	Y	FAC
3. <i>Vaccinium uliginosum</i>	5		FAC
4. <i>Vaccinium vitis-idaea</i>	8		FAC
5. <i>Salix pulchra</i>	20	Y	FACW
6. <i>Cassiope tetragyna</i>	4		FACU
7. <i>Betula nana</i>	4		FAC
8. <i>Rhododendron tomentosum</i>	1		FACW
9.			
Total Cover: <u>64</u>			
50% of total cover: <u>32</u> 20% of total cover: <u>12.8</u>			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 43 (B)

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: - X 1 = -

FACW species: 24 X 2 = 48

FAC species: 51 X 3 = 153

FACU species: 5 X 4 = 20

UPL species: 1 X 5 = 5

Column Totals: 81 (A) 226 (B)

PI = B/A = 2.79

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>2.6'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Pyrola asariflora</i>	1		FACU
2. <i>Petasites frigidus</i>	3		FACW
3. <i>Bistorta officinalis</i>	<u>48</u>	<u>X N</u>	<u>UPL NL</u>
4. <i>Arnica lessingii</i>	<u>T</u>		<u>UPL</u>
5. <i>Bistorta vivipara</i>	<u>T</u>		<u>FAC</u>
6. <i>Pedicularis</i>	<u>T</u>		<u>-</u>
7. <i>Valeriana capitata</i>	<u>T</u>		<u>FAC</u>
8. <i>Carex bigelowii</i>	12	Y	FAC
9. <i>grass sp</i>	<u>T</u>		<u>-</u>
10. <i>Calamagrostis canadensis</i>	<u>T</u>		<u>FAC</u>
Total Cover: <u>23 17</u>			
50% of total cover: <u>11.5</u> 20% of total cover: <u>4.6</u>			
8.5 3.4			

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.

8 % Bare Ground

35 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106 PA006

7.15.16

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		
0i 0-5								Saturated organics
A 5-8	10YR 3/2	100					Silt loam	high organic matter
Bw1 8-90	2.5Y 3/2	98	10YR 5/1	2	con	m	silt loam	sticky
Bw2 10-16	2.5Y 4/2	100					very gravelly 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>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> - Using B P 5 to wave Indicator. Soil does not meet any indicator.								
Notes: But with strong hydrology & water table expected to rise to 5" & surface water and slope gets progressively wetter below; the site is clearly a wetland.								
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>—</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>Y</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>expected to rise to 5" where seep begins</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>4</u>		EC: <u>434</u> pH <u>6.58</u>				
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106 PA006

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <input checked="" type="checkbox"/> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <input type="radio"/> Sapling (<5 dbh, <6m tall) <input type="radio"/> Tall shrub (2-6m) <input type="radio"/> Short shrub (0.5-2m) <input checked="" type="radio"/> 40 Dwarf shrub (<0.5m) <input type="radio"/> Tall herb (≥1m) <input type="radio"/> Short herb (<1m) <input checked="" type="radio"/> 40 Moss-Lichen <input checked="" type="radio"/> 20 Floating <input type="radio"/> Submerged <input type="radio"/>		
Number of Wetland Types (M): <input checked="" type="checkbox"/> 2 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 _____ <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 _____ 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 _____ 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 _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading 6.58	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits <input checked="" type="checkbox"/> Low Permeability Stratified Deposits _____ 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 _____ Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) <input checked="" type="checkbox"/> 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) _____ Medium (10-100 acres) <input checked="" type="checkbox"/> Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check:

GB

W

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106 PA006

Field Target: 315

Date: 7.15.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

J Brown 8.9.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 316	Map #: 6 Map Date: 6.9.16
Date: 7-15-16	Project Name: Alaska LNG		Feature Id: W106PA007
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 124	
Latitude: 68.6773147°	Longitude: -149.1315522°	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 34	Picture No.: P-W106PA007-001 thru 004	

SITE PARAMETERS	
Subregion: Brooks foothills	Landform (hillslope, terrace, hummocks, etc.): Hill top
Slope (%): 5	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B	Evidence of Wildlife Use: Caribou poop
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PEM1/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IIIA2, II D2

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

Dwarf shrub & Emergent tundra w/ tussocks of Eriogonum and thick sphagnum all about. A few frost boil/bare ground pot mark Plot. Pockets of standing water are throughout the polygon but not w/in plot.

WETLAND DETERMINATION DATA FORM

W106 PA 007

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	50	Y	FAC
2. <i>Rhododendron tomentosum</i>	30	Y	FACW
3. <i>Salix pulchra</i>	6		FACW
4. <i>Betula nana</i>	3		FAC
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>89</u> 50% of total cover: <u>44.5</u> 20% of total cover: <u>17.8</u>			

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

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species: _____ X 1 = _____
 FACW species: 82 X 2 = 164
 FAC species: 68 X 3 = 204
 FACU species: _____ X 4 = _____
 UPL species: 1 X 5 = 5
 Column Totals: 151 (A) 373 (B)
 PI = B/A = 2.47

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Bistorta officinalis</i>	1		NL(U)
2. <i>Carex bigelowii</i>	15	Y	FAC
3. <i>Petasites frigidus</i>	1		FACW
4. <i>Eriophorum vaginatum</i>	45	Y	FACW
5. <i>Saxifrag sp</i>	7		
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>62</u> 50% of total cover: <u>31</u> 20% of total cover: <u>12.4</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.

3 % Bare Ground
30 % 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

W106PA007

7-15-16

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								Damp sphagnum
4-8								Saturated sphagnum
Bul 8-14	10YR 4/2	95	10YR 4/4	5	con	M	silt loam	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS¹		
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) <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>Yerna Frost</u> Depth (inches): <u>8</u>								
Hydric Soil Present (Y/N): <u>Y</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>Y</u>		Sparsely Vegetated Concave Surface (B8) <u>N</u>		Oxidized Rhizospheres along Living Roots (C3) <u> </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>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>6.7</u>		EC: <u> </u>				
Notes: 								

AQUATIC SITE ASSESSMENT DATA FORM

W106PA007

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

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Jessie Broun

✓✓

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA007

Field Target: 316

Date: 7.15.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownee

Field Crew Chief (print)

X

J. Brownee 7.15.16

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 320	Map #: 3 Map Date: 6.9.16
Date: 7-16-16	Project Name: Alaska LNG		Feature Id: W106PA008
Investigators: Jessie Brannlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 96	
Latitude: 69.0211708°		Longitude: -148.82796°	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 35	Picture No.: P-W106PA008-001 thru 004	

SITE PARAMETERS	
Subregion: Brooks foothills	Landform (hillslope, terrace, hummocks, etc.): River terrace
Slope (%): 0-2	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: NDI, IIIA2	Evidence of Wildlife Use: Fox droppings, Passerine nest on ground
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
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): IIC2

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

Salix shrub community ~2' tall of Sal Ric primarily w/ Dry Int dwarf shrub.
Site is River terrace with soil showing several signs of depositional events.
Bg layer w/ concentrations is @ interface of textural change & likely patches
water due to textural differences ^{for short times} NO signs of hydrology.



WETLAND DETERMINATION DATA FORM

W106PA008

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>7.6'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Salix reticulata</u>	<u>6</u>		<u>FAC</u>
2. <u>Arctostaphylos ruber</u>	<u>8</u>		<u>FAC</u>
3. <u>Rhododendrum lapponica</u>	<u>6</u>		<u>FAC</u>
4. <u>Dryas Integrifolia</u>	<u>15</u>	<u>Y</u>	<u>FACU</u>
5. <u>Salix Richardsonii</u>	<u>18</u>	<u>Y</u>	<u>FACW</u>
6. <u>Vaccinium uliginosum</u>	<u>6</u>		<u>FAC</u>
7. <u>Salix pulchra</u>	<u>1</u>		<u>FACU</u>
8.			
9.			
Total Cover: <u>60</u>			
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 19 X 2 = 38

FAC species: 27 X 3 = 81

FACU species: 21 X 4 = 84

UPL species: 1 X 5 = 5

Column Totals: 68 (A) 208 (B)

PI = B/A = 3.06

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>7.6'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Equisetum Arvense</u>	<u>1</u>		<u>FAC</u>
2. <u>Bistorta vivipara</u>	<u>1</u>		<u>FAC</u>
3. <u>Hedysarum alpinum</u>	<u>2</u>	<u>Y</u>	<u>FACU</u>
4. <u>Pedicularis sp</u>	<u>1</u>		<u>—</u>
5. <u>Lupinus Arcticus</u>	<u>4</u>	<u>Y</u>	<u>FACU</u>
6. <u>Tofieldia pusilla</u>	<u>1</u>		<u>FAC</u>
7. <u>Oxytropis campestris</u>	<u>1</u>		<u>OBL</u>
8. <u>Equisetum variegatum</u>	<u>1</u>		<u>FACW</u>
9. <u>Parnassia palustris</u>	<u>1</u>		<u>FACW</u>
10. <u>Carex sp</u>	<u>1</u>		<u>—</u>
Total Cover: <u>9</u>			
50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</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

98 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

W106PAC08

7/16/18

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
0i 0-1.5	—							Dry organic s
C1 1.5-3	10YR 3/2	100					Sandy loam	
Aib 3-4	—							
C2 4-7	10YR 3/2	100					very fine sandy loam	
Oeb 7-8	—							
B2 8-9	2.5Y 4/1	92	10YR 4/4	8	con	M RC		con @ interface w/ sand below
C3 9-24	10YR 3/1	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 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>NO</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: texture changes just past 24 inches to very fine sandy loam w/ concentration pick up but beyond scope of description								
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>		Depth (in): <u>—</u>		EC: <u>—</u>				
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106 PAC08

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:

JBrowne

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106 PA008 Field Target: 320 Date: 7-16-16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date

Jessie Brownlee

7.16.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 319	Map #: 4 Map Date: 6.9.16
Date: 7-16-16	Project Name: Alaska LNG		Feature Id: W106PA009
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 98	
Latitude: 68.9823581°		Longitude: -148.821647°	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 35	Picture No.: P-W106PA009-001 thru 004	

SITE PARAMETERS	
Subregion: Brooks Foothills	Landform (hillslope, terrace, hummocks, etc.): mound
Slope (%): 15	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIES	Evidence of Wildlife Use: owl pellet, game bird 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 <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
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Viereck): 11B2, 11C2

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

Location of FT moved so as to not do an hour long site in 2' of water in area that was mapped correctly. See op W106PA009LOP. I am unsure of the history of the site. The location of the paper form is on an old mound that rings the PUBHx. At places it is bare ground w/ little veg (Herb stratum) w/ undulating uneven microtopography. In area overall, site is very wet. only this partial ring that is ~5' above the surrounding wetland



WETLAND DETERMINATION DATA FORM

W106PA009

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>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Alnus Ruber</u>	<u>4</u>		<u>FAC</u>
2. <u>Salix pulchra</u>	<u>5</u>		<u>FACW</u>
3. <u>Salix glauca</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>
4. <u>Dryas Integrifolia</u>	<u>20</u>	<u>Y</u>	<u>FACU</u>
5. <u>Salix reticulata</u>	<u>4</u>		<u>FAC</u>
6. <u>Dasiphora fruticosa</u>	<u>T</u>		<u>FACW</u>
7. <u>Shepherdia Canadensis</u>	<u>T</u>		<u>FACU</u>
8.			
9.			
Total Cover: <u>53</u>			
50% of total cover: <u>26.5</u> 20% of total cover: <u>10.6</u>			

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 6 X 2 = 12

FAC species: 28 X 3 = 74

FACU species: 32 X 4 = 128

UPL species: 0 X 5 = 0

Column Totals: 66 (A) 214 (B)

PI = B/A = 3.24

VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>20'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Parnassia palustris</u>	<u>1</u>		<u>FACW</u>
2. <u>Hedysarum alpinum</u>	<u>7</u>	<u>Y</u>	<u>FACU</u>
3. <u>Equisetum Arvense</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>
4. <u>Tofieldia pusilla</u>	<u>T</u>		<u>FAC</u>
5. <u>Gentiana prostrata</u>	<u>T</u>		<u>FACW</u>
6. <u>Bistorta vivipara</u>	<u>T</u>		<u>FAC</u>
7. <u>Carex sp</u>	<u>T</u>		
8. <u>Carex sp</u>	<u>1</u>		
9. <u>Equisetum Fluviale</u>	<u>T</u>		<u>OBL</u>
10. <u>Castilleja miniata</u>	<u>T</u>		<u>FAC</u>
Total Cover: <u>14</u>			
50% of total cover: <u>7</u> 20% of total cover: <u>2.8</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.

50 % 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

W106PA009

7-16

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		
C 0-24	10YR 3/1	98	2.5Y 5/1	1	Dep	M	Silt loam	
			10YR 4/4	1	can	M		
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: <u>no horizonation, no boundary differences. Homogenous Silt loam w/very few & very faint features w/a few small pockets of organic matter same texture, color & density to depth.</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):						
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

W106PA 009

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:

JBrownler

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA009 Field Target: 319 Date: 7.16.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

J Brownlee

Field Crew Chief (print)

X

Jessie Brownlee

Signature / Date

7.16.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 317	Map #: 5	Map Date: 6.9.16
Date: 7-16-16	Project Name: Alaska LNG		Feature ID: W106PA010	
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106	
State: Alaska	Region: Alaska	Milepost: 114		
Latitude: 68° 45' 50.251" N	Longitude: 148° 51' 24.419" W	Datum: WGS84		
Logbook No.: 2	Logbook Page No.: 36	Picture No.: P-W106PA010-001 through		

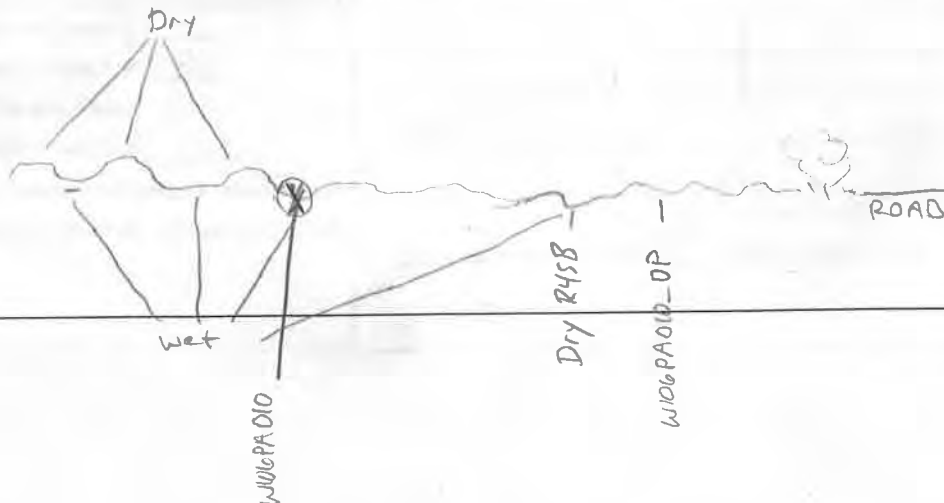
SITE PARAMETERS	
Subregion: Brooks Foothills	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U1102, IIIA2	Evidence of Wildlife Use: none
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no, explain in Notes)	
Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Notes.)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

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

Area is complicated mosaic w/ slight elevation changes just/dry call. Area shows many strong hydrology indicators w/ water stained leaves, unvegetated depressions, algal crust, hummocking, drainage channels with higher/drier mounds in between the wet areas.

Area ~~get~~ shows greater signs of surface hydrology from NE to SW but they are present throughout signature.

A dry op was dug @ original FT 317 Near road but upon seeing that site & exploring more, the paper plot was moved in order to capture the wet features.



WETLAND DETERMINATION DATA FORM

W106 PA010

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	35	Y	FAC
2. <i>Empetrum nigrum</i>	4		FAC
3. <i>Rhododendrum tomentosum</i>	1		FACU
4. <i>Vaccinium vitis-idaea</i>	3		FAC
5. <i>Salix pulchra</i>	5		FACU
6. <i>Vaccinium uliginosum</i>	20	Y	FAC
7. <i>Cassiope tetragona</i>	3		FACU
8. <i>Dryas integrifolia</i>	7		FACU
9. <i>Salix reticulata</i>	4		FAC

Total Cover: 93

50% of total cover: 46.5 20% of total cover: 18.6

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: _____ X 1 = _____

FACW species: 14 X 2 = 28

FAC species: 77 X 3 = 231

FACU species: 10 X 4 = 40

UPL species: 1 X 5 = 5

Column Totals: 102 (A) 304 (B)

PI = B/A = 2.98

<i>Arctostaphylos rubra</i>	5	3		FAC
<i>Andromeda polifolia</i>	5	1		FACW
<i>Rhododendrum tomentosum</i>	5	3		FACW
<i>Salix fuscescens</i>	5	T		FACW
<i>Salix richardsonii</i>	5	4		FACW

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Bistorta officinalis</i>	1		NL (U)
2. <i>Stellaria longipes</i>	T		FAC
3. <i>Saussurea angustifolia</i>	T		FAC
4. <i>Equisetum arvense</i>	8	Y	FAC
5. <i>Bistorta vivipara</i>	T		FAC
6. <i>Tofieldia pusilla</i>	T		FAC
7. <i>Pedicularis</i> sp	T		—
8. <i>Carex</i> sp	T		—
9. <i>Valeriana scouleri</i>	T		FAC
10.			

Total Cover: 9

50% of total cover: 4.5 20% of total cover: 1.8

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.

5 % 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

W106PA010

7-16-16

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								Damp organics
Bw 5-20	2.5Y 4/	88	10YR 4/6	10	con	m	very gravelly silt loam w/ cobbles	
			2.5Y 3/1	2	Dep	m		
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>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>		
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>Spotty XX in mineral</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>Y</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>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>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>Y</u>		Notes:				
Algal Mat or Crust (B4) <u>Edge</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>13</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>11</u>						
EC: <u>81</u> pH: <u>6.22</u>								
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106PA010

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>10</u> Dwarf shrub (<0.5m) <u>40</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>35</u> Moss-Lichen <u>15</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) <u>85</u> Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <u>X</u> 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 <u>X</u> 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.) _____ 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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>6.32</u>	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits <u>X</u> Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (>2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

LANDSCAPE VARIABLES (M)	
Wetland Juxtaposition: Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ 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:

JTBrownlee

YV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA010 Field Target: 317 Date: 7.16.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date

Jessie Brownlee

7.16.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Access Road (explain) Other (explain) <u>X</u>			Field Target: <u>322</u>	Map #: <u>1</u> Map Date: <u>6/9/16</u>
Date: <u>7-16-17</u>	Project Name: Alaska LNG		Feature Id: <u>W106PA011</u>	
Investigators: <u>Jessie Brownlee, Kaley Volker</u>			Team No.: <u>W106</u>	
State: Alaska	Region: Alaska	Milepost: <u>56</u>		
Latitude: <u>69° 32.8426' N</u>		Longitude: <u>148° 35.6952' W</u>	Datum: WGS84	
Logbook No.: <u>2</u>	Logbook Page No.: <u>36</u>	Picture No.: <u>P-W106PA011-001 thru 004</u>		

SITE PARAMETERS	
Subregion: <u>Beaufort Coastal Plain</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>PEM/SSIE</u>	Evidence of Wildlife Use: <u>Caribou tracks, vole + squirrel tracks</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <u>X</u> No <u> </u> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <u>X</u> No <u> </u> (If no, explain in Notes.)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Significantly Disturbed?	No <u>X</u> (If yes, explain in Notes)
Are Vegetation <u> </u> , Soil <u> </u> , or Hydrology <u> </u> Naturally Problematic?	No <u>X</u> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u> </u> No <u>N</u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Hydric Soil Present? Yes <u> </u> No <u>N</u>	Wetland Type: <u>PEM/SSIB¹⁰</u> <u>U</u> (See note below for details)
Wetland Hydrology Present? Yes <u>Y</u> No <u> </u>	Alaska Vegetation Classification (Viereck): <u>III A 2, II D 1</u> ^{in change of status}

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

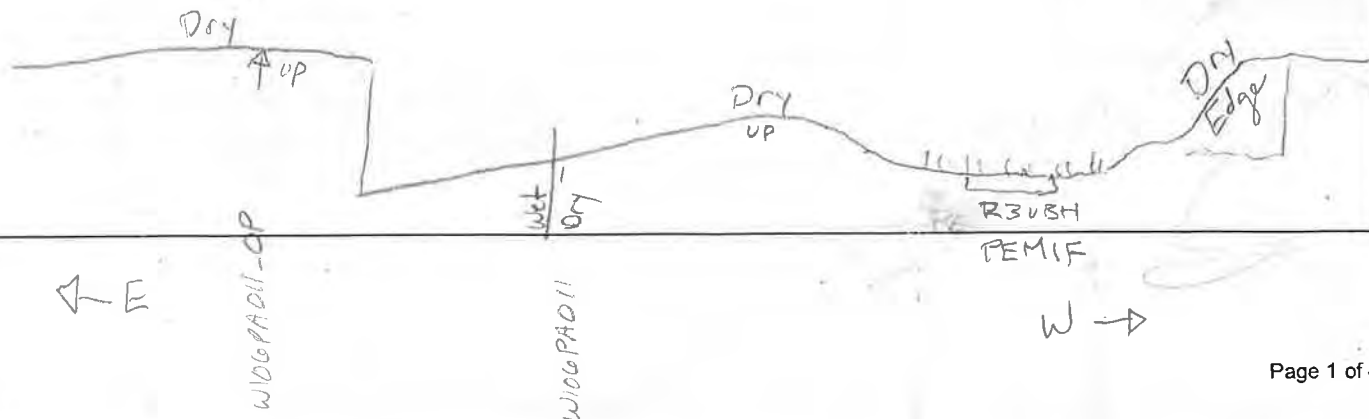
corridor.

Dwarf Shrub/Emergent community. Plants are hummocking w/ Bare ground/cryptogram crust around. Site sandwiched in between 2 uplands. Area Not as wet as mapped.

Weird pink alge or cryptogram @ lowest point before steep upland. Saturated @ surface there at base of elevation gain.

Point doesn't make a soil indicator. But using BPJ to waive it due to the signs of frequent saturation in the upper layers as evident by the Bg w/ foot features of the Distinct band of concentrations. Plot does not make veg either. Therefore I am considering this the boundary of the wetland sandwiched in between 2 uplands.

W106PA011.00 U: 11 D1, 11 C2



WETLAND DETERMINATION DATA FORM

W106 PA011

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>1</u> (A)
1.					Total Number of Dominant Species Across All Strata: <u>3</u> (B)
2.					% Dominant Species that are OBL, FACW, or FAC: <u>33</u> (A/B)
3.					
4.					
Total Cover: _____				Prevalence Index worksheet:	
50% of total cover: _____ 20% of total cover: _____				Total % Cover of: _____ Multiply by: _____	
Sapling/Shrub Stratum (<u>20'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	OBL species: _____ X 1 = _____
1.	<i>Dryas integrifolia</i>	15	Y	FACU	FACW species: _____ X 2 = _____
2.	<i>Vaccinium uliginosum</i>	1		FAC	FAC species: <u>8</u> X 3 = <u>24</u>
3.	<i>Cassiope tetragona</i>	1		FACU	FACU species: <u>17</u> X 4 = <u>68</u>
4.	<i>Arctostaphylos rubra</i>	2		FAC	UPL species: <u>3</u> X 5 = <u>15</u>
5.	<i>Salix reticulata</i>	T		FAC	Column Totals: <u>28</u> (A) <u>107</u> (B)
6.	<i>Salix fuscescens</i>	T		FACW	PI = B/A = <u>3.82</u>
7.	<i>Salix pulchra</i>	T		FACW	<i>Hedysarum alpinum</i> H T FACU
8.	<i>Dasiphora fruticosa</i>	1		FAC	<i>Pinguicula vulgaris</i> H T OBL
9.	<i>Rhododendrum lapponicum</i>	2		FAC	<i>Salix richardsonii</i> S T FACW
Total Cover: <u>22</u>				<i>grass sp</i> H T —	
50% of total cover: <u>11</u> 20% of total cover: <u>4.4</u>				<i>pen sp</i> H T —	
				<i>Boykinia richardsonii</i> H T NL(U)	
				<i>Potentilla biflora</i> H T NL(U)	

VEGETATION (use scientific names of plants)				Hydrophytic Vegetation Indicators:	
Herb Stratum (<u>20'</u>)		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	<u>N</u> Dominance Test is > 50%
1.	<i>Silene acaulis</i>	3	Y	UPL	<u>N</u> Prevalence Index is ≤ 3.0
2.	<i>Tofieldia pusillia</i>	T		FAC	— Morphological Adaptations ¹ (Provide supporting data in Notes)
3.	<i>Carex aquatilis</i>	T		OBL	— Problematic Hydrophytic Vegetation ¹ (Explain)
4.	<i>Carex lasiocarpa</i>	1		FACU	¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
5.	<i>Carex 2 multi Black</i>	T		—	
6.	<i>Carex 3 little single</i>	1		—	
7.	<i>Bistorta vivipara</i>	T		FAC	
8.	<i>Saxifraga oppositifolia</i>	2	Y	FAC	
9.	<i>Equisetum variegatum</i>	T		FACW	
10.	<i>Forb sp</i>	T		—	
Total Cover: <u>7</u>				<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; padding-left: 5px; margin-right: 5px;"> NAT recorded in field </div> <div> % Bare Ground % Cover of Wetland Bryophytes Total Cover of Bryophytes % Cover of Water </div> </div>	
50% of total cover: <u>3.5</u> 20% of total cover: <u>1.4</u>				Hydrophytic Vegetation Present (Y/N): <u>N</u> Notes: (If observed, list morphological adaptations below):	

WETLAND DETERMINATION DATA FORM

W106PA011

7-10-16

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		
0e 0-2	—							Damp organics
Bw 2-3	5YR 3/4	50	5YR 5/6	50	con	m	silt loam	Band of 100% concentrations
0e 3-5	—							Damp organics
Bg 5-8	2.5Y 3/4						silt loam	
C 8-24	—						very gravelly sand	(grains increasing in size w/depth)
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>see note on front NO</u>								
Notes: <u>Neg αα</u>								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)				SECONDARY INDICATORS (2 or more required)				
Surface Water (A1) <u>Edge 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>Y</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>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>Y</u>		Notes:				
Algal Mat or Crust (B4) <u>Edge</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>Edge 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>18</u>								
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u> Depth (in): <u>16</u>								
Notes: <u>EC: 651 pH 6.36</u>								

AQUATIC SITE ASSESSMENT DATA FORM

Disregard FA. Not a wetland. It is on the dry side of wetland/upland boundary!
W106PA011

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) <input type="checkbox"/> Sapling (<5 dbh, <6m tall) <input type="checkbox"/> Tall shrub (2-6m) <input type="checkbox"/> Short shrub (0.5-2m) <input checked="" type="checkbox"/> Dwarf shrub (<0.5m) <input checked="" type="checkbox"/> Tall herb (≥1m) <input type="checkbox"/> Short herb (<1m) <input checked="" type="checkbox"/> Moss-Lichen <input checked="" type="checkbox"/> Floating <input type="checkbox"/> Submerged <input type="checkbox"/>		
Number of Wetland Types (M): <input type="checkbox"/>		Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) <input checked="" type="checkbox"/> Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <input checked="" type="checkbox"/> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ 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 <input checked="" type="checkbox"/> 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 _____ Histosol:Sapric _____ Mineral: Gravelly <input checked="" type="checkbox"/> 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) <input checked="" type="checkbox"/> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>6.36</u>	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits <input checked="" type="checkbox"/> Low Permeability Stratified Deposits _____ 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:

OP Browalee

GPS Technician QA/QC check:

YV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA 011

Field Target: 322

Date: 7.16.17

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

J. Brownlee

Field Crew Chief (print)

X

Jessie Brownlee

7.16.17

Signature / Date

WETLAND DETERMINATION DATA FORM

→ New FT Color Foot #3

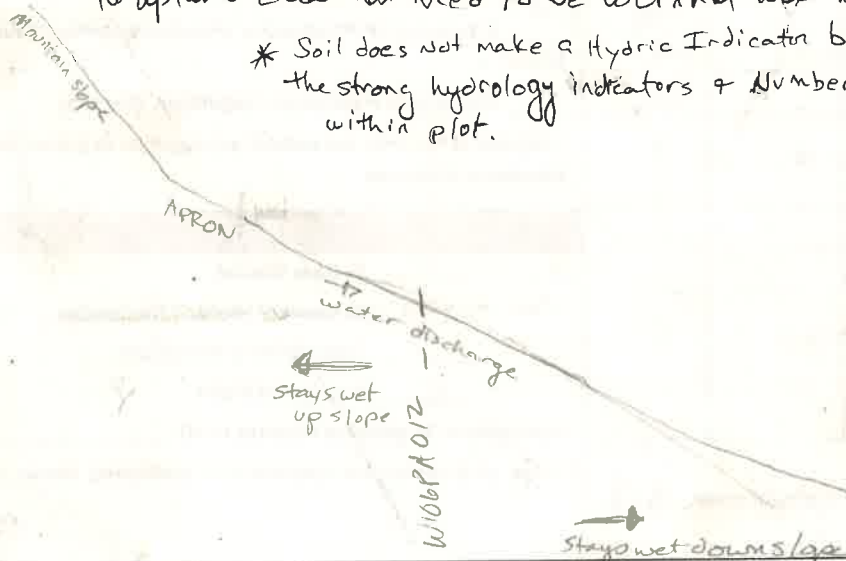
SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: <input type="checkbox"/>	Map #: 1 Map Date: 7-15-16
Date: 7-17-16	Project Name: Alaska LNG		Feature Id: W106PA012
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 163	
Latitude: 68.2134459°	Longitude: -149.3876994°	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 37	Picture No.: P-W106PA012-001 thru 004	

SITE PARAMETERS	
Subregion: Brook Range	Landform (hillslope, terrace, hummocks, etc.): Hillside Base of Alluvial fan
Slope (%): 15	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	Evidence of Wildlife Use: Caribou droppings, ground squirrel holes
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 checked="" type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic? No <input 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"/> ^{see note below} No <input type="checkbox"/>	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 11C2, 11A2

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

Diverse tussocking carex can big w/ dwarf shrub community. Site C Base of Alluvial fan w/ much water pumping out & large pools of standing water. A small R45B runs 10' to N from plot. It's wet up slope of here for quite a ways. Map has been updated over turning to upland calls that need to be wet that are to the north & south of here.

* Soil does not make a Hydric Indicator but using BPS to waive it due to the strong hydrology indicators & Number of FACW & OBL species found within plot.



WETLAND DETERMINATION DATA FORM

W106P1012

VEGETATION (use scientific names of plants)			
<u>Tree Stratum</u> (Plot sizes: <u>100</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>None</u>			
2.			
3.			
4.			
Total Cover: <u>—</u> 50% of total cover: <u>—</u> 20% of total cover: <u>—</u>			
<u>Sapling/Shrub Stratum</u> (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Cassiope tetragona</u>	<u>10</u>	<u>Y</u>	<u>FACU</u>
2. <u>Vaccinium uliginosum</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>
3. <u>Betula nana</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>
4. <u>Salix reticulata</u>	<u>4</u>		<u>FAC</u>
5. <u>Salix pulchra</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>
6. <u>Vaccinium vitis-idaea</u>	<u>8</u>		<u>FAC</u>
7. <u>Empetrum nigrum</u>	<u>5</u>		<u>FAC</u>
8. <u>Rhododendron tomentosum</u>	<u>3</u>		<u>FACW</u>
9. <u>Dryas integrifolia</u>	<u>10</u>	<u>Y</u>	<u>FACU</u>
Total Cover: <u>90</u> 50% of total cover: <u>45</u> 20% of total cover: <u>18</u>			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of: — Multiply by: —

OBL species: 2 X 1 = 2

FACW species: 5 X 2 = 10

FAC species: 105 X 3 = 315

FACU species: 20 X 4 = 80

UPL species: 0 X 5 = 0

Column Totals: 132 (A) 407 (B)

PI = B/A = 3.08

<u>Carex utriculata</u>	<u>H</u>	<u>T</u>	<u>OBL</u>
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VEGETATION (use scientific names of plants)			
<u>Herb Stratum</u> (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Carex bigelowii</u>	<u>35</u>	<u>Y</u>	<u>FAC</u>
2. <u>Calamagrostis canadensis</u>	<u>3</u>		<u>FAC</u>
3. <u>Carex rostrata</u>	<u>2</u>		<u>OBL</u>
4. <u>Sagittaria angustifolia</u>	<u>T</u>		<u>FAC</u>
5. <u>Eriophorum angustifolium</u>	<u>T</u>		<u>OBL</u>
6. <u>Petasites frigidus</u>	<u>T</u>		<u>FACW</u>
7. <u>Forb sp (Aster)</u>	<u>T</u>		<u>—</u>
8. <u>Bistorta vivipara</u>	<u>T</u>		<u>FAC</u>
9. <u>Pedicularis sp</u>	<u>T</u>		<u>—</u>
10. <u>Eriophorum vaginatum</u>	<u>2</u>		<u>FACW</u>
Total Cover: <u>42</u> 50% of total cover: <u>21</u> 20% of total cover: <u>8.4</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

30 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

10 % Cover of Water Y

Hydrophytic Vegetation Present (Y/N): —

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

WETLAND DETERMINATION DATA FORM

W106PA02

7.17.16

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
0i 0-2								Saturated organics
0e 2-6								" "
Bg 6-10	5Y 4/1	100					Silt (grainy)	
Bgf 10+	5Y 4/1	100					grainy silt	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>	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: permafrost Depth (inches): 10

Hydric Soil Present (Y/N): See Note on front page

Notes: Faint Comp. positive XX in spots.

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>Y</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>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>5</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>✓</u>	Depth (in): <u>expected to rise to point of seep 0.4"</u>	
Saturation Present (Y/N): <u>Y</u>	Depth (in): <u>0</u>	
EC: <u>118</u> pH <u>6.4</u>		

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W106PA012

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent <u>X</u> Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) _____ Short shrub (0.5-2m) _____ Dwarf shrub (<0.5m) <u>60</u> Tall herb (≥1m) _____ Short herb (<1m) <u>30</u> Moss-Lichen <u>10</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 _____ 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 _____ 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 <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.) _____ 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 _____ Restricted Outflow _____ Unrestricted Outflow <u>X</u>	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>6.4</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%) _____ High Gradient (≥2%) <u>X</u>	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106PA012 Field Target: ^{New} Coldfoot #3 Date: 7.17.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Jessie Brownlee

Field Crew Chief (print)

X

Jessie Brownlee 7.17.14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 184	Map #: 120 Map Date: 5-20-16
Date: 5-22-2016	Project Name: Alaska LNG		Feature Id: W106 T1001
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 743.5	
Latitude: 61° 22' 01.5215" N		Longitude: 150° 51' 19.3336" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 3	Picture No.: P-W106 T1001-001 thru -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat, hummocky
Pre-mapped Alaska LNG/NWI classification: PFO4/SS4B	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 (Viereck): 1A2, 11C2

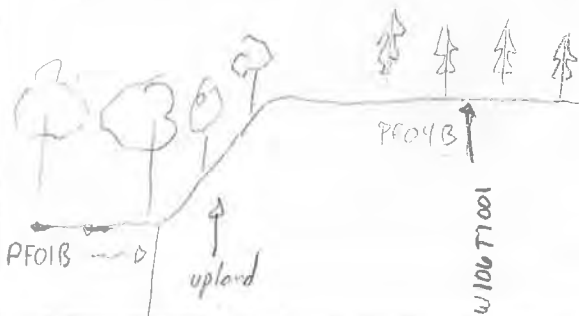
Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

on traverse from LZ 742.6 to here @ FT 184 All of Birch forest was wet until the topo break to the South East of this Field target. OP W106 T1001-OP3 was the only upland inclusion of ~ 30 yards wide.

Site is 25-30' Tall Spruce Forest with dense moss & blueberry & false huckleberry shrub layer.

Organic soils > 16" with water table @ 10"

→ NW



WETLAND DETERMINATION DATA FORM

W106T1001

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> 25'	40	Y Y	FACW
2.			
3.			
4.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Penzancea ferruginea</i> Erigeron annuus	20	Y	FACU
2. <i>Vaccinium vitis-idaea</i>	20	Y	FAC
3. <i>Empetrum nigrum</i>	20	5	FAC
4. <i>Liana horrealis</i>	20	Y	FACU
5. <i>Vaccinium ovalifolium</i>	35	Y	FAC
6. <i>Betula papyrifera</i>	T		
7. <i>Picea mariana</i>	T		FACW
8.			
9.			

Total Cover: 100

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 43 X 2 = 86

FAC species: 68 X 3 = 204

FACU species: 40 X 4 = 160

UPL species: 0 X 5 = 0

Column Totals: 151 (A) 450 (B)

PI = B/A = 2.98

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	8	Y	FAC
2. <i>Rubus chamaemorus</i>	3		FACU
3. <i>Cornus canadensis</i>	T		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 11

50% of total cover: 6.5 20% of total cover: 2.2

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.

0 % Bare Ground

60 % 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

5-22-16

189

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		
0-10								
10-110								
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>X</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>Y</u>								
Notes: <u>with a few sand lenses throughout</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>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>+</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: <u>pH 4.7</u> <u>EC 32</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>10</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>4</u>						
Notes:								

AQUATIC SITE ASSESSMENT DATA FORM

W106T1001

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>40</u> Sapling (<5 dbh, <6m tall) <u>1</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>100</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>1</u> Moss-Lichen <u>100</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>X</u> Highly Uneven _____ Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ 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 <u>X</u> Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ 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>7.7</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 <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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T100 \ Field Target: 184 Date: 5-22-16

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?
on 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 Haley Volper
Wetland Scientist (print)

X Haley Volper 5-22-16
Signature / Date

X J. Browne
Field Crew Chief (print)

X Jessie Browne 5-22-16
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 83	Map #: 120 Map Date: 5-20-15
Date: 5-22-16	Project Name: Alaska LNG		Feature Id: W106T100Z
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 743.8	
Latitude: 66°21'52.7954" N		Longitude: 150°51'37.6830" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 3	Picture No.: P-W106T100Z-001 thru -004	

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/EM1E	Evidence of Wildlife Use: trails
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: PSS1E
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 11C2, 111A3

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

Small PSS1E in center of P004/554B. See map for updated boundary and coding. Polygon should be smaller than it currently is and with the surrounding circle included with surrounding P004/554B. Confirmed status of Larger wetland to North was mapped correctly. Water swales out and down slope in the forest that is currently mapped upland & needs to change. See 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.			
2.			
3.			
4.			

Total Cover: 0

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

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	40	Y	FAC
2. <i>Rhododendrum tomentosum</i>	5		FACW
3. <i>Myrica gale</i>	10		OBL
4. <i>Dasiphora fruticosa</i>	T		FAC
5. <i>Picea mariana</i>	T		FACW
6. <i>Vaccinium oxycoccus</i>	1		OBL
7. <i>Vaccinium uliginosum</i>	3		FAC
8.			
9.			

Total Cover: 5950% of total cover: 29.5 20% of total cover: 11.8

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: 31 X 1 = 31FACW species: 11 X 2 = 22FAC species: 50 X 3 = 150

FACU species: _____ X 4 = _____

UPL species: _____ X 5 = _____

Column Totals: 92 (A) 203 (B)PI = B/A = 2.2

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	4		FACW
2. <i>Salmagandis canadensis</i>	4		FAC
3. <i>Carex sp Aquatilis</i>	20	Y	OBL
4. <i>Rubus pedatus</i>	3		FAC
5. <i>Equisetum Fluviale</i>	T		OBL
6. <i>Sundew Drosera rotundifolia</i>	T		OBL
7.			
8.			
9.			
10.			

Total Cover: 3350% of total cover: 16.5 20% of total cover: 6.6

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.0 % Bare Ground50 % Cover of Wetland Bryophytes50 Total Cover of Bryophytes3 % Cover of WaterHydrophytic Vegetation Present (Y/N): Y

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

W106T100Z

Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W106T1002

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>58</u> Dwarf shrub (<0.5m) <u>1</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>33</u> Moss-Lichen <u>50</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>3</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) <u>X</u> Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>X</u> N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

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

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet <u>50</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 _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvaquent Soils Sediment Created _____
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1002

Field Target: 183

Date: 5.22.14

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

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook? *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 Naley Valper
Wetland Scientist (print)

X Naley Valper 5-22-16
Signature / Date

X J. Brownlee
Field Crew Chief (print)

X Jessie Brownlee 5-22-16
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <input checked="" type="checkbox"/>		Field Target: 185	Map #: 118 Map Date: 5-20-16
Date: 5-22-16	Project Name: Alaska LNG		Feature Id: W106T1003
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 240	
Latitude: 61° 23' 10.407" N	Longitude: 150° 46' 53.636" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 3	Picture No.: P-W106T1003-001 thru-004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Flat low land
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PSS1/4B	Evidence of Wildlife Use: trail
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: PSS4/1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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.

open Skunked ^{dwane} spruce Forest. Trees range from 6" to 10' with most being under 5'. Thick moss layer of nearly 100%. Shrub community underlain by frost @ 10". Water table @ 6"

WETLAND DETERMINATION DATA FORM

W10671003

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: <u>0</u> 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	35	Y	FACW
2. <i>Betula Nana</i>	3		FAC
3. <i>Empetrum nigrum</i>	45	Y	FAC
4. <i>Rhododendron tomentosum</i>	10		FACW
5. <i>Vaccinium oxycoccus</i>	1		OBL
6. <i>Vaccinium uliginosum</i>	3		FAC
7. <i>Andromeda polifolia</i>	1		FACW
8.			
9.			
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: 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: 1 X 1 = 1
 OBL species: 1 X 1 = 1
 FACW species: 70 X 2 = 140
 FAC species: 51 X 3 = 153
 FACU species: 0 X 4 = 0
 UPL species: 0 X 5 = 0
 Column Totals: 122 (A) 294 (B)
 PI = B/A = 2.40

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>24</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus chamaemorus</i>	25	Y	FACW
2. <i>Eriophorum</i> sp. (C)	4		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>29</u> 50% of total cover: <u>14.5</u> 20% of total cover: <u>5.8</u>			

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

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

0 % Bare Ground
100 % 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

COV		Date <u>5.22.16</u>		Feature ID <u>185</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		
<u>0-10</u>							
<u>10-+</u>							
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>did not dig deep enough</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) <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>Frost</u> Depth (inches): <u>10</u>							
Hydric Soil Present (Y/N): <u>Y</u>							
Notes: <u>possibly a histosol but did not dig past 10" when we hit frost & met A2.</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>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>—</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>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>—</u>		Depth (in): <u>—</u>		Wetland Hydrology Present (Y/N): <u>Y</u>			
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>6</u>					
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u>3</u>					
EC: <u>38</u> pH: <u>4.6</u>				Notes:			

AQUATIC SITE ASSESSMENT DATA FORM

W106T1003

VEGETATION VARIABLES	
P = Plot, WL = 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) <input type="checkbox"/> Sapling (<5 dbh, <6m tall) <u>35</u> Tall shrub (2-6m) <input type="checkbox"/> Short shrub (0.5-2m) <input type="checkbox"/> Dwarf shrub (<0.5m) <u>102</u> Tall herb (≥1m) <input type="checkbox"/> Short herb (<1m) <u>29</u> Moss-Lichen <u>100</u> Floating <input type="checkbox"/> Submerged <input type="checkbox"/>	
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%) <u>X</u> 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 _____ Estuarine Fringe _____	

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

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>X</u> pH Reading <u>4.6</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:

J. Brancee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1006T1003

Field Target: 185

Date: 5-22-16

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

X Kately Volper
Wetland Scientist (print)

X Kately Volper 5-22-16
Signature / Date

X J. Broulee
Field Crew Chief (print)

X Jessie Broulee 5-22-16
Signature / Date

WETLAND DETERMINATION DATA FORM

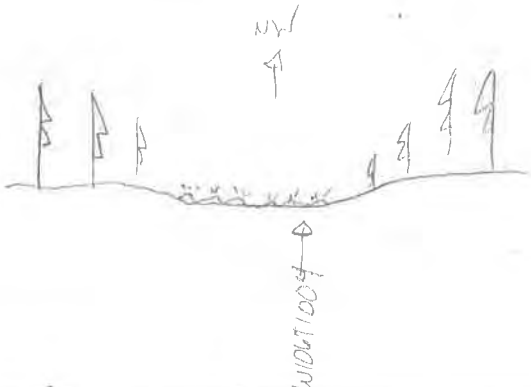
SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 190	Map #: 112 Map Date: 5-20-16
Date: 5-23-16	Project Name: Alaska LNG		Feature Id: W106T1004
Investigators: Jessie Brownlee, Valerie Watkins, Kaley Vape			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 702.80	
Latitude: 61° 48' 49.8207" N		Longitude: 150° 18' 7.32" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 4	Picture No.: P-W106T1004-001 thru -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	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/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 <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/EM1E
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11C2, 111A3

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

PSS1/EM1E Sparse shrub and emergent growing on hummocks with ~10% water interspersed throughout.



WETLAND DETERMINATION DATA FORM

W106 T1 004

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: _____

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

Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	9	Y	FAC
2. <i>Andromeda polifolia</i>	15	Y	FACW
3. <i>Rhododendron tomentosum</i>	10		FACW
4. <i>Vaccinium uliginosum</i>	3		FAC
5. <i>Salix fuscescens</i>	8.6		FACW
6. <i>Vaccinium oxycoccos</i>	7		OBL
7. <i>Picea mariana</i>	7		FACW
8.			
9.			

Total Cover: 39

50% of total cover: 19.5 20% of total cover: 7.8

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: 10 X 1 = 10

FACW species: 29 X 2 = 58

FAC species: 13 X 3 = 39

FACU species: - X 4 = -

UPL species: - X 5 = -

Column Totals: 52 (A) 107 (B)

PI = B/A = 2.05

VEGETATION (use scientific names of plants)

Herb Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Carex sp</i> (a)	10	Y	OBL
2. <i>Eriophorum sp</i> (c)	1		-
3. <i>Drosera rotundifolia</i>	7		OBL
4. <i>Rubus chamaemorus</i>	2		FACW
5. <i>Comarum palustre</i>	7		OBL
6. <i>Calamagrostis canadensis</i>	1		FAC
7.			
8.			
9.			
10.			

Total Cover: 14

50% of total cover: 7 20% of total cover: 2.8

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.

0 % Bare Ground

100 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

W106T1004

5.23.11

 γ Page 3 of 4

AQUATIC SITE ASSESSMENT DATA FORM

W10671004

VEGETATION VARIABLES	
F = Plot, M = Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>0</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>3640</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>1820</u> Moss-Lichen <u>40</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%) <u>X</u> High Density (60-80%) _____ Very High Density (80-100%) _____	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover <u>X</u> N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>	
HGM Class (P): Slope _____ Flat _____ Lacustrine Fringe _____ Depressional <u>X</u> Riverine _____ Estaurine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol:Sapric <u>X</u> 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 _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded <u>X</u>	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <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>4.5</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 Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1004 Field Target: 190 Date: 5-23-16

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

X Kaley Volper

Wetland Scientist (print)

X Kaley Volper 5/23/16

Signature / Date

X J Brownlee

Field Crew Chief (print)

X Jessie Brown

Signature / Date

5.23.16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 191	Map #: 112 Map Date: 5.20.16
Date: 5/23/16	Project Name: Alaska LNG		Feature Id: W106T1005
Investigators: Jessie Brownlee, Valerie Watkins, Kathy Volpe			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 702.70	
Latitude: 61° 48' 53.0632" N	Longitude: 150° 17' 59.2359" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 5	Picture No.: P-W106T1005-001 thru -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 0-3	Local relief (concave, convex, none): Flat hummocky
Pre-mapped Alaska LNG/NWI classification: U1C1	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 _____ 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, 11B2

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

open
Tall mature mixed forest ~ 60' tall of Bet Neo + Pic Mar with diverse understory of shrubs + thick moss.
No sign of hydrology
Soil a typical E/Bhs dry forest soil with few faint concentrations

WETLAND DETERMINATION DATA FORM

W106T1005

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>	30	Y	FACW
2. <i>Betula papyrifera</i>	20	Y	FAC
3.			
4.			

Total Cover: 5050% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium uliginosum</i>	3		FAC
2. <i>Salix bebbiana</i>	10	Y	FAC
3. <i>Vaccinium vitis-idaea</i>	2		FAC
4. <i>Betula papyrifera</i>	2		FAC
5. <i>Picea mariana</i>	3		FACW
6.			
7.			
8.			
9.			

Total Cover: 2050% of total cover: 10 20% of total cover: 4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)Total Number of Dominant Species Across All Strata: 4 (B)% Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0FACW species: 33 X 2 = 66FAC species: 39 X 3 = 117FACU species: 5 X 4 = 20UPL species: 0 X 5 = 0Column Totals: 77 (A) 203 (B)PI = B/A = 2.63

VEGETATION (use scientific names of plants)

Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	5	Y	FACU
2. <i>Equisetum sylvaticum</i>	1		FAC
3. <i>Calamagrostis lapponica</i>	1		FAC
4. <i>Rubus chamaemorus</i>	1		FACW
5. <i>Antennaria</i>	1		
6.			
7.			
8.			
9.			
10.			

Total Cover: 650% of total cover: 3 20% of total cover: 1.2

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.0 % Bare Ground0 % Cover of Wetland Bryophytes10 Total Cover of Bryophytes0 % Cover of WaterHydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W106T1005

5.23.16 191

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								
3-5	10YR 5/1	100				Coarse Sandy loam	Andic material	
5-14	7.5YR 2.5/2	40				Sandy loam		
	7.5YR 3/2	100						
14-24	10YR 4/4	92	7.5YR 4/6	8	Can	RC PL	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>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>-</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

W106T1005

VEGETATION VARIABLES	
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/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:

J. Brownlee

KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W100T1005

Field Target: 191

Date: 5-23-16

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)?

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

X Haley Volper
Wetland Scientist (print)

X Haley Volper
Signature / Date

5-23-16

X J Brownlee
Field Crew Chief (print)

X J Brownlee
Signature / Date

5-23-16

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>192</u>	Map #: <u>111</u> Map Date: <u>5-20</u>
Date: <u>5/23/16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106T1006</u>
Investigators: <u>SB, KV, VW</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>691.1</u>	
Latitude: <u>61° 58' 3.8123" N</u>		Longitude: <u>150° 11' 13.2850" W</u>	Datum: <u>WGS84</u>
Logbook No.: <u>1</u>	Logbook Page No.: <u>* 5</u>	Picture No.: <u>W106T1006-veg-veg-pit-plug</u>	

SITE PARAMETERS	
Subregion: <u>Southcentral Cook Inlet Basin</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>V</u>	Evidence of Wildlife Use: <u>None 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>PSS1/3B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>11B2, 11C2</u>

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

Previously burned Pic Mar Forest w/ ~40% standing dead spruce. Bet Neo & Rho Gro Regen is thick. Pockets of standing water through out site and sphagnum present. All area between LZ & here is wet

W106T1000

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: <u>0</u> 50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Rhododendrum groenlandicum</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>
2. <u>Betula nana</u>	<u>6</u>		<u>FAC</u>
3. <u>Vaccinium vitis-idaea</u>	<u>2</u>		<u>FAC</u>
4. <u>Betula neopalaskana</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>
5. <u>Vaccinium ovalifolium</u>	<u>3</u>		<u>FAC</u>
6. <u>Chamaedaphne calyculata</u>	<u>8</u>		<u>FACW</u>
7. <u>Rhododendrum tomentosum</u>	<u>2</u>		<u>FACW</u>
8. <u>Picea mariana</u>	<u>3</u>		<u>FACW</u>
9. <u>Vaccinium oxycoccus</u>	<u>T</u>		<u>OBL</u>
Total Cover: <u>74</u> 50% of total cover: <u>39.5</u> 20% of total cover: <u>15.8</u>			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species: 0 X 1 = 0

FACW species: 16 X 2 = 32

FAC species: 68 X 3 = 204

FACU species: 0 X 4 = 0

UPL species: 0 X 5 = 0

Column Totals: 84 (A) 234 (B)

PI = B/A = 2.8

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>20</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Equisetum sylvaticum</u>	<u>2</u>		<u>FAC</u>
2. <u>Chamaenerion angustifolium</u>	<u>T</u>		<u>FACU</u>
3. <u>Rubus chamaemorus</u>	<u>3</u>	<u>Y</u>	<u>FACW</u>
4. <u>Gymnocarpium dryopteris</u>	<u>T</u>		<u>FACU</u>
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</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.

Hydrophytic Vegetation Present (Y/N): Y

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

didn't record in field

_____ % Bare Ground

_____ % Cover of Wetland Bryophytes

_____ Total Cover of Bryophytes

_____ % Cover of Water

A few Picea mariana trees outside of plot.
Previous burn area, Tall dead standing Picea. Page 2 of 4

WETLAND DETERMINATION DATA FORM

Y

5-23-11 192

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			
0i 07							Fibric Organics	
0a 7-10							Supric Organics	
Bw1 10-20	10YR 3/2	98	10YR 3/3	2	con	RC	Very Fine Sandy loam	
Bw2 20-+	10YR 3/2	100					lobbles present	

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) _____	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:

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>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>5"</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): (includes capillary fringe) <u>Y</u>	Depth (in): <u>Ø</u>	
Notes:		EC: <u>35</u> <u>45</u>

AQUATIC SITE ASSESSMENT DATA FORM

W106T1006

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>40</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>60</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>0</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ 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) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) <u>X</u>		
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ 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.) _____ 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>4.5</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 <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:

J. Brownlee 5-23-16

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1006 Field Target: 192 Date: 5.23.16

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

X

Wetland Scientist (print)

X

Signature / Date

X

Field Crew Chief (print)

J. Browne

X

Signature / Date

Jessie Browne

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 193	Map #: 110 Map Date: 5/20
Date: 5/23/16	Project Name: Alaska LNG		Feature Id: W106T1007
Investigators: JB, KV, VW			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 690.4	
Latitude: 01° 58' 34.96"		Longitude: 150° 11' 49.48"	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 5	Picture No.: W106T1007-veg-veg-pit-plug	

SITE PARAMETERS	
Subregion: Southcentral Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): lowlands
Slope (%): 0-3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	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 <input checked="" type="checkbox"/> , or Hydrology _____ Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.) KV

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PSS1/EM1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11 B2, III A2

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

Previously burned Pic Mar Forest w/ trees ~60' tall. But Neo regen sapplings ~10' tall. Many downed trees, many standing snags. Significant Cal Can patches throughout site. Many pockets of 10" deep puddles. Watertable @ 6" and positive KXX starting at 6".

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>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nealaskana</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
2. <i>Vaccinium vitis-Idaea</i>	<u>1</u>		<u>FAC</u>
3. <i>Spiraea steyerii</i>	<u>3</u>		<u>FACU</u>
4. <i>Salix bebbiana</i>	<u>3</u>		<u>FAC</u>
5. <i>Picea mariana</i>	<u>1</u>		<u>FACW</u>
6. <i>Vaccinium ovalifolium</i>	<u>1</u>		<u>FAC</u>
7.			
8.			
9.			
Total Cover: <u>28</u> 50% of total cover: <u>14</u> 20% of total cover: <u>3.6</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: 0 X 1 = 0

FACW species: 1 X 2 = 2

FAC species: 51 X 3 = 153

FACU species: 7 X 4 = 28

UPL species: 0 X 5 = 0

Column Totals: 59 (A) 183 (B)

PI = B/A = 3.10

VEGETATION (use scientific names of plants)			
Herb Stratum (<u>26'</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	<u>3</u>		<u>FAC</u>
2. <i>Chamaenerion angustifolium</i>	<u>4</u>		<u>FACU</u>
3. <i>Cornus suecica</i>	<u>3</u>		<u>FAC</u>
4. <i>Calamagrostis canadensis</i>	<u>20</u>	<u>Y</u>	<u>FAC</u>
5. <i>Rubus chamaemorus</i>	<u>1</u>		<u>FACW</u>
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>31</u> 50% of total cover: <u>15.5</u> 20% of total cover: <u>6.2</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

5 Total Cover of Bryophytes

3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Previous burn area, Tall dead standing spruce + birch.

WETLAND DETERMINATION DATA FORM

W106T1007

5-23-16

193

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								hemic organics
A 4-6	10YR 3/1	100					Fine sandy loam	
Bw ¹ 6-10	10YR 4/2	98	2.5Y 4/4	2	Con	matrix	Sandy loam	Positive NO _x
Bw ² 10-24	10YR 4/3	80	7.5YR 3/3	10	Con	matrix	loamy sand	
			7.5YR 4/3	10	Con	matrix		
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>X</u> Yes! see note		
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>Y</u>								
Notes: Positive NO _x through Bw ¹ layer. High percent of conc in Bw ² 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>—</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>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:				
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>6"</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>3</u>		EC: <u>24</u> pH <u>5.10</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 <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>40</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>25</u> Dwarf shrub (<0.5m) <u>5</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>30</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 _____ <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 <u>X</u> Continuous Cover _____	
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) <u>X</u>	
Vegetative Interspersion (P): Low (large patches, concentric rings) _____ Moderate (broken irregular rings) <u>X</u> High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope _____ Flat <u>X</u> Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

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

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ 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) _____ 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: W100T1007

Field Target: 193

Date: 5.23.16

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

X

Wetland Scientist (print)

Naley Volper

X

Signature / Date

Naley Volper

5-23-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

Jessie Brownlee

5-23-16

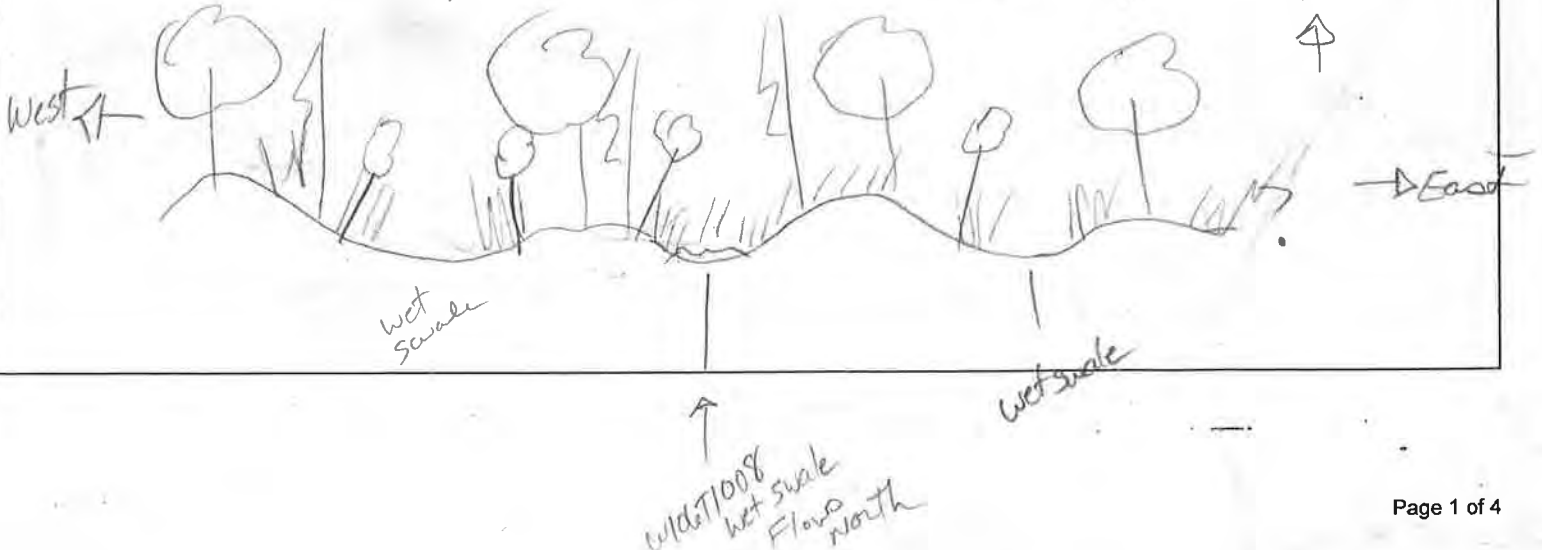
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>X Facility</i>	Field Target: <i>189</i>
Date: <i>5-24-16</i>	Project Name: Alaska LNG		Feature Id: <i>W106T1008</i>	
Investigators: <i>Jessie Brumlee, Kaley Volper</i>			Team No.: <i>W106</i>	
State: Alaska	Region: Alaska	Milepost: <i>721.8</i>		
Latitude: <i>61° 35' 34.669" N</i>	Longitude: <i>150° 31' 1.117" W</i>	Datum: WGS84		
Logbook No.: <i>1</i>	Logbook Page No.: <i>6</i>	Picture No.: <i>P-W106T1008-001 thru-004</i>		

SITE PARAMETERS	
Subregion: <i>Cook Inlet Basin</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Hillside Swale</i>
Slope (%): <i>5</i>	Local relief (concave, convex, none): <i>slightly concave</i>
Pre-mapped Alaska LNG/NWI classification: <i>1</i>	Evidence of Wildlife Use: <i>moose droppings</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 checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: <i>PFO1/SS1B JB</i> <i>PEM1/FO1B</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Viereck): <i>III A2, B3+</i> <i>B2, B3 JB</i>

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

Bet Neo woodland w/ trees ~60' w/ tall Alder ~20'. Thick understory of ferns and horse tail. Area is wetter than Imagery would imply with seeps expressing and running down slope. on transect to and from LZ to NE on gravel bar most swaling oriented from W to NE. Most were captured on map for map update purposes. Use best available topo and contours for mapping



WETLAND DETERMINATION DATA FORM

W106 T1008

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>5</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>60</u> (A/B)
1. <i>Alnus tenuifolia</i> 20'	40	Y	FAC	
2. <i>Betula neoalaskana</i> 60'	15	Y	FAC	
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>3</u> X 2 = <u>6</u> FAC species: <u>81</u> X 3 = <u>243</u> FACU species: <u>55</u> X 4 = <u>220</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>139</u> (A) <u>469</u> (B) PI = B/A = <u>3.37</u>
Sapling/Shrub Stratum (<u>26</u>)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Ribes frute</i>	3		FAC	
2. <i>Alnus tenuifolia</i>	10	Y	FAC	
3. <i>Delius clu's Oplopanax horridus</i>	5	Y	FACU	
4. <i>Sambucus racemosa</i>	3		FACU	
5.				
6.				
7.				
8.				
9.				
Total Cover: <u>31</u> 50% of total cover: <u>15.5</u> 20% of total cover: <u>10.3</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 <u>—</u> Morphological Adaptations ¹ (Provide supporting data in Notes) <u>—</u> 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>	8		FAC	
2. <i>Calamagrostis canadensis</i>	5		FAC	
3. <i>Streptopus amplexifolius</i>	7		FACU	
4.				
5. <i>Trientalis europaea</i>	2		FACU	% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>30</u> % Cover of Water: <u>5</u> Hydrophytic Vegetation Present (Y/N): <u>Y</u> Notes: (If observed, list morphological adaptations below):
6. <i>Valeriana sp</i>	7		—	
7. <i>Nitella palustris</i>	3		FACU	
8. <i>Dryopteris expansa</i>	35	Y	FACU	
9.				
10.				
Total Cover: <u>53</u> 50% of total cover: <u>26.5</u> 20% of total cover: <u>10.6</u>				