

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

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

# WETLAND DETERMINATION DATA FORM

W10671008

Y

5.24.16

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						
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-3	10YR 4/1							mucky fine sandy loam
3-15	10YR 3/2	97	10YR 3/6	3	Con	Matrix		Mucky silt loam
15-24	5Y 5/2	90	10YR 4/4	10	Con	med RC	clay	Dense Clay
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>Marginal</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 see note</u>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.								
<sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>Y</u> Depth (inches): <u>clay</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>Positive alpha starting @ 4"</u>								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)					SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>✓ 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>✓ Yes</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>✓ Yes</u>		Sparsely Vegetated Concave Surface (B8) <u>N</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>Y Clay</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>✓ marginal slight swale</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 ~ 5"</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>12</u>						
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u>4</u>		EC: <u>48</u> pH <u>5.9</u>				
Notes:								



# AQUATIC SITE ASSESSMENT DATA FORM

W10671008

## VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved X  
 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) 20 Sapling (<5 dbh, <6m tall) 50 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 8  
 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 30 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 \_\_\_\_\_ <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 X 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 X

## 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.) X Well Developed (6-18in.) \_\_\_\_\_ 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 5.9

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits \_\_\_\_\_ Low Permeability Stratified Deposits X  
 Glacial Till/Not Permeable \_\_\_\_\_

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

Evidence of Seeps and Springs (P): No Seeps or Springs \_\_\_\_\_ Seeps Observed X 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:

Jessie Browne

KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1008

Field Target: 189

Date: 5.24.14

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

### 1. Site Description

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

### 2. Vegetation

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

### 3. Soil

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

### 4. Hydrology

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

### 5. Functions and Values

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

### 6. Field Logbook

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

### 7. Maps

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



8. Photos

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

X

*Naley Volper*

Wetland Scientist (print)

X

*Naley Volper 5-27-16*

Signature / Date

X

*JBrownee*

Field Crew Chief (print)

X

*Jessica Brownee 5.24.23*

Signature / Date

# WETLAND DETERMINATION DATA FORM

W106T1009

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 180	Map #: 123 Map Date: 5-28-16
Date: 5-24-16	Project Name: Alaska LNG		Feature Id: W106T1009
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: _____	
Latitude: 61° 19' 53.8876" N	Longitude: 150° 58' 55.1379" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 7	Picture No.: P-W106T1009_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	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.

Tall mature mixed forest of spruce & Betula w/ Lots of tall alder.  
Understory is thick with horsetail and fern and dead downed trees  
Soil is dry with a well developed A horizon. Concentrations pick up lower down in profile.

No signs of hydrology.

Dry forest  
Closer to LZ the forest adjacent flood probably every 3-5 yrs  
with sediment observed throughout on vegetation





# WETLAND DETERMINATION DATA FORM

W106 T1009

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus tenuifolia</i> 10-25'	35	Y	FAC
2. <i>Picea glauca</i> 60'	15	Y	FACU
3. <i>Betula Neopalastana</i> 35'	15	Y	FAC
4.			
Total Cover: <u>65</u> 50% of total cover: <u>32.5</u> 20% of total cover: <u>13</u>			
Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Ribes friste</i>	5	Y	FAC
2. <i>Rosa acicularis</i>	T		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>5</u> 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>			

### Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 0 Multiply by:

OBL species: 0 X 1 = 0  
FACW species: 0 X 2 = 0  
FAC species: 13 X 3 = 339  
FACU species: 29 X 4 = 116  
UPL species: 0 X 5 = 0  
Column Totals: 142 (A) 455 (B)  
PI = B/A = 3.2

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>24</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Athyrium nclasarum</i>	30	Y	FAC
2. <i>Gymnocarpium dryopteris</i>	5		FACU
3. <i>Equisetum arvense</i>	20	Y	FAC
4. <i>Streptopus amplexiflorum</i>	4		FACU
5. <i>Calamagrostis canadensis</i>	8		FAC
6. <i>Heracleum maximum</i>	T		FACU
7. <i>Mertensia paniculata</i>	T		FACU
8. <i>Dryopteris expansa</i>	5		FACU
9. <i>Bedstraw</i> sp.	T		
10.			
Total Cover: <u>72</u> 50% of total cover: <u>36</u> 20% of total cover: <u>14.4</u>			

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%  
N Prevalence Index is ≤ 3.0  
— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)  
— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)  
<sup>1</sup> 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

W106T1009

5-29-16

SOIL	Date	Feature ID	Soil Pit Required (Y/N)					
<b>SOIL PROFILE DESCRIPTION:</b> (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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-2								sand lens mixed throughout high in organic matter
A 2-11	10YR 3/1	100					silt loam	
Bw1 11-19	10YR 4/2	75	10YR 4/4	10	con	matrix	silt loam	
	10YR 3/1	15						
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
<b>HYDRIC SOIL INDICATORS</b>							<b>INDICATORS FOR PROBLEMATIC HYDRIC SOILS<sup>3</sup></b>	
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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:								
<b>HYDROLOGY PRIMARY INDICATORS</b> (any one indicator is sufficient)					<b>SECONDARY INDICATORS</b> (2 or more required)			
Surface Water (A1) <u>N</u>		Surface Soil Cracks (B6) <u>N</u>		Water-stained Leaves (B9) <u>N</u>		Stunted or Stressed Plants (D1) <u>N</u>		
High Water Table (A2) <u>N</u>		Inundation Visible on Aerial Imagery (B7) <u>N</u>		Drainage Patterns (B10) <u>N</u>		Geomorphic Position (D2) <u>N</u>		
Saturation (A3) <u>N</u>		Sparsely Vegetated Concave Surface (B8) <u>N</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>N</u>		
Water Marks (B1) <u>N</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>N</u>		Microtopographic Relief (D4) <u>N</u>		
Sediment Deposits (B2) <u>N</u>		Hydrogen Sulfide Odor (C1) <u>N</u>		Salt Deposits (C5) <u>N</u>		FAC-Neutral Test (D5) <u>N</u>		
Drift Deposits (B3) <u>N</u>		Dry-Season Water Table (C2) <u>N</u>		Notes:				
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>N</u>		Depth (in): <u>  </u>		Wetland Hydrology Present (Y/N): <u>N</u>				
Water Table Present (Y/N): <u>N</u>		Depth (in): <u>  </u>						
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>  </u>		EC: <u>  </u>				
Notes:								



# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES	
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:

10

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1009

Field Target: 180

Date: 5.24.16

*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)

Katey Volper

X

Signature / Date

Katey Volper

5-27-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

Jess Brownlee

5.24.16

# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 181	Map #: 22 Map Date: 5.23.16
Date: 5-24-16	Project Name: Alaska LNG		Feature Id: W106 T1010
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 747.6	
Latitude: 61° 20' 17.95" N		Longitude: 150° 57' 23.54" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 7	Picture No.: P-W106 T1010 - 001 thru -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0-3	Local relief (concave, convex, none): undulating / hummocky
Pre-mapped Alaska LNG/NWI classification: PF01/4B 1C2, 11B2	Evidence of Wildlife Use: Bear prints
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: PF01/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 1C3, 11B2

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

Mature tall mixed woodland with trees ~20' to 60' tall.  
understory of Bet Nee ~6'-10' tall. Dense cover of ferns and horsetail.  
Bare ground with standing water is scattered about plot with a water table @ ~8".  
Area mapped correctly



# WETLAND DETERMINATION DATA FORM

W106 T1010

## 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>	15	Y	FAC
2. <i>Picea glauca</i>	<del>15</del> 8	Y	FACU
3.			
4.			

Total Cover: 23

50% of total cover: 11.5 20% of total cover: 4.6

Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Sambucus racemosa</i>	T		FACU
2. <i>Viburnum edule</i>	T		FACU
3. <i>Betula neolaskana</i>	20	Y	FAC
4. <i>Alnus tenuifolia</i>	T		FAC
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: 3 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 60 (A/B)

### Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by:

OBL species: - X 1 = -

FACW species: - X 2 = -

FAC species: 80 X 3 = 240

FACU species: 43 X 4 = 172

UPL species: - X 5 = -

Column Totals: 123 (A) 412 (B)

PI = B/A = 3.34

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Dryopteris expansa</i>	30	Y	FACU
2. <i>Streptopus amplexifolius</i>	3		FACU
3. <i>Equisetum Arvense</i>	30	Y	FAC
4. <i>Cymnocarpium dryopteris</i>	2		FACU
5. <i>Trientalis Europaea</i>	T		FACU
6. <i>Fish sp</i>	T		-
7. <i>Sanguisorba sp</i>	T		-
8. <i>Chamerion angustifolium</i>	T		FACU
9. <i>Calamagrostis canadensis</i>	15		FAC
10.			

Total Cover: 80

50% of total cover: 40 20% of total cover: 16

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup> 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

13 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

*Equisetum* Floutable outside of plot in standing water

4

Page 3 of 4

# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES	
P=Plot, M= Matrix	
<b>Primary Vegetation Type (P):</b> 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 _____	
<b>Percent Cover (P):</b> Tree (>5 dbh, >6m tall) <u>15</u> Sapling (<5 dbh, <6m tall) <u>35</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>50</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>	
<b>Number of Wetland Types (M):</b> <u>1</u>	<b>Evenness of Wetland Type Distribution (M):</b> Even <u>X</u> Highly Uneven _____ Moderately even _____
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>	
<b>Interspersion of Cover &amp; Open Water (P):</b> 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 _____	
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
<b>Presence of Islands (M):</b> Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches <u>X</u> Continuous Cover _____	
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) <u>X</u>	
<b>HGM Class (P):</b> Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

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

HYDROLOGIC VARIABLES	
<b>Inlet/Outlet Class (P):</b> No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet <u>X</u>	
<b>Wetland Water Regime (P):</b> Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
<b>Evidence of Sedimentation (P):</b> No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
<b>Microrelief of Wetland Surface (P):</b> Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <u>X</u> Pronounced (>18in.) _____	
<b>Frequency of Overbank Flooding (P):</b> No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
<b>Degree of Outlet Restriction (P):</b> No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
<b>Water pH (P):</b> No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ <b>pH Reading</b> <u>5.8</u>	
<b>Surficial Geologic Deposit Under Wetland (P):</b> High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
<b>Basin Topographic Gradient (M):</b> Low Gradient (<2%) _____ High Gradient (≥2%) <u>X</u>	
<b>Evidence of Seeps and Springs (P):</b> No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

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

Crew Chief QA/QC check:

*Jessie Brando*

GPS Technician QA/QC check:

*KV*



## **Wetland Determination Form QA/QC Checklist**

This form to be completed before leaving the field site.

Feature ID: W106T1010 Field Target: 181 Date: 5-24-16

*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)

*Valery Volper*

**X**

Signature / Date

*Valery Volper*

*5-27-16*

**X**

Field Crew Chief (print)

*Jessie Brannon*

**X**

Signature / Date

*[Signature]*

*5-27-16*

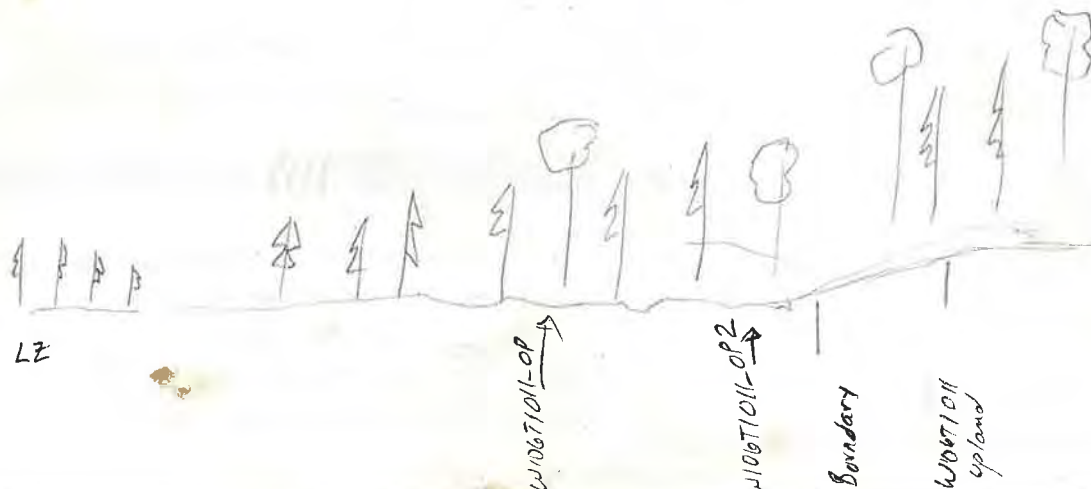
# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 170	Map #: 135 Map Date: 5-20-16
Date: 5-25-16	Project Name: Alaska LNG		Feature Id: W106T1011
Investigators: Jessie Brannlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 752.2	
Latitude: 61° 17' 34.2022" N		Longitude: 151° 3' 34.3363" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 8	Picture No.: P-W106T1011-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): mound
Slope (%): 5-8	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: U1C2, 11C2	Evidence of Wildlife Use: mouse droppings
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	
Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ 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, 11C2

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

on transect from LZ here almost all of forest was wet. This FT is only first dry spot. Tall mature forest of Picea, Picea Mar and Betula with False huckleberry and Vaccinium. 20' to the NE/E is wet w/ concave sparsely vegetated depressions w/ sphagnum and standing water.





# WETLAND DETERMINATION DATA FORM

W106 T1901

VEGETATION (use scientific names of plants)			
<b>Tree Stratum</b> (Plot sizes: <u>100</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Picea Mariana</i>	15	Y	FACW
2. <i>Betula Neeleaskana</i>	10	Y	FAC
3. <i>Picea Canadensis</i>	10	Y	FACU
4.			
<b>Total Cover:</b> <u>35</u> <b>50% of total cover:</b> <u>17.5</u> <b>20% of total cover:</b> <u>7</u>			
<b>Sapling/Shrub Stratum</b> ( <u>21</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Menziesia Ferruginea</i>	15	Y	FACU
2. <i>Vaccinium ovalifolium</i>	40	Y	FAC
3. <i>Betula Neeleaskana</i>	1		FAC
4. <i>Picea Canadensis</i>	6		FACU
5. <i>Linnaea borealis</i>	3		FACU
6. <i>Vaccinium vitis-idaea</i>	1		FAC
7.			
8.			
9.			
<b>Total Cover:</b> <u>64</u> <b>50% of total cover:</b> <u>32</u> <b>20% of total cover:</b> <u>12.8</u>			

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

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species: 0 X 1 = 0  
 FACW species: 15 X 2 = 30  
 FAC species: 52 X 3 = 156  
 FACU species: 37 X 4 = 148  
 UPL species: 0 X 5 = 0  
 Column Totals: 110 (A) 352 (B)  
 PI = B/A = 3.2

VEGETATION (use scientific names of plants)			
<b>Herb Stratum</b> ( <u>21</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	3	Y	FAC
2. <i>Gymnocarpium dryopteris</i>	3	Y	FACU
3. <i>Streptopus amplexifolius</i>	1		FACU
4. <i>Cornus canadensis</i>	1		FACU
5. <i>Rubus pedatus</i>	1		FAC
6. <i>Pyrola grandifolia</i>	2		FAC
7. <i>Rattlesnake orchid</i>	1		
8. <i>Equisetum Arvense</i>	2		FAC
9.			
10.			
<b>Total Cover:</b> <u>16</u> <b>50% of total cover:</b> <u>8</u> <b>20% of total cover:</b> <u>3.2</u>			

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

% Bare Ground: 0  
 % Cover of Wetland Bryophytes: 0  
 Total Cover of Bryophytes: 45  
 % Cover of Water: 0

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

## WETLAND DETERMINATION DATA FORM

W106T101

S. 25-16

SOIL	Date	Feature ID	Soil Pit Required (Y/N)					
<b>SOIL PROFILE DESCRIPTION:</b> (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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-1								
1-3							Sand	
3-5	10YR 2/1	100					silt loam	
5-14	10YR 3/2	90	8.5YR 3/4	5	con	RC	silt loam	
14-24			7.5YR 3/4	3	con	M		
24-34	10YR 4/2	100	2.5Y 5/2	2	Dep	M	silt loam	
34-44	10YR 4/4	68	10.5YR 4/4	4-30	con	M RC	fine sandy loam	4-5 con. dep only @ upper interface with B10a. They don't combine past
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix, 2-3 inches								
<b>HYDRIC SOIL INDICATORS</b>				<b>INDICATORS FOR PROBLEMATIC HYDRIC SOILS<sup>3</sup></b>				
Histosol or Histel (A1) <u>N</u>		Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) <sup>4</sup> <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)				
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>-</u> Depth (inches): <u>-</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>Neg alpha alpha</u>								
<b>HYDROLOGY PRIMARY INDICATORS</b> (any one indicator is sufficient)				<b>SECONDARY INDICATORS</b> (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>Y</u> <del>X</del>		Depth (in): <u>14</u>		EC: <u>-</u>				
Notes:								

# AQUATIC SITE ASSESSMENT DATA FORM

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

*KV*



## **Wetland Determination Form QA/QC Checklist**

This form to be completed before leaving the field site.

Feature ID: W106T1011

Field Target: 170

Date: 5.25.16

*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)

Haley Volper

X

Signature / Date

Haley Volper

5-27-16

X

Field Crew Chief (print)

Jessie Brownlee

X

Signature / Date

Jessie Brownlee 5.25.16

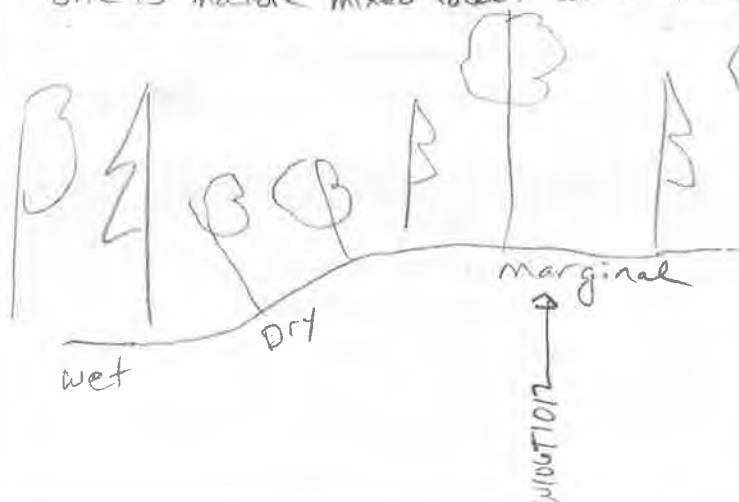
# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>169</u>	Map #: <u>135</u> Map Date: <u>5.20.16</u>
Date: <u>5-25-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106T1012</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>752</u>	
Latitude: <u>61° 17' 43.0690" N</u>	Longitude: <u>151° 03' 18.5167" W</u>	Datum: WGS84	
Logbook No.: <u>1</u>	Logbook Page No.: <u>10</u>	Picture No.: <u>P-W106T1012-001 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>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 <input checked="" type="checkbox"/> , or Hydrology <input checked="" type="checkbox"/> Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <u>Y</u> No _____	Is the Sampled Area within a Wetland? Yes <u>Y</u> No _____
Hydric Soil Present? Yes <u>Y</u> No _____	Wetland Type: <u>PF01/4B</u>
Wetland Hydrology Present? Yes _____ No _____ <u>Marginal</u>	Alaska Vegetation Classification (Vioreck): <u>1C2, 11C2</u>

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

Site is very marginal. Just outside of plot ~~are~~ many signs of hydrology such as sparsely concave surfaces w/ sphagnum & water stained leaves. Slight elevation changes through site dictate wet/dry call and depth to water table. Marginal hydrology, soil and veg throughout. Site is mature mixed forest with trees 70' tall & alder, Menfer



While site does not meet the exact indicators within our 26' diameter plot size, given that strong hydrology & soil indicators are present just outside and that up slope and down slope of this location is very wet I am using B.P.J. to make this a wet call. Jessie Brownlee

## WETLAND DETERMINATION DATA FORM

W106 T1012

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula neolasiana</i>	30	Y	FAC
2. <i>Picea mariana</i>	5		FACW
3. <i>Picea glauca</i>	5		FACU
4.			

Total Cover: 4050% of total cover: 20 20% of total cover: 8

Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> sp	15	Y	FAC
2. <i>Ribes triste</i>	7		FAC
3. <i>Picea glauca</i>	1		FACU
4. <i>Oplopanax horridus</i>	2		FAC
5. <i>Menziesia ferruginea</i>	10	Y	FAC
6. <i>Vaccinium ovalifolium</i>	10	Y	FAC
7.			
8.			
9.			

Total Cover: 4350% of total cover: 21.5 20% of total cover: 8.6

## 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: 0 X 1 = 0FACW species: 5 X 2 = 10FAC species: 125 X 3 = 375FACU species: 29 X 4 = 116UPL species: 0 X 5 = 0Column Totals: 159 (A) 501 (B)PI = B/A = 3.15

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	8		FAC
2. <i>Calamagrostis canadensis</i>	20	Y	FAC
3. <i>Equisetum arvense</i>	20	Y	FAC
4. <i>Cornus <del>sericea</del> canadensis</i>	2		FAC
5. <i>Streptopus amplexifolius</i>	2		FACU
6. <i>Dryopteris expansa</i>	20	Y	FACU
7. <i>Rubus pedatus</i>	3		FAC
8. <i>Trientalis europaea</i>	1		FACU
9. <i>Pyrola graciliflora</i>	7		FAC
10.			

Total Cover: 7650% of total cover: 38 20% of total cover: 15.2

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%N Prevalence Index is ≤ 3.0— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.0 % Bare Ground20 % Cover of Wetland Bryophytes30 Total Cover of Bryophytes0 % Cover of WaterHydrophytic Vegetation Present (Y/N): Y

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



# WETLAND DETERMINATION DATA FORM

W10611012

5.25.14

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 <sup>1</sup>	Loc <sup>2</sup>		
0-25-0i								
C 25-3.5							Sand	
Ab 3.5-13	10YR 2/1	100					Silt loam	
Bw1 13-18	10YR 3/2	100					Silt loam	
Bw2 18-24	10YR 5/2	95	5YR 4/6	95	con	RC M	Silt loam	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>Y</u>						Other (Explain in Notes) <u>—</u>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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: Negative $\alpha$ throughout. Using A12. I believe soil meets the intent of the indicator if not exact parameters.								
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>see note</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>N</u>		
Water Marks (B1) <u>N</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>Delayed &amp; very faint</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: using presence of strong hydrology just outside of plot to make this yes.				
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>0</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>18</u>						
Saturation Present (Y/N): <u>Y</u>		Depth (in): <u>17</u>		EC: <u>34</u> pH: <u>5.0</u>				
Notes: Sparsely vegetated concave surface are present just outside of 26' diameter plot size & scattered throughout signature to the NW								



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1012

VEGETATION VARIABLES		P= Plot, M= Matrix
<b>Primary Vegetation Type (P):</b> Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
<b>Percent Cover (P):</b> Tree (>5 dbh, >6m tall) <u>45</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>10</u> Short shrub (0.5-2m) <u>20</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>20</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>0</u>		
<b>Number of Wetland Types (M):</b> <u>2</u>	<b>Evenness of Wetland Type Distribution (M):</b> Even _____ Highly Uneven _____ Moderately even <input checked="" type="checkbox"/>	
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <input checked="" type="checkbox"/>		
<b>Interspersion of Cover &amp; Open Water (P):</b> 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 _____		
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) <input checked="" type="checkbox"/> High (>25) _____		
<b>Presence of Islands (M):</b> Absent (none) <input checked="" type="checkbox"/> One or Few _____ Several to Many _____ N/A _____		
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <input checked="" type="checkbox"/>		
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) <input checked="" type="checkbox"/> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) <input checked="" type="checkbox"/> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
<b>HGM Class (P):</b> Slope <input checked="" type="checkbox"/> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

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

HYDROLOGIC VARIABLES	
<b>Inlet/Outlet Class (P):</b> 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 _____	
<b>Wetland Water Regime (P):</b> Drier: Seasonally Flooded, Temporarily Flooded, Saturated <input checked="" type="checkbox"/> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
<b>Evidence of Sedimentation (P):</b> No Evidence Observed <input checked="" type="checkbox"/> Sediment Observed on Wetland Substrate _____ Fluvial/Quaternary Soils Sediment Created _____	
<b>Microrelief of Wetland Surface (P):</b> Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) <input checked="" type="checkbox"/> Pronounced (>18in.) _____	
<b>Frequency of Overbank Flooding (P):</b> No Overbank Flooding <input checked="" type="checkbox"/> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
<b>Degree of Outlet Restriction (P):</b> No Outflow <input checked="" type="checkbox"/> Restricted Outflow _____ Unrestricted Outflow _____	
<b>Water pH (P):</b> No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <input checked="" type="checkbox"/> pH Reading <u>5.0</u>	
<b>Surficial Geologic Deposit Under Wetland (P):</b> High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <input checked="" type="checkbox"/> Glacial Till/Not Permeable _____	
<b>Basin Topographic Gradient (M):</b> Low Gradient (<2%) <input checked="" type="checkbox"/> High Gradient (≥2%) _____	
<b>Evidence of Seeps and Springs (P):</b> No Seeps or Springs <input checked="" type="checkbox"/> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

*Jessie Brunelle*

*AV*

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1012

Field Target: 169

Date: 5.25.16

*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)

Kaley Volper

X

Signature / Date

Kaley Volper

5-27-16

X

Field Crew Chief (print)

Jessie Brownee

X

Signature / Date

Jessie Brownee

# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 173	Map #: 131 Map Date: 5.20.16
Date: 5-25-16	Project Name: Alaska LNG		Feature Id: W106T1013
Investigators: Jessie Brownlee, Katelyn Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 751.3	
Latitude: 61° 18' 10.1708" N	Longitude: 151° 2' 31.69" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 10	Picture No.: P-W106T1013-001 through -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Lowland/Swale
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PF04/1B	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: PF04/1B
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.

PF04/1B  
Tall (~60') mixed forest w/ alder <sup>understory</sup> community. Patches of sparsely vegetated  
concave surfaces + standing water throughout plot  
Swaling feature is



## WETLAND DETERMINATION DATA FORM

W106 T1013

## 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 alleghaniensis</i>	20	Y	FAC
3. <i>Picea canadensis</i>	3		FACU
4.			

Total Cover: 5350% of total cover: 26.5 20% of total cover: 10.6

Sapling/Shrub Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus fruticosa</i>	40	Y	FAC
2. <i>Spiraea stenophylla</i>	15		FACU
3. <i>Vaccinium ovalifolium</i>	12		FAC
4. <i>Linnaea borealis</i>	5		FACU
5. <i>Oplopanax horridus</i>	2		FACU
6. <i>Menziesia ferruginea</i>	9		FACU
7.			
8.			
9.			

Total Cover: 7850% of total cover: 39 20% of total cover: 15.6

## Dominance Test worksheet:

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

## Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_

OBL species: 0 X 1 = 0FACW species: 30 X 2 = 60FAC species: 119 X 3 = 357FACU species: 85 X 4 = 140UPL species: 0 X 5 = 0Column Totals: 184 (A) 557 (B)PI = B/A = 3.02

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus pedatus</i>	7		FAC
2. <i>Tricentris Europaea</i>	6		FACU
3. <i>Streptopus amplexifolius</i>	7		FACU
4. <i>Cornus canadensis</i>	7		
5. <i>Equisetum sylvaticum</i>	8		FAC
6. <i>Equisetum Arvense</i>	20	Y	FAC
7. <i>Calamagrostis canadensis</i>	10	Y	FAC
8. <i>Antherium cylindricum</i>	2		FAC
9.			
10.			

Total Cover: 5350% of total cover: 26.5 20% of total cover: 10.6

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%N Prevalence Index is ≤ 3.0- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.2 % Bare Ground

\_\_\_\_\_ % Cover of Wetland Bryophytes

\_\_\_\_\_ Total Cover of Bryophytes

1 % Cover of WaterHydrophytic Vegetation Present (Y/N): Y

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

Didn't record in field but recollection is &gt; 20% wetland Bryophytes.

W106T1013

Page 3 of 4

# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved <del>_____</del> Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved <del>_____</del> 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>60</u> Sapling (<5 dbh, <6m tall) <u>9</u> Tall shrub (2-6m) <u>15</u> Short shrub (0.5-2m) <u>0</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>25/15</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>1</u>	Evenness of Wetland Type Distribution (M): Even <u>1</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>1</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>1</u> N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>1</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>1</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>1</u>	
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) <u>1</u> Abundant (>50% of surface) _____	
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>1</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
HGM Class (P): Slope <u>1</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estuarine Fringe _____	

SOIL VARIABLES	
Soil Factors (P): Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic <u>1</u> Histosol:Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>1</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>1</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>1</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>1</u> Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>1</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>1</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) <u>1</u> pH Reading <u>4.9</u>	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>1</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) _____ High Gradient (≥2%) <u>1</u>	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>1</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>1</u> Unknown _____	
Wetland Land Use: High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) <u>1</u>	
Watershed Land Use: 0-5% Rural <u>1</u> 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
Size: Small (<10 acres) _____ Medium (10-100 acres) <u>1</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: W1106T1013

Field Target: 173

Date: 5.25.16

*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)

Kately Volper

X

Signature / Date

Kately Volper 5-27-16

X

Field Crew Chief (print)

Jesse Brumley

X

Signature / Date

[Signature] 5.26.16

# WETLAND DETERMINATION DATA FORM

W106T1014

<b>SITE DESCRIPTION</b>			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) <input type="checkbox"/>		Field Target: 177	Map #: 124 Map Date: 5-20-16
Date: 5-26-16	Project Name: Alaska LNG		Feature Id: W106T1014
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 748	
Latitude: 61° 19' 34.0347" N	Longitude: 151° 1' 13.2916" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 11	Picture No.: P-W106T1014-001 thru 004	

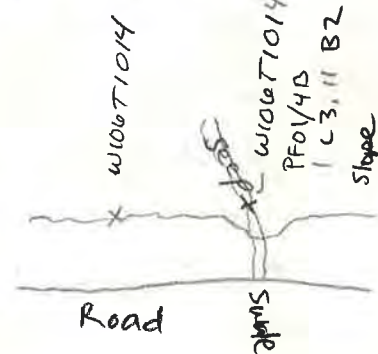
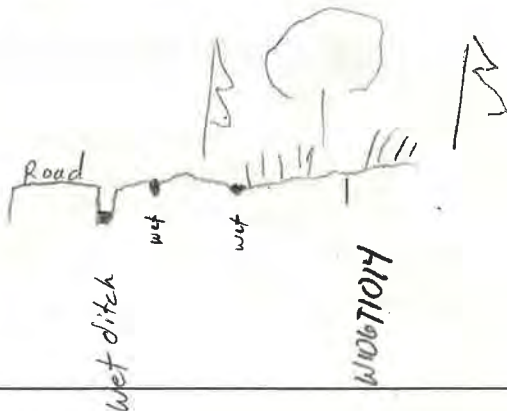
<b>SITE PARAMETERS</b>	
Subregion: Cook Inlet basin	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 5-8	Local relief (concave, convex, none): Slightly concave Flat
Pre-mapped Alaska LNG/NWI classification: U1C2.11C2	Evidence of Wildlife Use: moose <del>fecal matter</del> droppings
Are 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.)
<b>SUMMARY OF FINDINGS</b>	
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): 1C2.11B2

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

Mixed woodland w/ Bet Net & Pic 6/6 ~ 50' tall and Alder shrub understory.

Thick cal can cover.

Dry site with a few small depressions <sup>closer to the road</sup> that are slightly wet but over all 99% of site is dry. At W106T1014-OP a slight swaling feature is channeling water down slope. Possible Intermittent in and out let in wet times. water in creek pH 5.4 EC 56. OP has same veg type & <sup>matching</sup> ~~1C3.11B2~~ w/ H6M slope





# WETLAND DETERMINATION DATA FORM

W106T1014

## 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>	10	Y	FAC
2. <i>Alnus</i> sp	5	Y	FAC
3. <i>Picea Colouca</i> present in mapping polygon but not in our plot.			
4.			

Total Cover: 15

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

Sapling/Shrub Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus</i> sp	20	Y	FAC
2. <i>Ostrya virginica</i>	15	Y	FACU
3. <i>Viburnum edule</i>	7		FACU
4. <i>Rubus idaeus</i>	4		FACU
5. <i>Ribes</i> sp	7		
6.			
7.			
8.			
9.			

Total Cover: 46

50% of total cover: 23 20% of total cover: 9.2

### 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: 0 X 2 = 0

FAC species: 132 X 3 = 396

FACU species: 75 X 4 = 300

UPL species: 0 X 5 = 0

Column Totals: 207 (A) 696 (B)

PI = B/A = 3.36

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	70	Y	FAC
2. <i>Equisetum sylvaticum</i>	7		FAC
3. <i>Dryopteris expansa</i>	35	Y	FACU
4. <i>Equisetum Arvense</i>	20	Y	FAC
5. <i>Streptopus amplexifolius</i>	4		FACU
6. <i>Gymnocarpium dryopteris</i>	10		FACU
7. <i>Rubus idaeus</i>			FACU
8. <i>Chamerion angustifolium</i>	7		FACU
9.			
10.			

Total Cover: 146

50% of total cover: 73 20% of total cover: 29.2

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

35 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

W106T1014

5.26.16

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					
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-4								high sand content
A 4-6	10YR 2/1	100					Sandy loam	High root content & OM
Bw1 6-12	10YR 3/2	90	5YR 2-5/2	4	con	m	VF Sa loam	
Bw2 12-15	10YR 3/3	100	7.5YR 3/3	5	com	m	VF Sa loam	glistening on pedis
Bw3 15-24	10YR 3/4	15						
	10YR 3/2	100					VF Sa loam	~30% Rock Frag
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS					INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>			
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) <sup>4</sup> <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>			
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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: <u>Marginal see notes</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>N</u>		
Water Table Present (Y/N): <u>N</u>				Depth (in): <u>19</u>				
Saturation Present (Y/N): <u>Y</u>				Depth (in): <u>15-19</u>		EC: <u>235</u> pH <u>5.0</u>		
Notes: <u>Slight seeping @ 19" was able to sample water after ~30 minutes of seeping</u>								



# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
<b>Primary Vegetation Type (P):</b> 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 _____		
<b>Percent Cover (P):</b> 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 _____		
<b>Number of Wetland Types (M):</b> _____		<b>Evenness of Wetland Type Distribution (M):</b> Even _____ Highly Uneven _____ Moderately even _____
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
<b>Interspersion of Cover &amp; Open Water (P):</b> 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
<b>Presence of Islands (M):</b> Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
<b>HGM Class (P):</b> Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

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

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

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

*Jessie Brownlee*

*VV*



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W100T1014

Field Target: 177

Date: 5-26-28

*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)

Katey Volper

X

Signature / Date

Katey Volper 5-27-16

X

Field Crew Chief (print)

J. Brannlee

X

Signature / Date

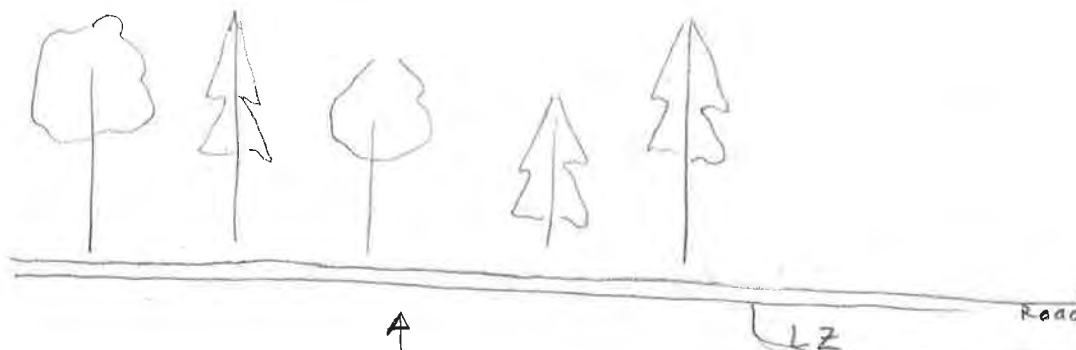
Jessie Brannlee 5.27.16

# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: 175	Map #: 129 Map Date: 5.20.16
Date: 5-26-16	Project Name: Alaska LNG		Feature Id: W106T1015
Investigators: Jessie Brundee Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 749	
Latitude: 61° 18' 36.977" N		Longitude: 150° 58' 3.85" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 12	Picture No.: P-W106T1016-001 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: U1C2, 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.



W106T1015-OP  
PSS/EMIE  
11C2, 11B2  
Flat or slope

# WETLAND DETERMINATION DATA FORM

W106 T1015

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. <i>Betula Neolascana</i>	20	Y	FAC
3.			
4.			
Total Cover: <u>50</u> 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			
Sapling/Shrub Stratum ( <u>14'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa acicularis</i>	35	Y	FACU
2. <i>Spiraea stevenii</i>	3		FACU
3. <i>Opilapanax horridus</i>	8		FACU
4. <i>Vaccinium ovalifolium</i>	3		FAC
5. <i>Linnaea borealis</i>	T		FACU
6. <i>Ribes triste</i>	T		FAC
7. <i>Alnus sp</i>			
8. <i>Picea glauca</i>	3		FAC
9. <i>Betula neolascana</i>	15	Y	FAC
Total Cover: <u>67.75</u> 50% of total cover: <u>33.875</u> 20% of total cover: <u>13.55</u>			

**Dominance Test worksheet:**  
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)  
 Total Number of Dominant Species Across All Strata: 5 (B)  
 % Dominant Species that are OBL, FACW, or FAC: .4 (A/B)

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species: 0 X 1 = 0  
 FACW species: 0 X 2 = 0  
 FAC species: 47 X 3 = 141  
 FACU species: 173 X 4 = 692  
 UPL species: 0 X 5 = 0  
 Column Totals: 220 (A) 833 (B)  
 PI = B/A = 3.73

VEGETATION (use scientific names of plants)			
Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	85	Y	FACU
2. <i>Chamaenerion angustifolium</i>	T		FACU
3. <i>Rubus pedatus</i>	3		FAC
4. <i>Pyrola grandiflora</i>	1		FAC
5. <i>Trientalis europaea</i>	2		FACU
6. <i>Equisetum sp</i>	T		
7. <i>Calamagrostis canadensis</i>	T		FAC
8. <i>Sparganium angustifolium</i>	1		FACU
9. <i>Equisetum arvense</i>	2		FAC
10. <i>Streptopus amplexifolius</i>	1		FACU
Total Cover: <u>95</u> 50% of total cover: <u>47.5</u> 20% of total cover: <u>19</u>			

**Hydrophytic Vegetation Indicators:**  
☒ Dominance Test is > 50%  
☒ Prevalence Index is ≤ 3.0  
☐ Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)  
☐ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup> 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  
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): ✓

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

forb sp. T  
*Dryopteris expansa* FACU T  
*Cornus canadensis* T FACU



# WETLAND DETERMINATION DATA FORM

W106T1015

5.26.15

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				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2								Dry organics
A 2-4	10YR 3/2	100					Silt loam	
E 4-10	10YR 5/2	100					Silt loam	
Bhs 10-11	5YR 3/4	15					Silt loam	
	7.5YR 4/4	85						
Bwl 11-24	10YR 4/4	100					Silt loam	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS							INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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>All boundaries are wavy especially the E &amp; Bhs</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): <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	
<b>Primary Vegetation Type (P):</b> 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 _____	
<b>Percent Cover (P):</b> 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 _____	
<b>Number of Wetland Types (M):</b> _____	<b>Evenness of Wetland Type Distribution (M):</b> Even _____ Highly Uneven _____ Moderately even _____
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____	
<b>Interspersion of Cover &amp; Open Water (P):</b> 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____	
<b>Presence of Islands (M):</b> Absent (none) _____ One or Few _____ Several to Many _____ N/A _____	
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____	
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
<b>HGM Class (P):</b> Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	
SOIL VARIABLES	
<b>Soil Factors (P):</b> Soil Lacking _____ Histosol:Fibric _____ Histosol:Hemic _____ Histosol: Sapric _____ Mineral: Gravelly _____ Mineral: Sandy _____ Mineral: Silty _____ Mineral: Clayey _____	
HYDROLOGIC VARIABLES	
<b>Inlet/Outlet Class (P):</b> 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 _____	
<b>Wetland Water Regime (P):</b> Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
<b>Evidence of Sedimentation (P):</b> No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ Fluvial Soils Sediment Created _____	
<b>Microrelief of Wetland Surface (P):</b> Absent _____ Poorly Developed (6in.) _____ Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
<b>Frequency of Overbank Flooding (P):</b> No Overbank Flooding _____ Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
<b>Degree of Outlet Restriction (P):</b> No Outflow _____ Restricted Outflow _____ Unrestricted Outflow _____	
<b>Water pH (P):</b> No surface water _____ Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
<b>Surficial Geologic Deposit Under Wetland (P):</b> High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits _____ Glacial Till/Not Permeable _____	
<b>Basin Topographic Gradient (M):</b> Low Gradient (<2%) _____ High Gradient (≥2%) _____	
<b>Evidence of Seeps and Springs (P):</b> No Seeps or Springs _____ Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	
LANDSCAPE VARIABLES (M)	
<b>Wetland Juxtaposition:</b> Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
<b>Wetland Land Use:</b> High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
<b>Watershed Land Use:</b> 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
<b>Size:</b> Small (<10 acres) _____ Medium (10-100 acres) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

*Jesse Brumfield*

GPS Technician QA/QC check:

*KV*

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W100T1015

Field Target: 175

Date: 5.26.16

*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

Kaley Volper

Wetland Scientist (print)

X

Kaley Volper 5-27-16

Signature / Date

X

J Brownlee

Field Crew Chief (print)

X

Jessica Brownlee 5-27-16

Signature / Date



# WETLAND DETERMINATION DATA FORM

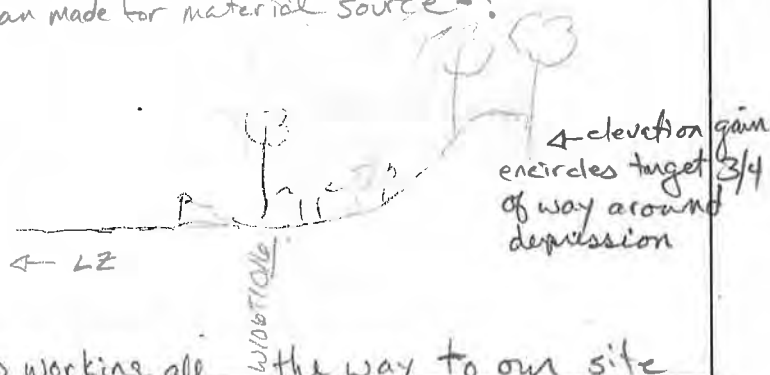
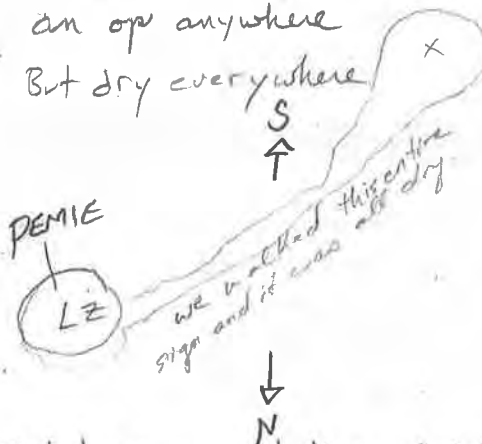
didn't have a map used Tablet for in place of map

SITE DESCRIPTION			
Survey Type: Centerline	Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>	Field Target: 102
Date: 5-26-16	Project Name: Alaska LNG Facility	Feature Id: W106T1016	Map #: 112 Map Date: 5-27
Investigators: Jessie Brannlee, Katelyn Volker			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 760	
Latitude: 61° 11' 29.316" N	Longitude: 151° 9' 22.234" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 13	Picture No.: P-W106T1016-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PFOV4B	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: Upland
Wetland Hydrology Present? Yes No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 11C2

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

FT is ringed by 15-25' tall elevation gain. This FT is in a depression but it's bone dry. Dug hole in the center most low spot next to a bare ground concave spot. Area is drier than mapped. The wet signature linking LZ to FT is dry. We walked length from LZ through the wet mapping & didn't come across any remotely wet ground. Was unable to take an op anywhere due to GPS not working. LZ is PEMIE But dry everywhere else. Feature possibly man made for material source?



Didn't have map at time of visit but GPS was working all the way to our site & some were able to verify the necessary changes.

# WETLAND DETERMINATION DATA FORM

W106T1016

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> (2)				FAC
2. Adding to shrub layer b/c its under 2 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>		80	Y	FACW
2. <i>Betula neolascana</i>		4		FAC
3. <i>Populus balsamifera</i>		T		FACU
4. <i>Picea glauca</i>		T		
5. <i>Spirea sterculiifolia</i>		T		
6. (2)				
7.				
8.				
9.				
Total Cover: <u>86</u> 50% of total cover: <u>43</u> 20% of total cover: <u>17.2</u>				

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_

OBL species: 0 X 1 = 0

FACW species: 80 X 2 = 160

FAC species: 21 X 3 = 63

FACU species: 12 X 4 = 48

UPL species: 0 X 5 = 0

Column Totals: 113 (A) 271 (B)

PI = B/A = 2.39

VEGETATION (use scientific names of plants)				
Herb Stratum ( <u>26'</u> )		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rubus arcticus</i>		15	Y	FAC
2. <i>Chamaenerion angustifolium</i>		3		FACU
3. <i>Geranium erianthum</i>		7	Y	FACU
4. <i>Calamagrostis canadensis</i>		T		FAC
5. <i>Poa</i> sp		T		
6. <i>Sagittaria</i> sp		4		
7. <i>Pyrola asarifolia</i>		2		FACU
8. <i>Trientalis europaea</i>		T		FACU
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:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

2 % Bare Ground

0 % Cover of Wetland Bryophytes

35 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

W106 T10 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 <sup>1</sup>			Loc <sup>2</sup>
0-2							fine - sandy loam w/ dry organics	
A 2-5	7.5YR 3/2	100					fine sandy loam	
Bh 5-16	10YR 4/4	75	7.5YR 3/4	5	con	m	silt loam	
	10YR 3/4	20						
Bw 16-24	10YR 3/2	100					silt loam w/ Andic properties	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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: Dry soil almost seems like a forest soil. Significant wavy boundaries and depths for all horizons.								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)					SECONDARY INDICATORS (2 or more required)			
Surface Water (A1) <u>N</u>		Surface Soil Cracks (B6) <u>N</u>		Water-stained Leaves (B9) <u>N</u>		Stunted or Stressed Plants (D1) <u>N</u>		
High Water Table (A2) <u>N</u>		Inundation Visible on Aerial Imagery (B7) <u>N</u>		Drainage Patterns (B10) <u>N</u>		Geomorphic Position (D2) <u>Yes</u>		
Saturation (A3) <u>N</u>		Sparsely Vegetated Concave Surface (B8) <u>marginally see note</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>N</u>		
Water Marks (B1) <u>N</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>N</u>		Microtopographic Relief (D4) <u>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: one small unvegetated depression that collects water in very wet times. No soil indicators meet though. It's ~6' x 2'.								



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1016

## VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved \_\_\_\_\_  
 Forested-Evergreen-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Broad-leaved \_\_\_\_\_  
 Scrub Shrub-Evergreen-Broad-leaved \_\_\_\_\_ Scrub Shrub-Evergreen-Needle-leaved \_\_\_\_\_ Emergent-Non-persistent \_\_\_\_\_ Emergent-Persistent \_\_\_\_\_  
 Aquatic Bed \_\_\_\_\_

Percent Cover (P): Tree (>5 dbh, >6m tall) \_\_\_\_\_ Sapling (<5 dbh, <6m tall) \_\_\_\_\_ Tall shrub (2-6m) \_\_\_\_\_ Short shrub (0.5-2m) \_\_\_\_\_  
 Dwarf shrub (<0.5m) \_\_\_\_\_ Tall herb (>1m) \_\_\_\_\_ Short herb (<1m) \_\_\_\_\_ Moss-Lichen \_\_\_\_\_ Floating \_\_\_\_\_ Submerged \_\_\_\_\_

Number of Wetland Types (M): \_\_\_\_\_ Evenness of Wetland Type Distribution (M): Even \_\_\_\_\_ Highly Uneven \_\_\_\_\_ Moderately even \_\_\_\_\_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water \_\_\_\_\_ <25% Scattered/Peripheral Cover \_\_\_\_\_ 26-75% Scattered or Peripheral Cover \_\_\_\_\_  
 >75% Scattered or Peripheral Cover \_\_\_\_\_ N/A \_\_\_\_\_

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

Presence of Islands (M): Absent (none) \_\_\_\_\_ One or Few \_\_\_\_\_ Several to Many \_\_\_\_\_ N/A \_\_\_\_\_

Cover Distribution of Dominant Layer (P): No Veg. \_\_\_\_\_ Solitary, Scattered Stems \_\_\_\_\_ 1 or More Large Patches; Parts of Site Open \_\_\_\_\_  
 Small Scattered Patches \_\_\_\_\_ Continuous Cover \_\_\_\_\_

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

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

HGM Class (P): Slope \_\_\_\_\_ Flat \_\_\_\_\_ Lacustrine Fringe \_\_\_\_\_ Depressional \_\_\_\_\_ Riverine \_\_\_\_\_ Estuarine Fringe \_\_\_\_\_

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet \_\_\_\_\_ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No Outlet \_\_\_\_\_  
 Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial Inlet/Intermittent Outlet \_\_\_\_\_  
 Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated \_\_\_\_\_  
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

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

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

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

Degree of Outlet Restriction (P): No Outflow \_\_\_\_\_ Restricted Outflow \_\_\_\_\_ Unrestricted Outflow \_\_\_\_\_

Water pH (P): No surface water \_\_\_\_\_ Circumneutral (5.5-7.4) \_\_\_\_\_ Alkaline (>7.4) \_\_\_\_\_ Acid (<5.5) \_\_\_\_\_ pH Reading \_\_\_\_\_

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

Basin Topographic Gradient (M): Low Gradient (<2%) \_\_\_\_\_ High Gradient (≥2%) \_\_\_\_\_

Evidence of Seeps and Springs (P): No Seeps or Springs \_\_\_\_\_ Seeps Observed \_\_\_\_\_ Intermittent Spring \_\_\_\_\_ Perennial Spring \_\_\_\_\_

## LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated \_\_\_\_\_ Wetlands within 400m, Not Connected \_\_\_\_\_ Only Connected Below \_\_\_\_\_  
 Only Connected Above \_\_\_\_\_ Connected Upstream & Downstream \_\_\_\_\_ Unknown \_\_\_\_\_

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

Watershed Land Use: 0-5% Rural \_\_\_\_\_ 5-25% Urbanized \_\_\_\_\_ 25-50% Urbanized \_\_\_\_\_ >50% Urbanized \_\_\_\_\_

Size: Small (<10 acres) \_\_\_\_\_ Medium (10-100 acres) \_\_\_\_\_ Large (>100 acres) \_\_\_\_\_

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Jessie Browne

KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1014 Field Target: 162 Date: 5-26-11

*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 5-27-16*

Signature / Date

X

*J Browlee*

Field Crew Chief (print)

X

*Jessie Browlee 5-26-16*

Signature / Date

# WETLAND DETERMINATION DATA FORM

<b>SITE DESCRIPTION</b>			
Survey Type: Centerline _____ Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <u>196</u>	Map #: <u>138</u> Map Date: <u>5.20</u>
Date: <u>5-29-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106T1017</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>749</u>	
Latitude: <u>61° 16' 20.5610" N</u>	Longitude: <u>150° 54' 23.3807" W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>15</u>	Picture No.: <u>P-W106T1017-001 mru-004</u>	

<b>SITE PARAMETERS</b>	
Subregion: <u>Cook Inlet lowlands</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Terrace</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>slightly concave 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 _____ (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.)	
<b>SUMMARY OF FINDINGS</b>	
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>1B3, 1B1</u>

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

Dense Even aged stand of Bet Neo, Pic Cola & Alder with a few taller Cottonwoods on the edge of plot. Site must have been clear cut @ time of road construction. Water table present @ 21' but no evidence of it raising in profile base on lack of soil concentrations or other indicators. Hole dug ~300' in same polygon is lighter green signature. That sight was wetter with a high % of concentrations. and higher water table. Put boundary between here and there.





# WETLAND DETERMINATION DATA FORM

W106T1017

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Populus balsamifera</i>	20	<del>FAC</del> Y	FACU
2. <i>Betula Neolaskana</i>	83		FAC
3. <i>Alnus viridis fruticosa</i>	3		FAC
4.			

Total Cover: 26

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

Sapling/Shrub Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus viridis ssp fruticosa</i>	12	Y	FAC
2. <i>Betula Neolaskana</i>	10	Y	FAC
3. <i>Picea Canadensis</i>	12	Y	FACU
4. <i>Salix sp</i>	T		
5. <i>Rhododendrum tomentosum</i>	T		FACW
6. <i>Populus balsamifera</i>	5		FACU
7. <i>Vaccinium vitis-idea</i>	T		
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: 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: 0 Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 40 X 3 = 120

FACU species: 40 X 4 = 160

UPL species: 0 X 5 = 0

Column Totals: 80 (A) 280 (B)

PI = B/A = 3.5

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum arvense</i>	7	Y	FAC
2. <i>Calamagrostis Canadensis</i>	2		FAC
3. <i>Chamerion angustifolium</i>	13	Y	FACU
4. <i>Pycnospora grandiflora</i>	3	Y	FAC
5. <i>Tway Black orchid</i>	T		
6. <i>Carex sp</i>	T		
7.			
8.			
9.			
10.			

Total Cover: 15

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

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

0 % Bare Ground

1 % Cover of Wetland Bryophytes

45 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



W106T1017

5029-16

Page 3 of 4



# AQUATIC SITE ASSESSMENT DATA FORM

W106 T1 017

## VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved \_\_\_\_\_  
 Forested-Evergreen-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Broad-leaved \_\_\_\_\_  
 Scrub Shrub-Evergreen-Broad-leaved \_\_\_\_\_ Scrub Shrub-Evergreen-Needle-leaved \_\_\_\_\_ Emergent-Non-persistent \_\_\_\_\_ Emergent-Persistent \_\_\_\_\_ Aquatic Bed \_\_\_\_\_

Percent Cover (P): Tree (>5 dbh, >6m tall) \_\_\_\_\_ Sapling (<5 dbh, <6m tall) \_\_\_\_\_ Tall shrub (2-6m) \_\_\_\_\_ Short shrub (0.5-2m) \_\_\_\_\_  
 Dwarf shrub (<0.5m) \_\_\_\_\_ Tall herb (≥1m) \_\_\_\_\_ Short herb (<1m) \_\_\_\_\_ Moss-Lichen \_\_\_\_\_ Floating \_\_\_\_\_ Submerged \_\_\_\_\_

Number of Wetland Types (M): \_\_\_\_\_ Evenness of Wetland Type Distribution (M): Even \_\_\_\_\_ Highly Uneven \_\_\_\_\_ Moderately even \_\_\_\_\_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water \_\_\_\_\_ <25% Scattered/Peripheral Cover \_\_\_\_\_ 26-75% Scattered or Peripheral Cover \_\_\_\_\_ >75% Scattered or Peripheral Cover \_\_\_\_\_ N/A \_\_\_\_\_

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

Presence of Islands (M): Absent (none) \_\_\_\_\_ One or Few \_\_\_\_\_ Several to Many \_\_\_\_\_ N/A \_\_\_\_\_

Cover Distribution of Dominant Layer (P): No Veg. \_\_\_\_\_ Solitary, Scattered Stems \_\_\_\_\_ 1 or More Large Patches; Parts of Site Open \_\_\_\_\_ Small Scattered Patches \_\_\_\_\_ Continuous Cover \_\_\_\_\_

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

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

HGM Class (P): Slope \_\_\_\_\_ Flat \_\_\_\_\_ Lacustrine Fringe \_\_\_\_\_ Depressional \_\_\_\_\_ Riverine \_\_\_\_\_ Estaurine Fringe \_\_\_\_\_

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet \_\_\_\_\_ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No Outlet \_\_\_\_\_ Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial Inlet/Intermittent Outlet \_\_\_\_\_ Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated \_\_\_\_\_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

Evidence of Sedimentation (P): No Evidence Observed \_\_\_\_\_ Sediment Observed on Wetland Substrate \_\_\_\_\_ Fluvial/Quaternary Soils Sediment Created \_\_\_\_\_

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

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

Degree of Outlet Restriction (P): No Outflow \_\_\_\_\_ Restricted Outflow \_\_\_\_\_ Unrestricted Outflow \_\_\_\_\_

Water pH (P): No surface water \_\_\_\_\_ Circumneutral (5.5-7.4) \_\_\_\_\_ Alkaline (>7.4) \_\_\_\_\_ Acid (<5.5) \_\_\_\_\_ pH Reading \_\_\_\_\_

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

Basin Topographic Gradient (M): Low Gradient (<2%) \_\_\_\_\_ High Gradient (≥2%) \_\_\_\_\_

Evidence of Seeps and Springs (P): No Seeps or Springs \_\_\_\_\_ Seeps Observed \_\_\_\_\_ Intermittent Spring \_\_\_\_\_ Perennial Spring \_\_\_\_\_

## LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated \_\_\_\_\_ Wetlands within 400m, Not Connected \_\_\_\_\_ Only Connected Below \_\_\_\_\_ Only Connected Above \_\_\_\_\_ Connected Upstream & Downstream \_\_\_\_\_ Unknown \_\_\_\_\_

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

Watershed Land Use: 0-5% Rural \_\_\_\_\_ 5-25% Urbanized \_\_\_\_\_ 25-50% Urbanized \_\_\_\_\_ >50% Urbanized \_\_\_\_\_

Size: Small (<10 acres) \_\_\_\_\_ Medium (10-100 acres) \_\_\_\_\_ Large (>100 acres) \_\_\_\_\_

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Jessie Brumlee

KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1016T1017

Field Target: 166  
160

Date: 5-29-16

*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

- 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

Wetland Scientist (print)

Haley Valper

X

Signature / Date

Haley Valper 5-29-16

X

Field Crew Chief (print)

J. Browner

X

Signature / Date

J. Browner 5-29-16



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <u>108</u>	Map #: <u>176</u> Map Date: <u>5-20</u>
Date: <u>5-29-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106T1018</u>
Investigators: <u>Jessie Braunter, Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>748</u>	
Latitude: <u>61° 16' 54.9119" N</u>	Longitude: <u>150° 55' 12.44" W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>17</u>	Picture No.: <u>P-W106T1018-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet basin</u>	Landform (hillslope, terrace, hummocks, etc.): <u>hill side</u>
Slope (%): <u>~15</u>	Local relief (concave, convex, none): <u>slightly 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 <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 _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	Wetland Type: <u>U</u>
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>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 mixed mature forest of cottonwood, Bet Neo, Pic Gala with Sam Rac under story. No sign of hydrology. Dry thick A horizon soils. Dug in lowest spot of in area but still dry*

Road upslope & behind

micro relief

W106T1018

# WETLAND DETERMINATION DATA FORM

W106T1018

## 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> 40'	15	Y	FAC
2. <i>Picea Canadensis</i> 60'	15	Y	FACU
3. <i>Populus balsamifera</i>	10	Y	FACU
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>Rubus idaeus</i>	3		FACU
2. <i>Sambucus racemosa</i>	40	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 43

50% of total cover: 21.5 20% of total cover: 8.6

### 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: 16.7 (A/B)

### Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 24 X 3 = 72

FACU species: 138 X 4 = 552

UPL species: 0 X 5 = 0

Column Totals: 162 (A) 624 (B)

PI = B/A = 3.85

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>20'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Chamerion angustifolium</i>	5		FACU
2. <i>Cynodon dactylon</i>	30	Y	FACU
3. <i>Trifolium repens</i>	7		FACU
4. <i>Equisetum arvense</i>	25	Y	FACU
5. <i>Hordeum maximum</i>	10		FACU
6. <i>Galium sp</i>	7		
7. <i>Valeriana sp</i>	7		
8. <i>Calamagrostis canadensis</i>	5		FAC
9. <i>Athyrium cyclosorum</i>	4		FAC
10.			

Total Cover: 79

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

### Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup> 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  
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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



# WETLAND DETERMINATION DATA FORM

W106T1018

5.29.16

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 <sup>1</sup>	Loc <sup>2</sup>		
0-3								
A1 3-12	10YR 3/2	100					loam	
A2 12-17	10YR 4/2	50					silt loam	10YR 4/2 is likely sub component
	10YR 3/2	50						
A3 17-24	10YR 3/2	100					loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) <sup>4</sup> <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>	

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

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

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>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

W106T1 018

## VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved \_\_\_\_\_  
 Forested-Evergreen-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Broad-leaved \_\_\_\_\_  
 Scrub Shrub-Evergreen-Broad-leaved \_\_\_\_\_ Scrub Shrub-Evergreen-Needle-leaved \_\_\_\_\_ Emergent-Non-persistent \_\_\_\_\_ Emergent-  
 Persistent \_\_\_\_\_ Aquatic Bed \_\_\_\_\_

Percent Cover (P): Tree (>5 dbh, >6m tall) \_\_\_\_\_ Sapling (<5 dbh, <6m tall) \_\_\_\_\_ Tall shrub (2-6m) \_\_\_\_\_ Short shrub (0.5-2m) \_\_\_\_\_  
 Dwarf shrub (<0.5m) \_\_\_\_\_ Tall herb (≥1m) \_\_\_\_\_ Short herb (<1m) \_\_\_\_\_ Moss-Lichen \_\_\_\_\_ Floating \_\_\_\_\_ Submerged \_\_\_\_\_

Number of Wetland Types (M): \_\_\_\_\_ Evenness of Wetland Type Distribution (M): Even \_\_\_\_\_ Highly Uneven \_\_\_\_\_ Moderately even \_\_\_\_\_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water \_\_\_\_\_ <25% Scattered/Peripheral Cover \_\_\_\_\_ 26-75% Scattered or  
 Peripheral Cover \_\_\_\_\_ >75% Scattered or Peripheral Cover \_\_\_\_\_ N/A \_\_\_\_\_

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

Presence of Islands (M): Absent (none) \_\_\_\_\_ One or Few \_\_\_\_\_ Several to Many \_\_\_\_\_ N/A \_\_\_\_\_

Cover Distribution of Dominant Layer (P): No Veg. \_\_\_\_\_ Solitary, Scattered Stems \_\_\_\_\_ 1 or More Large Patches; Parts of Site  
 Open \_\_\_\_\_ Small Scattered Patches \_\_\_\_\_ Continuous Cover \_\_\_\_\_

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

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

HGM Class (P): Slope \_\_\_\_\_ Flat \_\_\_\_\_ Lacustrine Fringe \_\_\_\_\_ Depressional \_\_\_\_\_ Riverine \_\_\_\_\_ Estaurine Fringe \_\_\_\_\_

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet \_\_\_\_\_ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No  
 Outlet \_\_\_\_\_ Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial  
 Inlet/Intermittent Outlet \_\_\_\_\_ Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated \_\_\_\_\_  
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

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

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

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

Degree of Outlet Restriction (P): No Outflow \_\_\_\_\_ Restricted Outflow \_\_\_\_\_ Unrestricted Outflow \_\_\_\_\_

Water pH (P): No surface water \_\_\_\_\_ Circumneutral (5.5-7.4) \_\_\_\_\_ Alkaline (>7.4) \_\_\_\_\_ Acid (<5.5) \_\_\_\_\_ pH Reading \_\_\_\_\_

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

Basin Topographic Gradient (M): Low Gradient (<2%) \_\_\_\_\_ High Gradient (≥2%) \_\_\_\_\_

Evidence of Seeps and Springs (P): No Seeps or Springs \_\_\_\_\_ Seeps Observed \_\_\_\_\_ Intermittent Spring \_\_\_\_\_ Perennial Spring \_\_\_\_\_

## LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated \_\_\_\_\_ Wetlands within 400m, Not Connected \_\_\_\_\_ Only Connected Below \_\_\_\_\_  
 Only Connected Above \_\_\_\_\_ Connected Upstream & Downstream \_\_\_\_\_ Unknown \_\_\_\_\_

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

Watershed Land Use: 0-5% Rural \_\_\_\_\_ 5-25% Urbanized \_\_\_\_\_ 25-50% Urbanized \_\_\_\_\_ >50% Urbanized \_\_\_\_\_

Size: Small (<10 acres) \_\_\_\_\_ Medium (10-100 acres) \_\_\_\_\_ Large (>100 acres) \_\_\_\_\_

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Jessie Brownlee

KW



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1018

Field Target: 168

Date: 5.29.16

*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

4

- ☒ 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 5-29-16

Signature / Date

X

J Brownlee

Field Crew Chief (print)

X

Jessie Branea 5-29-16

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: 164	Map #: 140 Map Date: 5-27
Date: 5-30-16	Project Name: Alaska LNG		Feature Id: W106T1019
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 755.9	
Latitude: 61° 15' 8.1963" N	Longitude: 151° 8' 6.071" W	Datum: WGS84	
I.logbook No.: 1	Logbook Page No.: 18	Picture No.: P-W106T1019-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 3-5	Local relief (concave, convex, none): slightly concave 4 ft
Pre-mapped Alaska LNG/NWI classification: PF04/1B	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: PF04/1B
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.

Tall mature mixed forest of Bet Neo & Pie Glad with Alder & Cal Can understory  
Site is a mosaic transition with slight elevation ~~the~~ changes dictating wet  
to marginally wet calls. 3 soil pits dug. All three had Deep A horizons verging  
on mucky modifier.  
water stained depressions  
sphagnum  
road nearly  
adjacent

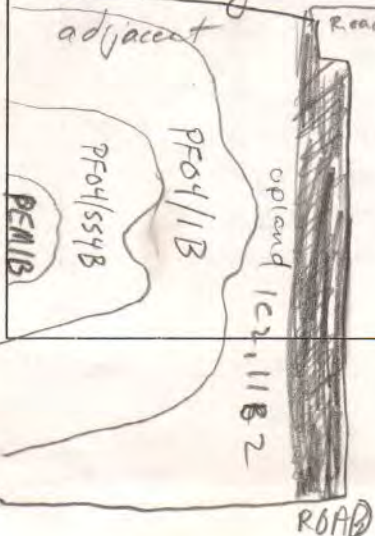
Many large concave sparsely vegetated  
are found through out site w/  
on Transect from LZ to  
all of Area (save for area  
to road) was wet.



W106T1019

PF04/SS4B

LZ  
PEM1B





# WETLAND DETERMINATION DATA FORM

W106T1019

## 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>	25	Y	FACU
3.			
4.			

Total Cover: 45

50% of total cover: 22.5 20% of total cover: 9

Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus incana ssp tenuifolia</i>	35	Y	FAC
2. <i>Vaccinium ovalifolium</i>	T		FAC
3. <i>Menziesia ferruginea</i>	4		FACU
4. <i>Spiraea stevenii</i>	T		-
5.			
6.			
7.			
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: 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: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 135 X 3 = 405

FACU species: 68 X 4 = 264

UPL species: 0 X 5 = 0

Column Totals: 201 (A) 669 (B)

PI = B/A = 3.3

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Calamagrostis canadensis</i>	50	Y	FAC
2. <i>Equisetum Arvense</i>	30	Y	FAC
3. <i>Dryopteris expansa</i>	8		FACU
4. <i>Trisetalis europaea</i>	2		FACU
5. <i>Viola sp</i>	T		-
6. <i>Gymnocarpium dryopteris</i>	25	Y	FACU
7. <i>Streptopus amplexifolius</i>	2		FACU
8. <i>Rubus pedatus</i>	T		FAC
9.			<u>23</u>
10.			

Total Cover: 117

50% of total cover: 58.5 20% of total cover: 23.4

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

5 % Bare Ground

5 % Cover of Wetland Bryophytes

-3- Total Cover of Bryophytes didn't record in field

7 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



# WETLAND DETERMINATION DATA FORM

5.30.16

W106T1019

SOIL		Date		Feature ID		Soil Pit Required (Y/N)		
<b>SOIL PROFILE DESCRIPTION:</b> (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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-2							Fine Sandy	Damp leaf litter
A1 2-4	10YR 2/2	100					VE SLo	Slightly mucky in horizon
A2 4-13	7.5YR 2.5/2	100					Silt loam	high organic content
Bw 13-18	10YR 3/3	90	5Y 2.5/2	10	can	2C m	Fine Silt loam	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
<b>HYDRIC SOIL INDICATORS</b>						<b>INDICATORS FOR PROBLEMATIC HYDRIC SOILS<sup>3</sup></b>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <u>N</u>		
Histic Epipedon (A2) <u>N</u>			Alaska Redox (A14) <u>N</u>			Alaska Alpine Swales (TA5) <u>N</u>		
Black Histic (A3) <u>N</u>			Alaska Gleyed Pores (A15) <u>N</u>			Alaska Redox with 2.5Y Hue <u>N</u>		
Hydrogen Sulfide (A4) <u>N</u>						Alaska Gleyed without 5Y Hue or Redder Underlying Layer <u>N</u>		
Thick Dark Surface (A12) <u>N</u>						Other (Explain in Notes) <u>Y</u>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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>Positive reaction @ 4". Mucky in spots in A1 Horizon</u> <u>Possibly Andic properties in texture</u>								
<b>HYDROLOGY PRIMARY INDICATORS</b> (any one indicator is sufficient)						<b>SECONDARY INDICATORS</b> (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>N</u>		Geomorphic Position (D2) <u>M</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>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: <u>Water seeping in quickly from 4". Water table expected to rise to at least this level.</u>				
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>N</u>		Depth (in): <u>—</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>14</u> <u>see note</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>10</u>						
EC: <u>36</u> pH <u>5.3</u>								
Notes:								



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1019

## 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) 45 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 30 Short shrub (0.5-2m) 0  
 Dwarf shrub (<0.5m) 0 Tall herb (>1m) 0 Short herb (<1m) 25 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 \_\_\_\_\_ Estuarine Fringe \_\_\_\_\_

## SOIL VARIABLES

Soil Factors (P): Soil Lacking \_\_\_\_\_ Histosol:Fibric \_\_\_\_\_ Histosol:Hemic \_\_\_\_\_ Histosol:Sapric \_\_\_\_\_  
 Mineral: Gravelly \_\_\_\_\_ Mineral: Sandy \_\_\_\_\_ Mineral: Silty ☒ Mineral: Clayey \_\_\_\_\_

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet ☒ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No  
 Outlet \_\_\_\_\_ Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial  
 Inlet/Intermittent Outlet \_\_\_\_\_ Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated ☒  
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

Evidence of Sedimentation (P): No Evidence Observed ☒ Sediment Observed on Wetland Substrate \_\_\_\_\_ Fluvial/Quaternary Soils Sediment  
 Created \_\_\_\_\_

Microrelief of Wetland Surface (P): Absent \_\_\_\_\_ Poorly Developed (6in.) \_\_\_\_\_ Well Developed (6-18in.) ☒ Pronounced (>18in.) \_\_\_\_\_

Frequency of Overbank Flooding (P): No Overbank Flooding ☒ Return Interval 1-2 yrs \_\_\_\_\_ Return Interval 2-5 yrs \_\_\_\_\_  
 Return Interval >5 yrs \_\_\_\_\_

Degree of Outlet Restriction (P): No Outflow ☒ Restricted Outflow \_\_\_\_\_ Unrestricted Outflow \_\_\_\_\_

Water pH (P): No surface water \_\_\_\_\_ Circumneutral (5.5-7.4) \_\_\_\_\_ Alkaline (>7.4) \_\_\_\_\_ Acid (<5.5) ☒ pH Reading 5.3

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits \_\_\_\_\_ Low Permeability Stratified Deposits ☒  
 Glacial Till/Not Permeable \_\_\_\_\_

Basin Topographic Gradient (M): Low Gradient (<2%) \_\_\_\_\_ High Gradient (≥2%) ☒

Evidence of Seeps and Springs (P): No Seeps or Springs ☒ Seeps Observed \_\_\_\_\_ Intermittent Spring \_\_\_\_\_ Perennial Spring \_\_\_\_\_

## LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated \_\_\_\_\_ Wetlands within 400m, Not Connected \_\_\_\_\_ Only Connected Below ☒  
 Only Connected Above \_\_\_\_\_ Connected Upstream & Downstream \_\_\_\_\_ Unknown \_\_\_\_\_

Wetland Land Use: High Intensity (i.e., ag.) \_\_\_\_\_ Moderate Intensity (i.e., forestry) \_\_\_\_\_ Low Intensity (i.e. open space) ☒

Watershed Land Use: 0-5% Rural ☒ 5-25% Urbanized \_\_\_\_\_ 25-50% Urbanized \_\_\_\_\_ >50% Urbanized \_\_\_\_\_

Size: Small (<10 acres) \_\_\_\_\_ Medium (10-100 acres) ☒ Large (>100 acres) \_\_\_\_\_

Crew Chief QA/QC check:

Jessie Brownlee

GPS Technician QA/QC check:

KV



### Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1019 Field Target: 164 Date: 5.30.16

*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 5-30-16  
Signature / Date

**X** J. Browlee  
Field Crew Chief (print)

**X** Jessie Browlee 5.30.16  
Signature / Date



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____	Field Target: 163	Map #: 41	Map Date: 5.27.16
Date: 5-30-16	Project Name: Alaska LNG	Feature Id: W106T1020	
Investigators: Jessie Brannlee, Kaley Volper	Team No.: W106		
State: Alaska	Region: Alaska	Milepost: 755.9	
Latitude: 61° 14' 46.051" N	Longitude: 151° 7' 50.46" W	Datum: WGS84	
Logbook No.:	Logbook Page No.: 181	Picture No.: P106T1020-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): 5-8	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: U	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 <input checked="" type="checkbox"/> , or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PFO1/4B-1
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Viereck): 1C2.11 B2

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

Marginal/transitional zone, transitioning to wet slightly here and down slope. a few small pockets of wet spots were mapped on transition from road along transect - see map for updates

This point to

Gravel/construction site

wet

wet

W106T1020

Marginal

Wetland to SE

PFO1/EM16

upland

1C2.11 C2

PFO1/4B

1C2.11 B2



# WETLAND DETERMINATION DATA FORM

W106T1020

VEGETATION (use scientific names of plants)				
<u>Tree Stratum</u> (Plot sizes: <u>100'</u> )		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Betula neolaskana</i>	18	Y	FAC
2.	<i>Picea glauca</i>	3		FACU
3.	<i>Alnus incana tenuifolia</i>	5		FAC
4.				
Total Cover: <u>26</u>				
50% of total cover: <u>13</u>		20% of total cover: _____		
<u>Sapling/Shrub Stratum</u> ( <u>26'</u> )		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Alnus incana</i> var. <i>tenuifolia</i>	20	Y	FAC
2.	<i>Betula neolaskana</i>	4		FAC
3.	<i>Rosa acicularis</i>	2		FACU
4.	<i>Viburnum edule</i>	5		FACU
5.	<i>Ribes triste</i>	2		FAC
6.				
7.				
8.				
9.				
Total Cover: <u>33</u>				
50% of total cover: <u>16.5</u>		20% of total cover: <u>6.6</u>		

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 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: 100 X 3 = 300

FACU species: 46 X 4 = 184

UPL species: 0 X 5 = 0

Column Totals: 146 (A) 484 (B)

PI = B/A = 3.3

VEGETATION (use scientific names of plants)				
<u>Herb Stratum</u> ( <u>26'</u> )		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	<i>Equisetum arvense</i>	20	Y	FAC
2.	<i>Calamagrostis canadensis</i>	30	Y	FAC
3.	<i>Dryopteris expansa</i>	30	Y	FACU
4.	<i>Cornus canadensis</i>	2		FACU
5.	<i>Trientalis europaea</i>	4		FACU
6.	<i>Violet</i> sp	3		—
7.	<i>Equisetum sylvaticum</i>	1		FAC
8.	<i>Streptopus amplexifolius</i>	1		FACU
9.				
10.				
Total Cover: <u>90</u>				
50% of total cover: <u>45</u>		20% of total cover: <u>18</u>		

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

5 % Bare Ground

1 % Cover of Wetland Bryophytes

3 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

W106T1020

5.30.16

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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
Oe 0-3								Leaf litter + sand throughout
A 3-6	10YR 2/2	100						Mucky fine sandy loam possibly Andic
Bw1 6-12	10YR 3/2	90	5YR 2.5/2	5	con	m RC	Silt loam	con on primary interface w/ A horizon
			5YR 3/4	5	con	m RC		
Bw2 12-18	10YR 4/2	95	7.5YR 4/4	5	con	m RC	Silt loam	
Bw3 18-24	2.5Y 4/2	92	7.5YR 4/6	8	con	RC M	Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) <sup>4</sup> <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>Marginal Yes see note</u>	

<sup>3</sup>One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

<sup>4</sup>Give details of color change in Notes.

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

Hydric Soil Present (Y/N): Y

Notes: Silt loam fairly dense. Positive ~~XX~~ very faint in Bw1 horizon. Consulted w/ Bryan Strong who guided me saying faint ~~XX~~ is still positive if it's immediate reaction, which it was

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>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>Marginal see soil note</u>	Microtopographic Relief (D4) <u>N</u>
Sediment Deposits (B2) <u>N</u>	Hydrogen Sulfide Odor (C1) <u>N</u>	Salt Deposits (C5) <u>N</u>	FAC-Neutral Test (D5) <u>N</u>
Drift Deposits (B3) <u>N</u>	Dry-Season Water Table (C2) <u>XX 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>20</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>9-15" see note</u>	
		EC: <u>40</u> pH <u>5.5</u>

Notes: Woody debris @ 9" with soil saturation at point of contact and below. Other parts of pit saturation starts @ closer to 15"



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1020

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>30</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>40</u> Moss-Lichen <u>0</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even <u>X</u>
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____	
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____	
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open <u>X</u> Small Scattered Patches <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 <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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.5</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 _____ 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: W106T1020

Field Target: 163

Date: 5-30-16

*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

5-31-16

X Jesse Brownlee

Field Crew Chief (print)

X

Signature / Date

5-31-16

# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 176	Map #: 128 Map Date: 5-20
Date: 5-30-16	Project Name: Alaska LNG		Feature Id: W106T1021
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 750.6	
Latitude: 61° 18' 38.23" N		Longitude: 151° 1' 39.88" W	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 18	Picture No.: P-W106T1021-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet Ecoregion	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 5-8	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: PFO1/4B	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 <input checked="" type="checkbox"/> 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.

Surrounding area is very wet. This is a small, marginal upland in otherwise wet forest. This site is marginal w/ wetlands up & down slope & connectivity between the two on either side of this upland inclusion.

Site revisit recommend. Due to the slope change I believe water drops just low enough in profile to keep site from making hydric soil & question whether site reduces at all given slope & well drained soil @ 16" & down

up starting right before FT 176



# WETLAND DETERMINATION DATA FORM

W106T1021

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Alnus incana tenuifolia</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>
2. <u>Betula nealaskana</u>	<u>15</u>		<u>FAC</u>
3. <u>Picea glauca</u>	<u>5</u>		<u>FACU</u>
4.			

Total Cover: 45

50% of total cover: 22.5 20% of total cover: 9

Sapling/Shrub Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Alnus incana tenuifolia</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>
2. <u>Ribes triste</u>	<u>10</u>		<u>FAC</u>
3. <u>Oplepanax harridus</u>	<u>7</u>		<u>FACU</u>
4. <u>Rosa acicularis</u>	<u>4</u>		<u>FACU</u>
5. <u>Picea glauca</u>	<u>7</u>		<u>FACU</u>
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: 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: 0 Multiply by:

OBL species: 0 X 1 = 0

FACW species: 0 X 2 = 0

FAC species: 138 X 3 = 414

FACU species: 44 X 4 = 176

UPL species: 0 X 5 = 0

Column Totals: 182 (A) 590 (B)

PI = B/A = 3.24

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Calamagrostis canadensis</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>
2. <u>Equisetum arvense</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>
3. <u>Equisetum sylvaticum</u>	<u>8</u>		<u>FACU</u>
4. <u>Trientalis europaea</u>	<u>6</u>		<u>FACU</u>
5. <u>Dryopteris expansa</u>	<u>15</u>		<u>FACU</u>
6.			
7.			
8.			
9.			
10.			

Total Cover: 79

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

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup> 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

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



## WETLAND DETERMINATION DATA FORM

W106T1021

5-30-16

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 <sup>1</sup>	Loc <sup>2</sup>		
0: 0-4								Dry organics
A 4-6	10YR 2/2	100					Sandy loam	
Bw1 6-16	10YR 3/2	85	5YR 3/3	5	con	RC	Silt loam	Aridic properties also core due
Bw2 16-24	10YR 4/2	80	5YR 2.5/2	20	con	RC M	Sandy loam	focused at interface between Bw1 & Bw2 also 15% Rock
								Fragile
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>—</u> Depth (inches): <u>—</u>								
Hydric Soil Present (Y/N): <u>N</u>								
Notes: <u>neg OX in upper 12" of 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>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>X</u>		
Drift Deposits (B3) <u>N</u>		Dry-Season Water Table (C2) <u>X</u> <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>X</u> <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>16</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>14</u>		EC: <u>46</u> pH <u>5.7</u>				
Notes:								



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1021

## VEGETATION VARIABLES

P = Plot, M = Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved \_\_\_\_\_  
 Forested-Evergreen-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Broad-leaved \_\_\_\_\_  
 Scrub Shrub-Evergreen-Broad-leaved \_\_\_\_\_ Scrub Shrub-Evergreen-Needle-leaved \_\_\_\_\_ Emergent-Non-persistent \_\_\_\_\_ Emergent-  
 Persistent \_\_\_\_\_ Aquatic Bed \_\_\_\_\_

Percent Cover (P): Tree (>5 dbh, >6m tall) \_\_\_\_\_ Sapling (<5 dbh, <6m tall) \_\_\_\_\_ Tall shrub (2-6m) \_\_\_\_\_ Short shrub (0.5-2m) \_\_\_\_\_  
 Dwarf shrub (<0.5m) \_\_\_\_\_ Tall herb (≥1m) \_\_\_\_\_ Short herb (<1m) \_\_\_\_\_ Moss-Lichen \_\_\_\_\_ Floating \_\_\_\_\_ Submerged \_\_\_\_\_

Number of Wetland Types (M): \_\_\_\_\_ Evenness of Wetland Type Distribution (M): Even \_\_\_\_\_ Highly Uneven \_\_\_\_\_ Moderately even \_\_\_\_\_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water \_\_\_\_\_ <25% Scattered/Peripheral Cover \_\_\_\_\_ 26-75% Scattered or  
 Peripheral Cover \_\_\_\_\_ >75% Scattered or Peripheral Cover \_\_\_\_\_ N/A \_\_\_\_\_

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

Presence of Islands (M): Absent (none) \_\_\_\_\_ One or Few \_\_\_\_\_ Several to Many \_\_\_\_\_ N/A \_\_\_\_\_

Cover Distribution of Dominant Layer (P): No Veg. \_\_\_\_\_ Solitary, Scattered Stems \_\_\_\_\_ 1 or More Large Patches; Parts of Site  
 Open \_\_\_\_\_ Small Scattered Patches \_\_\_\_\_ Continuous Cover \_\_\_\_\_

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

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

HGM Class (P): Slope \_\_\_\_\_ Flat \_\_\_\_\_ Lacustrine Fringe \_\_\_\_\_ Depressional \_\_\_\_\_ Riverine \_\_\_\_\_ Estuarine Fringe \_\_\_\_\_

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet \_\_\_\_\_ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No  
 Outlet \_\_\_\_\_ Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial  
 Inlet/Intermittent Outlet \_\_\_\_\_ Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated \_\_\_\_\_  
 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

Evidence of Sedimentation (P): No Evidence Observed \_\_\_\_\_ Sediment Observed on Wetland Substrate \_\_\_\_\_ Fluvial/Quaternary Soils Sediment  
 Created \_\_\_\_\_

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

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

Degree of Outlet Restriction (P): No Outflow \_\_\_\_\_ Restricted Outflow \_\_\_\_\_ Unrestricted Outflow \_\_\_\_\_

Water pH (P): No surface water \_\_\_\_\_ Circumneutral (5.5-7.4) \_\_\_\_\_ Alkaline (>7.4) \_\_\_\_\_ Acid (<5.5) \_\_\_\_\_ pH Reading \_\_\_\_\_

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

Basin Topographic Gradient (M): Low Gradient (<2%) \_\_\_\_\_ High Gradient (≥2%) \_\_\_\_\_

Evidence of Seeps and Springs (P): No Seeps or Springs \_\_\_\_\_ Seeps Observed \_\_\_\_\_ Intermittent Spring \_\_\_\_\_ Perennial Spring \_\_\_\_\_

## LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated \_\_\_\_\_ Wetlands within 400m, Not Connected \_\_\_\_\_ Only Connected Below \_\_\_\_\_  
 Only Connected Above \_\_\_\_\_ Connected Upstream & Downstream \_\_\_\_\_ Unknown \_\_\_\_\_

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

Watershed Land Use: 0-5% Rural \_\_\_\_\_ 5-25% Urbanized \_\_\_\_\_ 25-50% Urbanized \_\_\_\_\_ >50% Urbanized \_\_\_\_\_

Size: Small (<10 acres) \_\_\_\_\_ Medium (10-100 acres) \_\_\_\_\_ Large (>100 acres) \_\_\_\_\_

Crew Chief QA/QC check:

Jessie 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: W106T1021 W106T1022 Field Target: 176 186 Date: 5-30-16 5-31-16

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

5-31-16

X

J Browlee

Field Crew Chief (print)

X

Jessie Browlee

Signature / Date

5-31-16



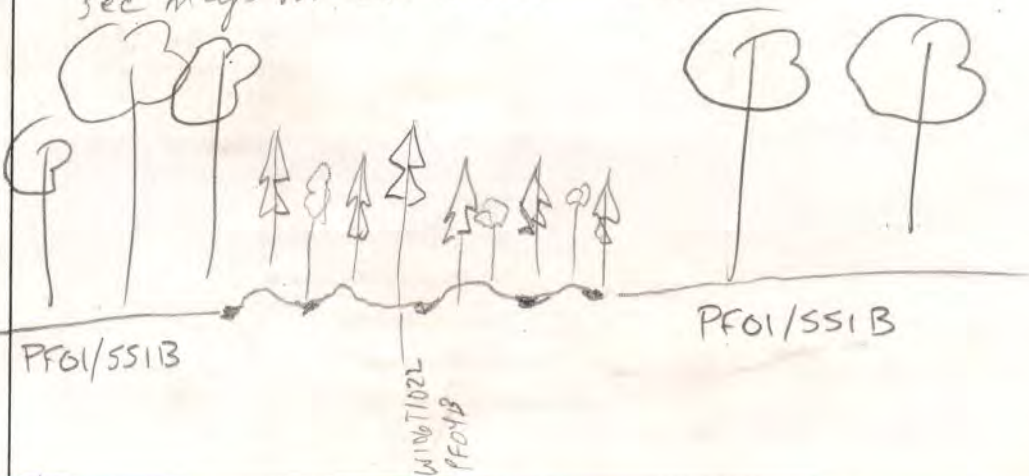
# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: <u>186</u>	Map #: <u>117</u> Map Date: <u>5.23</u>
Date: <u>5-31-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106T1022</u>
Investigators: <u>Jessie Brownlie, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>738.8</u>	
Latitude: <u>61° 23' 52.0714" N</u>	Longitude: <u>150° 44' 52.32" W</u>	Datum: WGS84	
Logbook No.: <u>1</u>	Logbook Page No.: <u>20</u>	Picture No.: <u>P-W10611 022-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</u>	Landform (hillslope, terrace, hummocks, etc.): <u>lowland</u>
Slope (%): <u>3-5</u>	Local relief (concave, convex, none): <u>Flat/hummocky</u>
Pre-mapped Alaska LNG/NWI classification: <u>PF04B</u>	Evidence of Wildlife Use: <u>moose tracks, bird songs, 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>PF04B + A2 + B2</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): <u>1A2, 11B2</u>

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

Tall mature Black spruce forest w/ Bet Neo understory & Ego syl  
Area shows many signs of hydrology w/ preferential growth on hummocks.  
Present in concave water stained depressions. Soil shows consistent saturation  
- from 17" down, w/ water table likely to rise to 15" @ time of visit.  
see maps for additional info.





# WETLAND DETERMINATION DATA FORM

W106T1022

## 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>	45	Y	FACW
2. <i>Betula neolascana</i>	10		FAC
3.			
4.			
Total Cover: <u>55</u> 50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>			
Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	3		FAC
2. <i>Menisperm ferruginea</i>	10	Y	FACW
3. <i>Ribes triste</i>	3		FAC
4. <i>Spirea stevenii</i>	T		
5. <i>Betula neolascana</i>	15	Y	FAC
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>			

### 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: 49 X 2 = 98  
FAC species: 73 X 3 = 219  
FACU species: 18 X 4 = 72  
UPL species: 0 X 5 = 0  
Column Totals: 140 (A) 389 (B)  
PI = B/A = 2.7

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	4		FACU
2. <i>Equisetum sylvaticum</i>	40	Y	FAC
3. <i>Monarda sp.</i>	4		FACU
4. <i>Rubus chamaemorus</i>	4		FACW
5. <i>Sparganium angustifolium</i>	T		FACU
6. <i>Neottia sp.</i>	T		
7. <i>Equisetum arvense</i>	T		FAC
8. <i>Calamagrostis canadensis</i>	2		FAC
9. <i>Fern sp.</i>	T		
10. <i>Goodyera repens</i>	T		FAC
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%  
Y Prevalence Index is ≤ 3.0  
— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)  
— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)  
<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

3 % Bare Ground  
15 % Cover of Wetland Bryophytes  
80 Total Cover of Bryophytes  
0 % Cover of Water  
Hydrophytic Vegetation Present (Y/N): Y  
Notes: (If observed, list morphological adaptations below):



## WETLAND DETERMINATION DATA FORM

W106T1022

5-31-14

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		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
	Color (moist)	%	Color (moist)	%				
0-6								
A 6-10	10YR 2/2	100					mucky loam	Damp organics
Bwl 10-17	10YR 3/2	100	7.5YR 3/3	8	con	RC M	silt loam	High in organics
Bg 17-24	10Y 3/1	95	10YR 5/4	5	con	M RC	coarse sandy loam	Dense

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

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

<sup>3</sup>One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

<sup>4</sup>Give details of color change in Notes.

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

Hydric Soil Present (Y/N): Y

Notes: Positive XX starting @ 10" from surface & throughout  
A 10 mucky modifier

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>M</u> see note	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>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>N</u>	Shallow Aquitard (D3) <u>N</u>
Water Marks (B1) <u>N</u>	Marl Deposits (B15) <u>N</u>	Presence of Reduced Iron (C4) <u>Y</u>	Microtopographic Relief (D4) <u>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>XY</u>	Notes: Low spots have very saturated organic surface horizon.	
Algal Mat or Crust (B4) <u>N</u>	Other (Explain in Notes):		
Iron Deposits (B5) <u>N</u>			

Surface Water Present (Y/N): <u>M</u>	Depth (in):	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>XY</u>	Depth (in): <u>15-17</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>15</u>	EC: <u>110</u> <u>5.38 pH</u>

Notes: Seeping, saturation @ 15". expect water table to rise to 17" @ least if not 15"



# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved <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>65</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>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>20</u> Moss-Lichen <u>5</u> Floating <u>0</u> Submerged <u>0</u>		
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven <u>X</u> Moderately even _____	
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ 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.) _____ 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>5.38</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: KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1023

Field Target: 186

Date: 5.31.16

*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 5-31-16  
Signature / Date

**X** J Broulee  
Field Crew Chief (print)

**X** Jessie Broulee 5-31-16  
Signature / Date



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____	Field Target: 187	Map #: 116	Map Date: 5-23
Date: 5-31-16	Project Name: Alaska LNG	Feature Id: W106T1023	
Investigators: Jessie Brownlee, Kaley Volper		Team No.: W106	
State: Alaska	Region: Alaska	Milepost: 737.9	
Latitude: 61° 24' 26.05" N	Longitude: 150° 43' 53.65" W	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 20	Picture No.: P-W106T1023-001 thru 004	

SITE PARAMETERS	
Subregion: Cook Inlet	Landform (hillslope, terrace, hummocks, etc.): Hillside / rise slope to mt substrate
Slope (%): 5-8	Local relief (concave, convex, none): Flat, hummocky from Ferns
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: moose pellets
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes.)
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	Wetland Type: PEM1/SS1B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11B2, 11A2

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

Transition zone from upland up slope to sampling feature down slope.  
Soil shows repeated/continuous saturat water table fluctuation from 17" down  
# as is evident by band of concentrations and depleted sand underneath  
Mapping notes: the stream to the NW of FT is not always drawn in correctly  
use contours to better trace it in.  
Also it jets off to East of upper wet knob under LZ. upper knob is  
Not wet



See map

FT167



# WETLAND DETERMINATION DATA FORM

W106T1023

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Alnus incana tenuifolia</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>
2. <u>Betula neolascana</u>	<u>T</u>		<u>FAC</u>
3. <u>Picea glauca</u>	<u>T</u>		<u>FACU</u>
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. <u>Rosa acicularis</u>	<u>5</u>		<u>FACU</u>
2. <u>Alnus incana tenuifolia</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>
3. <u>Viburnum edule</u>	<u>4</u>		<u>FACU</u>
4. <u>Ribes triste</u>	<u>3</u>		<u>FAC</u>
5. <u>Rubus idaeus</u>	<u>1</u>		<u>FACU</u>
6.			
7.			
8.			
9.			

Total Cover: 28

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

## 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: 1 X 2 = 2

FAC species: 91 X 3 = 273

FACU species: 48 X 4 = 192

UPL species: 0 X 5 = 0

Column Totals: 140 (A) 467 (B)

PI = B/A = 3.3

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Calamagrostis canadensis</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>
2. <u>Dryopteris expansa</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>
3. <u>Equisetum arvense</u>	<u>15</u>		<u>FAC</u>
4. <u>Equisetum sylvaticum</u>	<u>3</u>		<u>FAC</u>
5. <u>Streptopus amplexifolius</u>	<u>1</u>		<u>FACU</u>
6. <u>Bedstraw sp</u>	<u>T</u>		<u>-</u>
7. <u>Trientalis europaea</u>	<u>2</u>		<u>FACU</u>
8. <u>Angelica sp</u>	<u>1</u>		<u>-</u>
9. <u>Gymnocarpium dryopteris</u>	<u>5</u>		<u>FACU</u>
10. <u>Equisetum pratense</u>	<u>1</u>		<u>FACW</u>

Total Cover: 103

50% of total cover: 51.5 20% of total cover: 20.6

Anthriscum cylindricum FAC Y 25  
Heracleum maximum FACU T

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

2 % Bare Ground

0 % Cover of Wetland Bryophytes

5 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



# WETLAND DETERMINATION DATA FORM

W106T1023

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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
De 0-4								Damp (slightly) organics
A 4-7	Black	100					loam	high organic content
Bw 7-12	10YR 4/2	85	5YR 3/3	7.5YR 4/6	15 C	RC M	silt/loam	5' Buried Mucky Dark @ 8" in Bw. Conc. are in a band a bit from surface. In fact, horizon on 15' band of concentration. Between sand & silt loam
Bw2 12-13	5YR 3/3	100					VF Sa Loam	
C1 13-17	10YR 4/3	100					loamy coarse sand	
C2 17-19	7.5YR 3/6	100					coarse sand	Band of conc. on circling pit
C3 19-24	10Y 3/	100					" "	Depleted sand & woody debris
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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 A10</u>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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: <u>Negative xx throughout profile. woody debris throughout</u> <u>A10 Muck</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>1 marginal M2's spot</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>XY</u>		Notes:				
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes):						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>N</u>		Depth (in): <u>2</u>		Wetland Hydrology Present (Y/N): <u>Y</u>				
Water Table Present (Y/N): <u>Y</u>		Depth (in): <u>expected to rise to 14" @ location of seeping</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>		Depth (in): <u>12</u>						
EC: <u>660</u>				<u>5.8</u>				
Notes: <u>pit pictures were taken after all the water was scooped out in order to show the bands of concentrations &amp; depleted sand underneath.</u>								



# AQUATIC SITE ASSESSMENT DATA FORM

W106T1023

<b>VEGETATION VARIABLES</b> P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <input checked="" type="checkbox"/> Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>1</u> Sapling (<5 dbh, <6m tall) <u>25</u> Tall shrub (2-6m) <u>02</u> Short shrub (0.5-2m) <u>8</u> Dwarf shrub (<0.5m) <u>0</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>05</u> Moss-Lichen <u>1</u> Floating <u>0</u> Submerged <u>0</u>	
Number of Wetland Types (M): <u>2</u>	Evenness of Wetland Type Distribution (M): Even <input checked="" type="checkbox"/> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <input checked="" type="checkbox"/>	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <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 _____	

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

<b>HYDROLOGIC VARIABLES</b>	
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>5.8</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%) _____ 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 _____	

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

Crew Chief QA/QC check:

Jessie Brancee

GPS Technician QA/QC check:

KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1023

Field Target: 187

Date: 5-31-16

*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 Volker X Kaley Volker 5-31-16  
Wetland Scientist (print) Signature / Date

X J Brownlee X Jessie Brownlee 5.31.16  
Field Crew Chief (print) 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>169</u>	Map #: <u>139</u> Map Date: <u>6-20</u>
Date: <u>0-1-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106T1024</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>750</u>	
Latitude: <u>61° 16' 12.58" N</u>	Longitude: <u>150° 52' 37.3983" W</u>	Datum: WGS84	
Logbook No.: <u>1</u>	Logbook Page No.: <u>21</u>	Picture No.: <u>P-W106T1024-001 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>U</u>	Evidence of Wildlife Use: <u>Moose browse, droppings</u>
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (if no, explain in Notes.)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: <u>1C2, 11C2</u> <u>U</u>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	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.

Mature tall (50-~~80~~<sup>100</sup>') mixed forest of Bet Neo & Pic 60a with saplings of each and Vib Eds, Fern, and Cal Can understory. Many downed trees.  
Dry soil with signs of seasonal saturations as is evident by depleted pockets & concentrations but does not meet an indicator.

No signs of hydrology.





# WETLAND DETERMINATION DATA FORM

W106T1024

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: <u>100'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Betula nealaskana</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>
2. <u>Picea glauca</u>	<u>5</u>		<u>FACU</u>
3.			
4.			
Total Cover: <u>35</u>			
50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>			
Sapling/Shrub Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Betula nealaskana</u>	<u>7</u>		<u>FAC</u>
2. <u>Viburnum edule</u>	<u>25</u>	<u>Y</u>	<u>FACU</u>
3. <u>Rosa acicularis</u>	<u>8</u>		<u>FACU</u>
4. <u>Ribes triste</u>	<u>3</u>		<u>FAC</u>
5. <u>Oplapanax horridus</u>	<u>2</u>		<u>FACU</u>
6.			
7.			
8.			
9.			
Total Cover: <u>45</u>			
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>			

## Dominance Test worksheet:

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

## Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species: — X 1 = —  
 FACW species: — X 2 = —  
 FAC species: 87 X 3 = 261  
 FACU species: 63 X 4 = 252  
 UPL species: \_\_\_\_\_ X 5 = \_\_\_\_\_  
 Column Totals: 150 (A) 513 (B)  
 PI = B/A = 3.42

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <u>Calamagrostis canadensis</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>
2. <u>Equisetum sylvaticum</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>
3. <u>Equisetum arvense</u>	<u>10</u>		<u>FAC</u>
4. <u>Streptopus amplexifolius</u>	<u>1</u>		<u>FACU</u>
5. <u>Dryopteris expansa</u>	<u>15</u>	<u>Y</u>	<u>FACU</u>
6. <u>Trentalis europea</u>	<u>5</u>		<u>FACU</u>
7. <u>Cornus canadensis</u>	<u>2</u>		<u>FACU</u>
8. <u>Anthyrium cylindricum</u>	<u>2</u>		<u>FAC</u>
9.			
10.			
Total Cover: <u>70</u>			
50% of total cover: <u>35</u> 20% of total cover: <u>14</u>			

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%  
N Prevalence Index is ≤ 3.0  
— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)  
— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)  
<sup>1</sup> 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  
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



# WETLAND DETERMINATION DATA FORM

W106T1024

6.1.16

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 <sup>1</sup>	Loc <sup>2</sup>		
0' 0-1								
A 1-3	10YR 3/2	100					loam	Dry organics
Bw 3-7	10YR 4/2	100					Silt loam	
Bw 7-14	2.5Y 5/2	10	10YR 4/4	10	con	mat pc		
	10YR 4/3	60	10YR 2/2	20	mg/A	pockets		
Bw 2/4-20	2.5YR 5/2	70	10YR 3/6	20	con	mat pc	Silt loam	Dense
	10YR 4/3	10						
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS					INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>			
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>		Alaska Color Change (TA4) <sup>4</sup> <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>			
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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): <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

W106 T1024

## 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:

Jessie Branslee

KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1034 Field Target: 1165 Date: 6-1-16

*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)

Naley Valper

X

Signature / Date

Naley Valper 6-1-16

X

Field Crew Chief (print)

J. Brownlee

X

Signature / Date

Jessie Brownlee 6-1-16

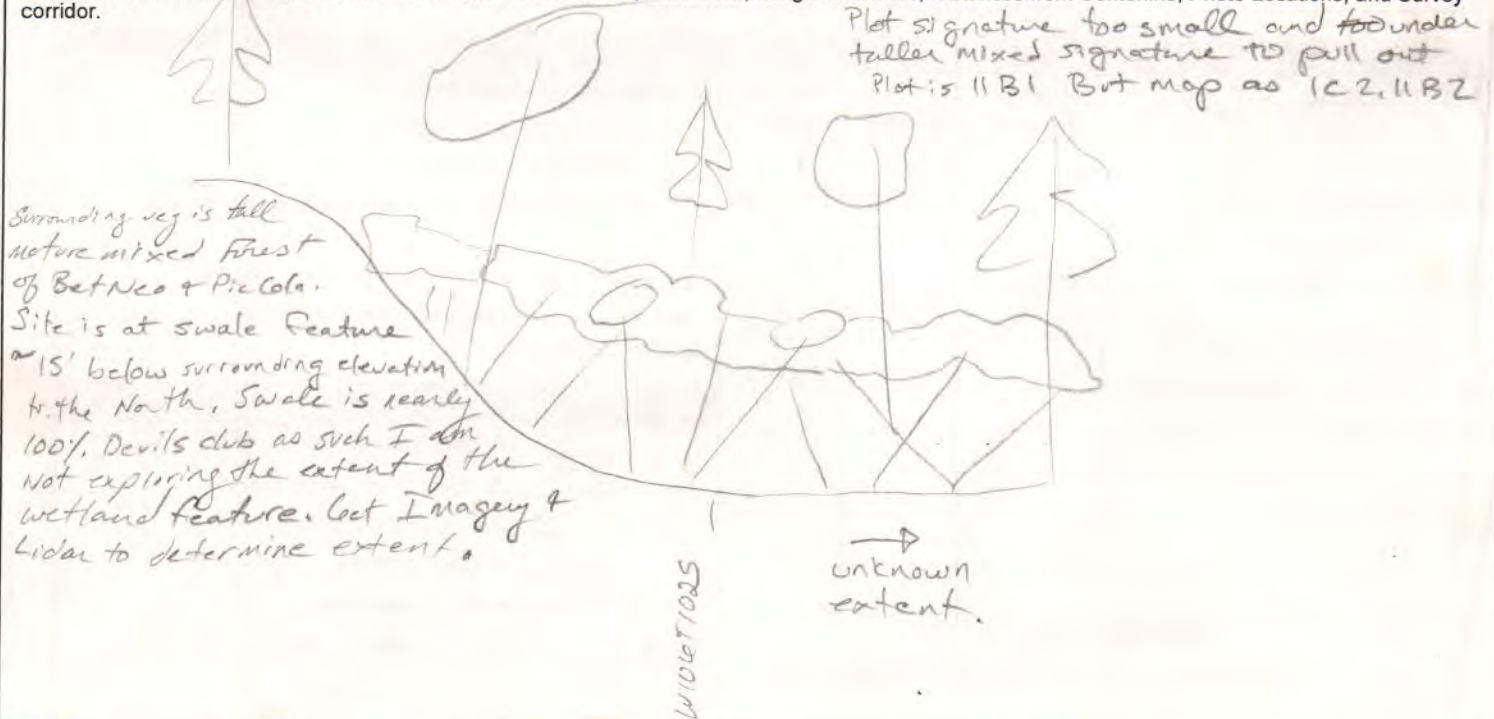


# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <u>167</u>	Map #: <u>137</u> Map Date: <u>5.20</u>	
Date: <u>6-1-16</u>	Project Name: <u>Alaska LNG</u>		Feature Id: <u>W106T1025</u>	
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>	
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>750.5</u>		
Latitude: <u>61° 16' 44.9435" N</u>		Longitude: <u>150° 52' 32.0219" W</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>1</u>	Logbook Page No.: <u>23</u>	Picture No.: <u>P-W106T1025-001 thru 004</u>		

SITE PARAMETERS	
Subregion: <u>Cook Inlet Basin</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>No animal in their right mind would come down here.</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>PFO1/4B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> 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.





# WETLAND DETERMINATION DATA FORM

W106T1025

VEGETATION (use scientific names of plants)			
Tree Stratum (Plot sizes: <u>100'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus incana tenuifolia</i>	45	Y	FAC
2. <i>Betula neealaskana</i>	35	Y	FAC
3. <i>Picea glauca</i>	1		FACU
4.			
Total Cover: <u>81</u>			
50% of total cover: <u>40.5</u> 20% of total cover: <u>16.2</u>			
Sapling/Shrub Stratum ( <u>250'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Alnus incana tenuifolia</i>	30	Y	FAC
2. <i>Oplopanax horridis</i>	85	Y	FACU
3. <i>Ribes triste</i>	6		FAC
4. <i>Viburnum edule</i>	8		FACU
5.			
6.			
7.			
8.			
9.			
Total Cover: <u>129</u>			
50% of total cover: <u>64.5</u> 20% of total cover: <u>25.8</u>			

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 6 (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: 122 X 3 = 366

FACU species: 117 X 4 = 468

UPL species: - X 5 = -

Column Totals: 254 (A) 864 (B)

PI = B/A = 3.40

VEGETATION (use scientific names of plants)			
Herb Stratum ( <u>250'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum p</i>	15	Y	FACW
2. <i>Equisetum sylvaticum</i>	5		FAC
3. <i>Gymnocarpium dryopteris</i>	8		FACU
4. <i>Dryopteris expansa</i>	10	Y	FACU
5. <i>Trientalis europaea</i>	5		FACU
6. <i>Calamagrostis canadensis</i>	1		FAC
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:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

5 % Bare Ground

3 % Cover of Wetland Bryophytes

113 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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



W108T1025

6.1.16

Page 3 of 4



# AQUATIC SITE ASSESSMENT DATA FORM

W10G11025

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved <u>X</u> Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved _____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) <u>55</u> Sapling (<5 dbh, <6m tall) <u>0</u> Tall shrub (2-6m) <u>45</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>0</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 <u>X</u> <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) <u>X</u> High (>25) _____		
Presence of Islands (M): Absent (none) <u>X</u> One or Few _____ Several to Many _____ N/A _____		
Cover Distribution of Dominant Layer (P): No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover <u>X</u>		
Dead Woody Material (P): Low Abundance (0-25% of surface) <u>X</u> Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
Vegetative Interspersion (P): Low (large patches, concentric rings) <u>X</u> Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
HGM Class (P): Slope <u>X</u> Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

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

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet <u>X</u> No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated <u>X</u> Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed <u>X</u> Sediment Observed on Wetland Substrate _____ Fluvuquent Soils Sediment Created _____	
Microrelief of Wetland Surface (P): Absent _____ Poorly Developed (6in.) <u>X</u> Well Developed (6-18in.) _____ Pronounced (>18in.) _____	
Frequency of Overbank Flooding (P): No Overbank Flooding <u>X</u> Return Interval 1-2 yrs _____ Return Interval 2-5 yrs _____ Return Interval >5 yrs _____	
Degree of Outlet Restriction (P): No Outflow <u>X</u> Restricted Outflow _____ Unrestricted Outflow _____	
Water pH (P): No surface water _____ Circumneutral (5.5-7.4) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.96</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) _____ Large (>100 acres) _____	

Crew Chief QA/QC check:

GPS Technician QA/QC check: KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1025

Field Target: 167

Date: 6.1.16

*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 Valper X Kaley Valper 6-1-15  
Wetland Scientist (print) Signature / Date

X J. Brumlee X Jessie Brumlee 6-1-15  
Field Crew Chief (print) Signature / Date



# WETLAND DETERMINATION DATA FORM

<b>SITE DESCRIPTION</b>			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input checked="" type="checkbox"/> Other (explain) _____		Field Target: <del>108</del> <sup>172</sup>	Map #: 132 Map Date: 5.20
Date: 6-2-16	Project Name: Alaska LNG		Feature Id: W106T1026
Investigators: Jessie Brownlee, Kaley Volter			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 750 ish	
Latitude: 61.29702		Longitude: -150.94168	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 27	Picture No.: P-W106T1026-001 thru 004	

<b>SITE PARAMETERS</b>	
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: U: 1C1	Evidence of Wildlife Use: Browse Moose
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No _____ (if no, explain in Notes)	
Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No _____ (If no, explain in Notes.)	
Are Vegetation _____, Soil _____, or Hydrology _____ Significantly Disturbed? No <input checked="" type="checkbox"/> (If yes, explain in Notes)	
Are Vegetation _____, Soil _____, or Hydrology _____ Naturally Problematic? No <input checked="" type="checkbox"/> (If yes, explain in Notes.)	
<b>SUMMARY OF FINDINGS</b>	
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): 1C1, III A2

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

Tall Mature Mixed forest w/ Bet Nut & Pic Cola w/ thick understory of ferns.  
 FT. in along road, ~ 30' away. Soil is dry typical forest soil w/ E Bhs  
 Soil. No signs of hydrology. Across street was a man made dug out.  
 Appears an excavator dug a hole that is full of water. unsure how far extent of past  
 human disturbance extends to on other side of road



# WETLAND DETERMINATION DATA FORM

W106T1024

VEGETATION (use scientific names of plants)			
<b>Tree Stratum</b> (Plot sizes: <u>100</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula Neolabiana</i>	35	Y	FAC
2. <i>Picea Canadensis</i>	35	Y	FACU
3.			
4.			
Total Cover: <u>70</u> 50% of total cover: <u>35</u> 20% of total cover: <u>14</u>			
<b>Sapling/Shrub Stratum</b> ( <u>24</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Rosa acicularis</i>	8	Y	FACU
2. <i>Viburnum edule</i>	5		FACU
3. <i>Linnaea borealis</i>	1		FACU
4. <i>Salix hebbiana</i>	6		FAC
5. <i>Betula neolabiana</i>	20	Y	FAC
6.			
7.			
8.			
9.			
Total Cover: <u>39</u> 50% of total cover: <u>19.5</u> 20% of total cover: <u>7.8</u>			

**Dominance Test worksheet:**  
 No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)  
 Total Number of Dominant Species Across All Strata: 5 (B)  
 % Dominant Species that are OBL, FACW, or FAC: 40 (A/B)

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species: - X 1 = -  
 FACW species: 8 X 2 = 16  
 FAC species: 102 X 3 = 186  
 FACU species: 124 X 4 = 496  
 UPL species: - X 5 = -  
 Column Totals: 194 (A) 698 (B)  
 PI = B/A = 3.59

VEGETATION (use scientific names of plants)			
<b>Herb Stratum</b> ( <u>24</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Gymnocarpium dryopteris</i>	70	Y	FACU
2. <i>Chamaenerion angustifolium</i>	3		FACU
3. <i>Equisetum pratense</i>	8		FACW
4. <i>Calamagrostis canadensis</i>	1		FAC
5. <i>Sagittaria sp</i>	1		-
6. <i>Cornus canadensis</i>	3		FACU
7. <i>Sparganium angustifolium</i>	1		FACU
8. <i>Rubus pedatus</i>	1		FAC
9. <i>Mertensia paniculata</i>	1		FACU
10.			
Total Cover: <u>84</u> 50% of total cover: <u>42</u> 20% of total cover: <u>16.8</u>			

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

% Bare Ground: 0  
 % Cover of Wetland Bryophytes: 0  
 Total Cover of Bryophytes: 15  
 % Cover of Water: 0  
 Hydrophytic Vegetation Present (Y/N): N  
 Notes: (If observed, list morphological adaptations below):



# WETLAND DETERMINATION DATA FORM

W10671026

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 <sup>1</sup>		
O <sub>i</sub> 0-2							Dry organics
A 2-3						loam	
E 3-6	10YR 5/2	30					Silt loam
B <sub>hs</sub> 6-9	10YR 5/1	30					
B <sub>w1</sub> 9-18	10YR 3/3	95	7.5YR 3/4	5	con	RC M	Silt loam
B <sub>w2</sub> 18-24	10YR 3/4	90	5YR 3/4	10	con	RC M	Silt loam
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.							
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>	
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> Give details of color change in Notes.							
Restrictive Layer (if present): Type: <u>—</u> Depth (inches): <u>—</u>							
Hydric Soil Present (Y/N): <u>N</u>							
Notes: <u>All horizons have wavy, discontinuous boundaries with packets of each distributed at depth regardless of horizon. All horizons showed properties of Andic material.</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>—</u>	
Drift Deposits (B3) <u>N</u>		Dry-Season Water Table (C2) <u>N</u>		Notes:			
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes):					
Iron Deposits (B5) <u>N</u>							
Surface Water Present (Y/N): <u>N</u>		Depth (in): <u>—</u>		Wetland Hydrology Present (Y/N): <u>N</u>			
Water Table Present (Y/N): <u>N</u>		Depth (in): <u>—</u>					
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>—</u>		EC: <u>—</u>			
Notes:							



## AQUATIC SITE ASSESSMENT DATA FORM

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

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

HYDROLOGIC VARIABLES	
Inlet/Outlet Class (P): No Inlet/Outlet _____ No Inlet/Intermittent Outlet _____ No Inlet/Perennial Outlet _____ Intermittent Inlet/No Outlet _____ Intermittent Inlet/Intermittent Outlet _____ Intermittent Inlet/Perennial Outlet _____ Perennial Inlet/No Outlet _____ Perennial Inlet/Intermittent Outlet _____ Perennial Inlet/Perennial Outlet _____	
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated _____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____	
Evidence of Sedimentation (P): No Evidence Observed _____ Sediment Observed on Wetland Substrate _____ 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

Jesse Brown



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1026

Field Target: 172

Date: 6.2.16

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

### 1. Site Description

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

### 2. Vegetation

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

### 3. Soil

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

### 4. Hydrology

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

### 5. Functions and Values

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

### 6. Field Logbook

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

### 7. Maps

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

### 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 Kately Volper  
Wetland Scientist (print)

X Kately Volper 6-3-16  
Signature / Date

X J. Brantley  
Field Crew Chief (print)

X Jessie Brantley 6-2-16  
Signature / Date



# WETLAND DETERMINATION DATA FORM

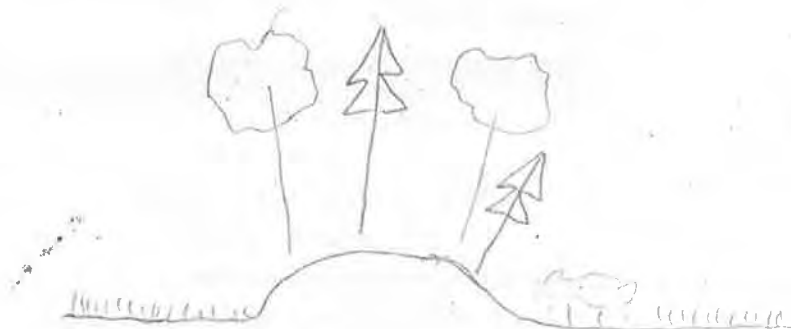
→ New Wasilla 2

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <input checked="" type="checkbox"/>
Field Target:		Map #: 18 Map Date: 7.15.16	
Date: 7.28.16	Project Name: Alaska LNG		Feature Id: W10GT1027
Investigators: Jessie Brownlee Kim Holmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 725.9	
Latitude: 61.5431		Longitude: -150.56031	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 41	Picture No.: P-W10GT1027-001 thro -004	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Mound
Slope (%): 3-5	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: Not pre mapped	Evidence of Wildlife Use: Moose browse
Are climatic/hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No (if no explain in Notes)	Are "Normal Circumstances" present: Yes <input checked="" type="checkbox"/> No (If no, explain in Notes.)
Are Vegetation, Soil, or Hydrology Significantly Disturbed?	No <input checked="" type="checkbox"/> (If yes, explain in Notes)
Are Vegetation, Soil, or Hydrology Naturally Problematic?	No <input checked="" type="checkbox"/> (If yes, explain in Notes.)
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	Wetland Type: U
Wetland Hydrology Present? Yes No <input checked="" type="checkbox"/>	Alaska Vegetation Classification (Vioreck): 1C2.11.B2

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

Mature Pic Cola, Bet Neo Open Forest. with tall shrubs of Rose > 5" tall & alder understory. Diverse forb community of ferns & Ego Arv. Site is a Dry sandy mound surrounded by wetlands.



# WETLAND DETERMINATION DATA FORM

W106T1027

## 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>	30	Y	FACU
2. <i>Betula neolaskana</i>	15	Y	FACU
3. <i>Populus balsamifera</i>	3		FACU
4.			
Total Cover: <u>48</u>			
50% of total cover: <u>24</u> 20% of total cover: <u>9.6</u>			
Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Viburnum edule</i>	12		FACU
2. <i>Rosa acicularis</i>	45	Y	FACU
3. <i>Alnus incana tenuifolia</i>	10		FAC
4. <i>Rubus idaeus</i>	3		FACU
5. <i>Ribes triste</i>	4		FAC
6. <i>Oplopanax horridus</i>	2		FACU
7.			
8.			
9.			
Total Cover: <u>76</u>			
50% of total cover: <u>38</u> 20% of total cover: <u>15.2</u>			

## Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)  
 Total Number of Dominant Species Across All Strata: 5 (B)  
 % Dominant Species that are OBL, FACW, or FAC: 40 (A/B)

## Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species: \_\_\_\_\_ X 1 = \_\_\_\_\_  
 FACW species: 1 X 2 = 2  
 FAC species: 22 X 3 = 66  
 FACU species: 114 X 4 = 456  
 UPL species: \_\_\_\_\_ X 5 = \_\_\_\_\_  
 Column Totals: 137 (A) 524 (B)  
 PI = B/A = 3.82

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Tridentalis europaea</i>	T		FACU
2. <i>Equisetum pratense</i>	1		FACU
3. <i>Equisetum Arvense</i>	5	Y	FAC
4. <i>Galium boreale</i>	T		FACU
5. <i>Streptopus amplexifolius</i>	1		FACU
6. <i>Mertensia paniculata</i>	2		FACU
7. <i>Calamagrostis canadensis</i>	3	Y	FAC
8. <i>Sida pyralis</i> sp	T		
9. <i>Cornus canadensis</i>	1		FACU
10.			
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 Adaptations<sup>1</sup> (Provide supporting data in Notes)  
- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)  
<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

20 % Bare Ground leaf Litter  
0 % Cover of Wetland Bryophytes  
30 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

W106T1027

7.28.16

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 <sup>1</sup>	Loc <sup>2</sup>		
0-2								
2-4								
A 4-5	10YR 2/2	100					Loam	
Bw 5-8	2.5Y 4/1	85	10YR 4/2	15	Con	M RC	Silt loam	Band of concentration of interface with A horizon. Band of 10YR 3/1 below A
Ab 8-9	10YR 3/1	100					Loam	
C1 9-14	2.5Y 4/3	100					Fine sand	
C2 14-24	2.5Y 4/1	100					Fine sand	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS							INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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 JB</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)		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.								
<sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>NO</u> Depth (inches): <u>7</u>								
Hydric Soil Present (Y/N): <u>Y JB</u>								
Notes: Soil shows signs of saturation in the Bw 5-8" horizon. This is likely due to strong textural change from silt loam to fine sand & not necessarily do a indicator of wetness @ site. Giving soil the indicator Redox w/ 2.5Y anyway.								
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>						
Notes:								

# AQUATIC SITE ASSESSMENT DATA FORM

W106T1027

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:

Jessie Brownlee



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106T1027 Field Target: New Wasilla 2 Date: 7-28-16

*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



7.28.14



# WETLAND DETERMINATION DATA FORM

Wasilla 1

<b>SITE DESCRIPTION</b>			
Survey Type: Centerline		Access Road (explain):	Other (explain): <input checked="" type="checkbox"/>
Field Target:		Map #: 17 Map Date: 7-15-16	
Date: 7.28.16	Project Name: Alaska LNG		Feature Id: W106T1028
Investigators: Jessie Brownlee, Kim Halmes			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 693.4	
Latitude: 61.93583	Longitude: -150.21532		Datum: WGS84
Logbook No.: 2	Logbook Page No.: 41	Picture No.: P-W106T1028-001 thru -004	

<b>SITE PARAMETERS</b>	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): River terrace
Slope (%): 3-5	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: Not mapped	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.)
<b>SUMMARY OF FINDINGS</b>	
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): 11B2, 11C2

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

Previously burned Picea forest. Now it is Mesic forb & shrub community. Soil is dry and sandy with distinct charcoal / Burned mass mat over ash over Bhs soil. Much tree throw made for spotty discontinuous horizons. No signs of hydrology. Much downed wood and many standing snags.



# WETLAND DETERMINATION DATA FORM

W106T1028

## 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> dead snag <sup>standing</sup>	25		
2.			
3.			
4.			
Total Cover: <u>0</u> 50% of total cover: <u>0.05</u> 20% of total cover: <u>0</u>			
Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Vaccinium vitis-idaea</i>	25	FAC	FAC
2. <i>Populus tremula</i>	5		FACU
3. <i>Betula neoalaskana</i>	15	Y	FACU
4. <i>Salix glauca</i>	15	Y	FAC
5. <i>Picea mariana</i>	2		FAC
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: 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 = 1  
FACW species: - X 2 = -  
FAC species: 89 X 3 = 267  
FACU species: 31 X 4 = 124  
UPL species: - X 5 = -  
Column Totals: 120 (A) 391 (B)  
PI = B/A = 3.25

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Cornus canadensis</i>	10		FACU
2. <i>Chamerion angustifolium</i>	10		FACU
3. <i>Equisetum sylvaticum</i>	8		FAC
4. <i>Calamagrostis canadensis</i>	4		FAC
5. <i>Cornus suecica</i>	35	Y	FAC
6.			
7.			
8.			
9.			
10.			
Total Cover: <u>63</u> 50% of total cover: <u>31.5</u> 20% of total cover: <u>12.6</u>			

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%  
N Prevalence Index is ≤ 3.0  
- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)  
- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

0 % Bare Ground  
0 % Cover of Wetland Bryophytes  
35 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

W106T1028

7-28-16

SOIL		Date		Feature ID		Soil Pit Required (Y/N)		
<b>SOIL PROFILE DESCRIPTION:</b> (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 <sup>1</sup>	Loc <sup>2</sup>		
0-3								Dry organics
3-4	Black	100					organics	Charcoal
4-5	7.5YR 6/2	100					Ash	Ash
Bhs 5-13	7.5YR 3/2	30					very fine sandy	Ash & charcoal free throw throughout horizon
	7.5YR 5/6	70						
C 13-24	10YR 4/4	100					very fine sand loam	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
<b>HYDRIC SOIL INDICATORS</b>						<b>INDICATORS FOR PROBLEMATIC HYDRIC SOILS<sup>3</sup></b>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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)		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> 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:								
<b>HYDROLOGY PRIMARY INDICATORS</b> (any one indicator is sufficient)						<b>SECONDARY INDICATORS</b> (2 or more required)		
Surface Water (A1) <u>N</u>		Surface Soil Cracks (B6) <u>N</u>		Water-stained Leaves (B9) <u>N</u>		Stunted or Stressed Plants (D1) <u>N</u>		
High Water Table (A2) <u>N</u>		Inundation Visible on Aerial Imagery (B7) <u>N</u>		Drainage Patterns (B10) <u>N</u>		Geomorphic Position (D2) <u>N</u>		
Saturation (A3) <u>N</u>		Sparsely Vegetated Concave Surface (B8) <u>N</u>		Oxidized Rhizospheres along Living Roots (C3) <u>N</u>		Shallow Aquitard (D3) <u>N</u>		
Water Marks (B1) <u>N</u>		Marl Deposits (B15) <u>N</u>		Presence of Reduced Iron (C4) <u>N</u>		Microtopographic Relief (D4) <u>N</u>		
Sediment Deposits (B2) <u>N</u>		Hydrogen Sulfide Odor (C1) <u>N</u>		Salt Deposits (C5) <u>N</u>		FAC-Neutral Test (D5) <u>N</u>		
Drift Deposits (B3) <u>N</u>		Dry-Season Water Table (C2) <u>N</u>		Notes:				
Algal Mat or Crust (B4) <u>N</u>		Other (Explain in Notes): <u>N</u>						
Iron Deposits (B5) <u>N</u>								
Surface Water Present (Y/N): <u>N</u>		Depth (in): <u>-</u>		Wetland Hydrology Present (Y/N): <u>N</u>				
Water Table Present (Y/N): <u>N</u>		Depth (in): <u>-</u>						
Saturation Present (Y/N): (includes capillary fringe) <u>N</u>		Depth (in): <u>-</u>		EC: <u>-</u>				
Notes:								

# AQUATIC SITE ASSESSMENT DATA FORM

W106T1028

VEGETATION VARIABLES	
P= Prot, M= Matrix	
<b>Primary Vegetation Type (P):</b> 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 _____	
<b>Percent Cover (P):</b> 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 _____	
<b>Number of Wetland Types (M):</b> _____	<b>Evenness of Wetland Type Distribution (M):</b> Even _____ Highly Uneven _____ Moderately even _____
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____	
<b>Interspersion of Cover &amp; Open Water (P):</b> 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____	
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____	
<b>Presence of Islands (M):</b> Absent (none) _____ One or Few _____ Several to Many _____ N/A _____	
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____	
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____	
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____	
<b>HGM Class (P):</b> Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____	

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

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

LANDSCAPE VARIABLES (M)	
<b>Wetland Juxtaposition:</b> Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
<b>Wetland Land Use:</b> High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
<b>Watershed Land Use:</b> 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
<b>Size:</b> 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: W106T1028

Field Target: <sup>NEW</sup>Whalla 1

Date: 7.28.16

*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

7.28.16



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline		Access Road (explain)	Other (explain) <i>Facility</i>
Field Target: <i>270</i>		Map #: <i>53</i> Map Date: <i>6.9.16</i>	
Date: <i>6.25.16</i>	Project Name: Alaska LNG		Feature Id: <i>W106YL001</i>
Investigators: <i>Jessie Brownlee, Kaley Valper</i>			Team No.: <i>W106</i>
State: Alaska	Region: Alaska	Milepost: <i>382</i>	
Latitude: <i>65.665632° N</i>	Longitude: <i>-149.0856921°</i>	Datum: WGS84	
Logbook No.: <i>2</i>	Logbook Page No.: <i>8</i>	Picture No.: <i>P-W106YL001-001 thru -004</i>	

SITE PARAMETERS	
Subregion: <i>Ray Mountains</i>	Landform (hillslope, terrace, hummocks, etc.): <i>Lowland</i>
Slope (%): <i>0-3</i>	Local relief (concave, convex, none): <i>Flat</i>
Pre-mapped Alaska LNG/NWI classification: <i>PEMIB</i>	Evidence of Wildlife Use: <i>NONE</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>RSS1/EMIB</i>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <i>11C2, 111A2</i>

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

*Open Bet Neo shrub community w/ tall tussocks throughout. Pockets of water in between tussocks. Pic Mar saplings ~ 12" tall a plot but percent of maturity increase to the north but not enough to be woodland Area was previously Pic Mar Woodland Prior to burn.*



# WETLAND DETERMINATION DATA FORM

W106YLC001

## VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)

	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 ( 20 )

	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Betula nana</i>	40	Y	FAC
2. <i>Chamaedaphne calyculata</i>	10		FACW
3. <i>Arctostaphylos rubra</i>	8		FAC
4. <i>Salix pulchra</i>	8		FACW
5. <i>Picea mariana</i>	T		FACW
6. <i>Vaccinium uliginosum</i>	10		FAC
7. <i>Rhododendrum groenlandicum</i>	4		FAC
8. <i>Andromeda polifolia</i>	T		FACW
9. <i>Betula neoalastana</i>	T		FACW

Total Cover: 20

50% of total cover: 40 20% of total cover: 10

## 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: 20 X 2 = 40

FAC species: 87 X 3 = 261

FACU species: 3 X 4 = 12

UPL species: 0 X 5 = 0

Column Totals: 110 (A) 313 (B)

PI = B/A = 2.8

<i>Rhododendrum tomentosum</i>	T		FACW
<i>Picea glauca</i>	T		FACU

## VEGETATION (use scientific names of plants)

Herb Stratum ( 20 )

	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Pyrola grandiflora</i>	T		FAC
2. <i>Pyrola asarifolia</i>	3		FACU
3. <i>Rubus chamaemorus</i>	2		FACW
4. <i>Carex bigelowii</i>	25	Y	FAC
5. <i>Equisetum scirpoides</i>	T		FACU
6.			
7.			
8.			
9.			
10.			

Total Cover: 30

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

## Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

- Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

- Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

0 % Bare Ground  
20 % Cover of Wetland Bryophytes  
80 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

W106YL 001

6.25.16

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 <sup>1</sup>	Loc <sup>2</sup>		
Op 0-8								Saturated organics frozen organics
Oef 8-t								

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>	
Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>	Alaska Color Change (TA4) <sup>4</sup> <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)	

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

Restrictive Layer (if present): Type: Perma Frost Depth (inches): 8

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) <u>Y</u>	Surface Soil Cracks (B6) <u>N</u>	Water-stained Leaves (B9) <u>N</u>	Stunted or Stressed Plants (D1) <u>Y</u>
High Water Table (A2) <u>Y</u>	Inundation Visible on Aerial Imagery (B7) <u>N</u>	Drainage Patterns (B10) <u>N</u>	Geomorphic Position (D2) <u>Y</u>
Saturation (A3) <u>Y</u>	Sparsely Vegetated Concave Surface (B8) <u>N</u>	Oxidized Rhizospheres along Living Roots (C3) <u> </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>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>2</u>	
Saturation Present (Y/N): (includes capillary fringe) <u>Y</u>	Depth (in): <u>0</u>	EC: <u>310</u> PH <u>6.39</u>
Notes:		



# AQUATIC SITE ASSESSMENT DATA FORM

W106YLOO1

VEGETATION VARIABLES		P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____		
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) <u>2</u> Tall shrub (2-6m) <u>15</u> Short shrub (0.5-2m) <u>23</u> Dwarf shrub (<0.5m) <u>30</u> Tall herb (>1m) <u>0</u> Short herb (<1m) <u>35</u> Moss-Lichen <u>10</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) <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 _____ 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>6.39</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: W106YL001

Field Target: 270

Date: 6.25.16

*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?

### 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)

Kaley Volper

X

Signature / Date

Kaley Volper

6-26-16

X

Field Crew Chief (print)

J Brownlee

X

Signature / Date

J Brownlee

6.25.16



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input type="checkbox"/> Access Road (explain) <input type="checkbox"/> Other (explain) <u>Facility</u>		Field Target: <u>269</u>	Map #: <u>54</u> Map Date: <u>6-9-16</u>
Date: <u>6-25-16</u>	Project Name: Alaska LNG		Feature Id: <u>W106YL002</u>
Investigators: <u>Jessie Brownlee, Kaley Volper</u>			Team No.: <u>W106</u>
State: Alaska	Region: Alaska	Milepost: <u>382</u>	
Latitude: <u>65.66379856°</u>		Longitude: <u>-149.0994478°</u>	Datum: WGS84
Logbook No.: <u>2</u>	Logbook Page No.: <u>8</u>	Picture No.: <u>P-W106</u>	

SITE PARAMETERS	
Subregion: <u>Ray Mountains</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Lowland, Valley bottom</u>
Slope (%): <u>3.5</u>	Local relief (concave, convex, none): <u>Flat</u>
Pre-mapped Alaska LNG/NWI classification: <u>PEMI/SS3B</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 checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Type: <u>PEMI/SS3B</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Alaska Vegetation Classification (Vioreck): <u>IIIA211C2</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 Woodland that is now a diverse <sup>salix</sup> shrub community w/ a high Carex <sup>big</sup> eri vag understory.  
From Dalton Highway we walked in on a 4 wheeler trail that had destroyed the moss layer & was very wet. In general area is drier than mapped.  
The ground, moss & Tussocks were burned in fire & make for a highly uneven ground.



# WETLAND DETERMINATION DATA FORM

W106X1002

## 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 alba</i> <del>OK</del>	1		FAC
2. <i>Vaccinium vitis-idaea</i>	10	Y	FAC
3. <i>Arctostaphylos rubra</i>	10	Y	FAC
4. <i>Vaccinium uliginosum</i>	20	Y	FAC
5. <i>Salix glauca</i>	6		FAC
6. <i>Salix arbusculoides</i>	4		FACW
7. <i>Rhododendron groenlandicum</i>	7		FAC
8. <i>Picea canadensis</i>	4		FACU
9. <i>Dasiphora fruticosa</i>	2		FAC

Total Cover: 69

50% of total cover: 34.5 20% of total cover: 13.8

### Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

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

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

### Prevalence Index worksheet:

Total % Cover of: \_\_\_\_\_ Multiply by:

OBL species: 0 X 1 = 0

FACW species: 45 X 2 = 90

FAC species: 75 X 3 = 225

FACU species: 4 X 4 = 16

UPL species: 0 X 5 = 0

Column Totals: 124 (A) 331 (B)

PI = B/A = 2.67

<i>Betula Nana</i>	S	S		FAC

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26'</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Eriophorum vaginatum</i>	<u>40</u>	Y	FACU
2. <i>Pyrola asarifolia</i>	<u>7</u>		FACU
3. <i>Carex bigelowii</i>	<u>15</u>	Y	FAC
4. <i>Forb sp</i>	<u>7</u>		
5. <i>Pyrola grandiflora</i>	<u>7</u>		FAC
6.			
7.			
8.			
9.			
10.			

Total Cover: 55

50% of total cover: 27.5 20% of total cover: 11

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup> 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

W106YLOO2

6.25.16

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		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
	Color (moist)	%	Color (moist)	%				
0-4								Bottom inches is damp
B <sub>g</sub> 4-10	2.5Y 3/1	90	7.5YR 4/4	10	con	mat rc	Silt	
B <sub>wh</sub> 10-+	10YR 3/1	100						organic debris
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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>X</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)		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.								
<sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>Perma Frost</u> Depth (inches): <u>10</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>Positive X<sub>d</sub> in 4-10" horizon.</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>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>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</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>4-6</u>		EC: <u>-</u>				
Notes:								



# AQUATIC SITE ASSESSMENT DATA FORM

W1064L002

VEGETATION VARIABLES	
P= Plot, M= Matrix	
Primary Vegetation Type (P): Vegetation Lacking _____ Forested-Deciduous-Needle-leaved _____ Forested-Deciduous-Broad-leaved _____ Forested-Evergreen-Needle-leaved _____ Scrub Shrub-Deciduous-Needle-leaved _____ Scrub Shrub-Deciduous-Broad-leaved <u>X</u> Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved _____ Emergent-Non-persistent _____ Emergent-Persistent _____ Aquatic Bed _____	
Percent Cover (P): Tree (>5 dbh, >6m tall) _____ Sapling (<5 dbh, <6m tall) <u>4</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>25</u> Dwarf shrub (<0.5m) <u>25</u> Tall herb (≥1m) <u>0</u> Short herb (<1m) <u>40</u> Moss-Lichen <u>4</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>1</u> Highly Uneven _____ Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) <u>X</u>	
Interspersion of Cover & Open Water (P): 100% Cover or Open Water <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>1</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: Gravely _____ 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 <u>X</u> 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 <u>X</u> Circumneutral (5.5-7.4) _____ Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading _____	
Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits _____ Low Permeability Stratified Deposits <u>X</u> Glacial Till/Not Permeable _____	
Basin Topographic Gradient (M): Low Gradient (<2%) <u>X</u> High Gradient (≥2%) _____	
Evidence of Seeps and Springs (P): No Seeps or Springs <u>X</u> Seeps Observed _____ Intermittent Spring _____ Perennial Spring _____	

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

J Brownlee

KV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1064002

Field Target: 269

Date: 6-25-16

*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 Kaley Volper  
Wetland Scientist (print)

X Kaley Volper 6-26-16  
Signature / Date

X JBrowlee  
Field Crew Chief (print)

X JBrowlee 6-28-16  
Signature / Date



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: <u>Centerline</u> <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) <u>Facility</u>	Field Target: <u>272</u>	Map #: <u>51</u>	Map Date: <u>6.9.16</u>
Date: <u>6.25.16</u>	Project Name: <u>Alaska LNG</u>	Feature Id: <u>W106YL003</u>	
Investigators: <u>Jessie Brownlee Kaley Volper</u>			Team No.: <u>W106</u>
State: <u>Alaska</u>	Region: <u>Alaska</u>	Milepost: <u>357.4</u>	
Latitude: <u>65.867061°</u>	Longitude: <u>-149.741712°</u>	Datum: <u>WGS84</u>	
Logbook No.: <u>2</u>	Logbook Page No.: <u>9</u>	Picture No.: <u>P-W106YL003-001 thru 004</u>	

SITE PARAMETERS	
Subregion: <u>Ray mountains</u>	Landform (hillslope, terrace, hummocks, etc.): <u>Hillside</u>
Slope (%): <u>8-10 or more (?)</u>	Local relief (concave, convex, none): <u>Flat to slightly convex</u>
Pre-mapped Alaska LNG/NWI classification: <u>PSSH13</u>	Evidence of Wildlife Use: <u>Hare 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 <input checked="" type="checkbox"/> <u>LV</u>	Alaska Vegetation Classification (Viereck): <u>HA2</u>

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

Shunted Pic Cola open forest w/ trees 10-20' tall & all < 3" DBH.  
 Very low species diversity & thick cover of Feather moss.  
 Site is on a steep slope. On walk from car All of Area is dry. The three  
 "wetland" polygons mapped further down the hill are on ridges and steep slopes  
 and are upland - Need to change - Shunted Pic Mar is due to N facing slope &  
 permafrost. Not water.





# WETLAND DETERMINATION DATA FORM

W10642003

VEGETATION (use scientific names of plants)				
Tree Stratum (Plot sizes: <u>100</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1.				<b>Dominance Test worksheet:</b> No. of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) % Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
2.				
3.				
4.				
Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____				
Sapling/Shrub Stratum ( <u>210</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Rhododendrum groenlandicum</i>	<u>6</u>		FAC	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species: <u>0</u> X 1 = <u>0</u> FACW species: <u>45</u> X 2 = <u>90</u> FAC species: <u>18</u> X 3 = <u>54</u> FACU species: <u>1</u> X 4 = <u>4</u> UPL species: <u>0</u> X 5 = <u>0</u> Column Totals: <u>58</u> 64 (A) <u>129</u> 148 (B) PI = B/A = <u>2.31</u>
2. <i>Vaccinium vitis-idaea</i>	<u>4</u>		FAC	
3. <i>Betula neoalaskana</i>	<u>1</u>		FACU	
4. <i>Salix glauca</i>	<u>3</u>		FAC	
5. <i>Alnus viridis fruticosa</i>	<u>5</u>		FAC	
6. <i>Rosa aciculata</i>	<u>7</u>		FACU	
7. <i>Picea mariana</i>	<u>45</u>	<u>Y</u>	FACW	
8.				
9.				
Total Cover: <u>58</u> 50% of total cover: <u>29</u> 20% of total cover: <u>11.6</u>				

VEGETATION (use scientific names of plants)				
Herb Stratum ( <u>210</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	
1. <i>Pyrola grandiflora</i>	<u>7</u>		FAC	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is > 50% <input checked="" type="checkbox"/> Prevalence Index is ≤ 3.0 <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Notes) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <i>Equisetum scirpoides</i>	<u>7</u>		FACU	
3. <i>Mertensia paniculata</i>	<u>7</u>		FACU	
4. <i>Carex</i>	<u>7</u>			
5.				% Bare Ground: <u>0</u> % Cover of Wetland Bryophytes: <u>0</u> Total Cover of Bryophytes: <u>100</u> % Cover of Water: <u>0</u> <b>Hydrophytic Vegetation Present (Y/N):</b> <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: _____				



W106YL003

6.25.11

Page 3 of 4



# AQUATIC SITE ASSESSMENT DATA FORM

W106YL003

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:

KV

J. Brownlee



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W10676003

Field Target: 272

Date: 6.25.16

*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 Kaleny Valper  
Wetland Scientist (print)

X Kaleny Valper 6/26/16  
Signature / Date

X JBrownlee  
Field Crew Chief (print)

X JBrownlee 6.26.16  
Signature / Date



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 268	Map #: 56 Map Date: 6.9.16
Date: 6.26.16	Project Name: Alaska LNG		Feature Id: W106YLOO4
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 386.4	
Latitude: 65° 38' 4.183" N	Longitude: 148° 57' 55.552" W	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 10	Picture No.: P-W106YLOO4-001 thru 004	

SITE PARAMETERS	
Subregion: Ray Mountains	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 3-5	Local relief (concave, convex, none): Flat, undulating
Pre-mapped Alaska LNG/NWI classification: PSSIC	Evidence of Wildlife Use: Northern Harrier & Harlequin Hawk
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/FD4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11C2, 1A3

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 woodland. Pic Mar range from 12" to 20' but all are under 3" DBH. Ground ie Moss cover has been burned and is uneven.

Area is a Pic Mar woodland w/ diverse shrub community and large tussocks of Eri Vag. Site of original target ~15' North is a swale and unrepresentative of area so plot was moved to better represent veg, soil and hydrology.

Soil is very thixotropic stopping in. Water is seeping in to a depth of 3" from the interface of organic & mineral and is expected to slowly rise to Depth of 7" @ interface



# WETLAND DETERMINATION DATA FORM

W106YLOO4

6.26.16

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 <sup>1</sup>			
Di 0-4							Dry organics	
De 4-7							Saturated organics	
Bw 7-10	2.5Y 4/1	80	10YR 2/4	10	con	m rc	silt	
	10YR 3/1	10						
B/NF 10-f	2.5Y 4/1	90	10YR 4/4	10	con		silt	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>-</u>			Alaska Gleyed (A13) <u>-</u>			Alaska Color Change (TA4) <sup>4</sup> <u>-</u>		
Histic Epipedon (A2) <u>almost</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) <u>yes &amp; x</u>		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.								
<sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>fine</u> Depth (inches): <u>10</u>								
Hydric Soil Present (Y/N): <u>Y</u>								
Notes: <u>positive &amp; x</u>								
HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)						SECONDARY INDICATORS (2 or more required)		
Surface Water (A1) <u>on edge of plot</u> <u>YES</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>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>Y on edge</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>7</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>5</u>						
EC: <u>60</u> pH <u>5.51</u> <u>water/swale outside of plot</u>								
Notes:								



# WETLAND DETERMINATION DATA FORM

W106YL004

6.26.16

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 <sup>1</sup>	Loc <sup>2</sup>		
0i 0-4								Dry organics
0e 4-7								Saturated organics
Bw 7-10	2.5Y 4/1	80	10YR 4/4	10	con	m rc	silt	
	10YR 3/1	10						
BwF 10-1	2.5Y 4/1	90	10YR 4/4	10	con		silt	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
HYDRIC SOIL INDICATORS						INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>-</u>			Alaska Gleyed (A13) <u>-</u>			Alaska Color Change (TA4) <sup>4</sup> <u>-</u>		
Histic Epipedon (A2) <u>almost</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)		
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> Give details of color change in Notes.								
Restrictive Layer (if present): Type: <u>Root</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>on edge of plot</u> <u>YES</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>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>Y on edge</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>7</u>						
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)		Depth (in): <u>5</u>						
Notes:					EC: <u>60</u> pH <u>5.51</u> <u>water/swale outside of plot.</u>			



# AQUATIC SITE ASSESSMENT DATA FORM

W106/L004

## VEGETATION VARIABLES

P = Plot, M = Matrix

Primary Vegetation Type (P): Vegetation Lacking \_\_\_\_\_ Forested-Deciduous-Needle-leaved \_\_\_\_\_ Forested-Deciduous-Broad-leaved \_\_\_\_\_  
 Forested-Evergreen-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Needle-leaved \_\_\_\_\_ Scrub Shrub-Deciduous-Broad-leaved ☒  
 Scrub Shrub-Evergreen-Broad-leaved \_\_\_\_\_ Scrub Shrub-Evergreen-Needle-leaved \_\_\_\_\_ Emergent-Non-persistent \_\_\_\_\_ Emergent-Persistent \_\_\_\_\_ Aquatic Bed \_\_\_\_\_

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 15 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 30  
 Dwarf shrub (<0.5m) 20 Tall herb (≥1m) 0 Short herb (<1m) 30 Moss-Lichen 15 Floating 0 Submerged 0

Number of Wetland Types (M): 1 Evenness of Wetland Type Distribution (M): Even ☒ Highly Uneven \_\_\_\_\_ Moderately even \_\_\_\_\_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water ☒ <25% Scattered/Peripheral Cover \_\_\_\_\_ 26-75% Scattered or Peripheral Cover \_\_\_\_\_ >75% Scattered or Peripheral Cover \_\_\_\_\_ N/A \_\_\_\_\_

Plant Species Diversity (P): Low (< 5 plant species) \_\_\_\_\_ Medium (5-25 species) ☒ High (>25) \_\_\_\_\_

Presence of Islands (M): Absent (none) ☒ One or Few \_\_\_\_\_ Several to Many \_\_\_\_\_ N/A \_\_\_\_\_

Cover Distribution of Dominant Layer (P): No Veg. \_\_\_\_\_ Solitary, Scattered Stems \_\_\_\_\_ 1 or More Large Patches; Parts of Site Open \_\_\_\_\_ Small Scattered Patches \_\_\_\_\_ Continuous Cover ☒

Dead Woody Material (P): Low Abundance (0-25% of surface) ☒ Moderately Abundant (25-50% of surface) \_\_\_\_\_ Abundant (>50% of surface) \_\_\_\_\_

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

HGM Class (P): Slope \_\_\_\_\_ Flat ☒ Lacustrine Fringe \_\_\_\_\_ Depressional \_\_\_\_\_ Riverine \_\_\_\_\_ Estaurine Fringe \_\_\_\_\_

## SOIL VARIABLES

Soil Factors (P): Soil Lacking \_\_\_\_\_ Histosol:Fibric \_\_\_\_\_ Histosol:Hemic \_\_\_\_\_ Histosol:Sapric \_\_\_\_\_  
 Mineral: Gravelly \_\_\_\_\_ Mineral: Sandy \_\_\_\_\_ Mineral: Silty ☒ Mineral: Clayey \_\_\_\_\_

## HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet ☒ No Inlet/Intermittent Outlet \_\_\_\_\_ No Inlet/Perennial Outlet \_\_\_\_\_ Intermittent Inlet/No Outlet \_\_\_\_\_ Intermittent Inlet/Intermittent Outlet \_\_\_\_\_ Intermittent Inlet/Perennial Outlet \_\_\_\_\_ Perennial Inlet/No Outlet \_\_\_\_\_ Perennial Inlet/Intermittent Outlet \_\_\_\_\_ Perennial Inlet/Perennial Outlet \_\_\_\_\_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated ☒ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded \_\_\_\_\_

Evidence of Sedimentation (P): No Evidence Observed ☒ Sediment Observed on Wetland Substrate \_\_\_\_\_ 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 3.5

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: W106YL004

Field Target: 268

Date: 6-26-16

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

X JBrownlee X JBrownlee 6-21-16  
Field Crew Chief (print) Signature / Date



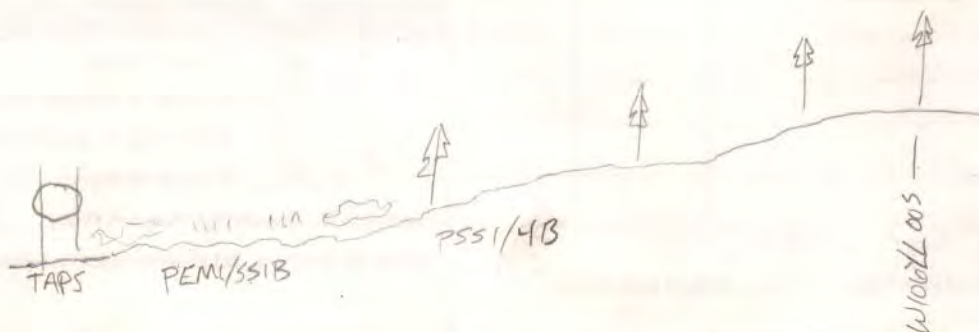
# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 267	Map #: 56 Map Date: 6.9.16
Date: 6-29-16	Project Name: Alaska LNG		Feature Id: W106YL005
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 386.3	
Latitude: 65.63218225°	Longitude: -148.9613071°	Datum: WGS84	
Logbook No.: 2	Logbook Page No.: 14	Picture No.: P-W106YL005-001 thru 004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): Apron
Slope (%): 3-5	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: PSS1/F04B	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: PSS1/4B
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Alaska Vegetation Classification (Vioreck): 11C2.11A3

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. Most tall trees are dead snags w/ majority of PicMar being sapplings. Walked to highest point on landscape broad flat expanse to see if it was dry. Because this is wet I am assuming everything to the TABS Row is too. Popped 1 hole in a dry looking spot on steeper slope and it was saturated But neg xx but close enough to being wet that I wouldn't want to over turn wet call.



# WETLAND DETERMINATION DATA FORM

W106 YL005

## 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: 5

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

Sapling/Shrub Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Salix pulchra</i>	6		FACW
2. <i>Rhododendrum tomentosum</i>	25	Y	FACW
3. <i>Vaccinium uliginosum</i>	20	Y	FAC
4. <i>Vaccinium vitis-idaea</i>	18	Y	FAC
5. <i>Rosa pratincola</i>	3		FACU
6. <i>Betula nana</i>	5		FAC
7. <i>Picea mariana</i> ~ 12"	10		FACW
8. <i>Rhododendrum groenlandicum</i>	2		FAC
9.			

Total Cover: 89

50% of total cover: 44.5 20% of total cover: 17.8

### 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: — X 1 = —

FACW species: 57 X 2 = 114

FAC species: 60 X 3 = 180

FACU species: 3 X 4 = 12

UPL species: — X 5 = —

Column Totals: 120 (A) 306 (B)

PI = B/A = 2.55

Many Burned Snags.

## VEGETATION (use scientific names of plants)

Herb Stratum ( <u>26</u> )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. <i>Equisetum sylvaticum</i>	4		FAC
2. <i>Eriophorum vaginatum</i>	8	Y	FACW
3. <i>Calamagrostis canadensis</i>	8	Y	FAC
4. <i>Stellaria</i>	T		—
5. <i>Petasites frigidus</i>	T		FACW
6. <i>Rubus chamaemorus</i>	3		FACU
7. <i>Calamagrostis canadensis</i>	3		FAC
8. <i>Saussurea angustifolia</i>	T		FAC
9. Dock	T		
10. <i>Carex</i> sp	T		

Total Cover: 26

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

### Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

— Morphological Adaptations<sup>1</sup> (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

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

0 % 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

W10646005

6.29.16

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 <sup>1</sup>	Loc <sup>2</sup>	Texture	Notes
0-2								Damp organics
2-6								" "
6-8								Saturated organics
Buil 8-11a	10YR 3/2	80	10YR 4/4	10	con	m	silt loam	
			2.5Y 4/1	10	2-5	m		

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

HYDRIC SOIL INDICATORS	INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>
Histosol or Histel (A1) <u>N</u>	Alaska Gleyed (A13) <u>N</u>
Histic Epipedon (A2) <u>Y</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)

<sup>3</sup>One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

<sup>4</sup>Give details of color change in Notes.

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

Hydric Soil Present (Y/N): Y

Notes: neg OX

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>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>3</u>	Wetland Hydrology Present (Y/N): <u>Y</u>
Water Table Present (Y/N): <u>Y</u>	Depth (in): <u>7</u>	
Saturation Present (Y/N): <u>Y</u> (includes capillary fringe)	Depth (in): <u>5</u>	
EC: <u>59</u>		<u>pH 5.83</u>

Notes:



# AQUATIC SITE ASSESSMENT DATA FORM

W106YL005

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>10</u> Tall shrub (2-6m) <u>0</u> Short shrub (0.5-2m) <u>33</u> Dwarf shrub (<0.5m) <u>38</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>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 _____ 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) <u>X</u> Alkaline (>7.4) _____ Acid (<5.5) _____ pH Reading <u>5.83</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:

JBrownlee

LV



## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1100/L005

Field Target: 267

Date: 6-29-16

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 Valper

Wetland Scientist (print)

X Kaley Valper

Signature / Date

6-29-16

X Brownee

Field Crew Chief (print)

X [Signature]

Signature / Date

6-29-16



# WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline <input checked="" type="checkbox"/> Access Road (explain) _____ Other (explain) _____		Field Target: 271	Map #: 52 Map Date: 6.9.16
Date: 6-28-16	Project Name: Alaska LNG		Feature Id: W106.YL006
Investigators: Jessie Brownlee, Kaley Volper			Team No.: W106
State: Alaska	Region: Alaska	Milepost: 363.4	
Latitude: 65.819980		Longitude: -149.573930	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 13	Picture No.: P-W106.YL006-001 thru 004	

SITE PARAMETERS	
Subregion: Ray mountains	Landform (hillslope, terrace, hummocks, etc.): Hill side
Slope (%): 5-8	Local relief (concave, convex, none): slightly convex
Pre-mapped Alaska LNG/NWI classification: PF04/SSIB	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 <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 Pic Mar forest. Trees range from 2" sapplings to 30' tall. Diverse thick understory of Rho Coro, Egy Sy, & thick feather moss. Microrelief is undulating. Soil was saturated in the thixotropic mineral layers but not in organics. Frost @ 9" which was a repeat of the Bwl colors & %. Soil did not make an indicator & neg AX throughout.

# WETLAND DETERMINATION DATA FORM

W106YL006

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>6</u> (A)
1. <i>Picea Mariana</i>		<u>25</u>	<u>Y</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
2.					% Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
3.					
4.					
Total Cover: <u>25</u>					Prevalence Index worksheet:
50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>					
Sapling/Shrub Stratum ( <u>26'</u> )		Absolute % Cover	Dominant Species? (Y/N)	Indicator Status	Total % Cover of: _____ Multiply by: _____
1. <i>Rhododendrum groenlandicum</i>		<u>20</u>	<u>Y</u>	<u>FAC</u>	OBL species: <u>0</u> X 1 = <u>0</u>
2. <i>Vaccinium vitis-idaea</i>		<u>18</u>	<u>Y</u>	<u>FAC</u>	FACW species: <u>57</u> X 2 = <u>114</u>
3. <i>Alnus viridis fruticosa</i>		<u>1</u>		<u>FAC</u>	FAC species: <u>55</u> X 3 = <u>165</u>
4. <i>Vaccinium uliginosum</i>		<u>10</u>		<u>FAC</u>	FACU species: <u>7</u> X 4 = <u>4</u>
5. <i>Salix pulchra</i>		<u>5</u>		<u>FACU</u>	UPL species: <u>0</u> X 5 = <u>0</u>
6. <i>Spiraea stevenii</i>		<u>1</u>		<u>FACU</u>	Column Totals: <u>113</u> (A) <u>283</u> (B)
7. <i>Rosa acicularis</i>		<u>T</u>		<u>FACU</u>	PI = B/A = <u>2.5</u>
8. <i>Betula nana</i>		<u>1</u>		<u>FAC</u>	
9. <i>Picea Mariana</i>		<u>15</u>	<u>Y</u>	<u>FACW</u>	
Total Cover: <u>71</u>					
50% of total cover: <u>35.5</u> 20% of total cover: <u>14.2</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 sylvaticum</i>		<u>5</u>	<u>Y</u>	<u>FAC</u>	<u>Y</u> Prevalence Index is ≤ 3.0
2. <i>Rubus chamaemorus</i>		<u>10</u>	<u>Y</u>	<u>FACW</u>	— Morphological Adaptations <sup>1</sup> (Provide supporting data in Notes)
3. <i>Petasites Frigidus</i>		<u>2</u>		<u>FACW</u>	— Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
4. <i>grass so</i>		<u>T</u>			<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
5.					
6.					
7.					
8.					
9.					
10.					
Total Cover: <u>17</u>					% Bare Ground % Cover of Wetland Bryophytes 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):
50% of total cover: <u>8.5</u> 20% of total cover: <u>3.4</u>					



# WETLAND DETERMINATION DATA FORM

W106YLO06

6.28.16

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 <sup>1</sup>	Loc <sup>2</sup>			
0-4								Dry Feather moss	
4-5								Damp organics	
Bul 5-9	10YR 3/1	90	10YR 4/4	6	con	m rc	Silt		
			10YR 3/3	3	con	m rc			
			10YR 4/1	1	Dep	M			
BulF 9-10	Same as Bul but frozen						Silt		
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.									
HYDRIC SOIL INDICATORS							INDICATORS FOR PROBLEMATIC HYDRIC SOILS <sup>3</sup>		
Histosol or Histel (A1) <u>N</u>			Alaska Gleyed (A13) <u>N</u>			Alaska Color Change (TA4) <sup>4</sup> <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)			
<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic. <sup>4</sup> Give details of color change in Notes.									
Restrictive Layer (if present): Type: <u>Frost</u> Depth (inches): <u>9</u>									
Hydric Soil Present (Y/N): _____									
Notes: <u>Thixotropic Soil</u> <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>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>5</u>		EC: <u>-</u>					
Notes:									



# AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES		P= Plot, M= Matrix
<b>Primary Vegetation Type (P):</b> 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 _____		
<b>Percent Cover (P):</b> 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 _____		
<b>Number of Wetland Types (M):</b> _____		<b>Evenness of Wetland Type Distribution (M):</b> Even _____ Highly Uneven _____ Moderately even _____
<b>Vegetation Density/Dominance (P):</b> Sparse (0-20%) _____ Low Density (20-40%) _____ Medium Density (40-60%) _____ High Density (60-80%) _____ Very High Density (80-100%) _____		
<b>Interspersion of Cover &amp; Open Water (P):</b> 100% Cover or Open Water _____ <25% Scattered/Peripheral Cover _____ 26-75% Scattered or Peripheral Cover _____ >75% Scattered or Peripheral Cover _____ N/A _____		
<b>Plant Species Diversity (P):</b> Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____		
<b>Presence of Islands (M):</b> Absent (none) _____ One or Few _____ Several to Many _____ N/A _____		
<b>Cover Distribution of Dominant Layer (P):</b> No Veg. _____ Solitary, Scattered Stems _____ 1 or More Large Patches; Parts of Site Open _____ Small Scattered Patches _____ Continuous Cover _____		
<b>Dead Woody Material (P):</b> Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____		
<b>Vegetative Interspersion (P):</b> Low (large patches, concentric rings) _____ Moderate (broken irregular rings) _____ High (small groupings, diverse and interspersed) _____		
<b>HGM Class (P):</b> Slope _____ Flat _____ Lacustrine Fringe _____ Depressional _____ Riverine _____ Estaurine Fringe _____		

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

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

LANDSCAPE VARIABLES (M)	
<b>Wetland Juxtaposition:</b> Wetland Isolated _____ Wetlands within 400m, Not Connected _____ Only Connected Below _____ Only Connected Above _____ Connected Upstream & Downstream _____ Unknown _____	
<b>Wetland Land Use:</b> High Intensity (i.e., ag.) _____ Moderate Intensity (i.e., forestry) _____ Low Intensity (i.e. open space) _____	
<b>Watershed Land Use:</b> 0-5% Rural _____ 5-25% Urbanized _____ 25-50% Urbanized _____ >50% Urbanized _____	
<b>Size:</b> 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: W106# 4C006 Field Target: 271 Date: 6.28.16

*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 6-30-16

Signature / Date

X J Browne

Field Crew Chief (print)

X [Signature] 6-28-16

Signature / Date