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

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__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_____ 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__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: GPS Technician QA/QC check: 3m

QARC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: 185 Field Target: N60TI012 Date: 06-03-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Meade, Zoe — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X [signature] — **Signature / Date**

QAQC

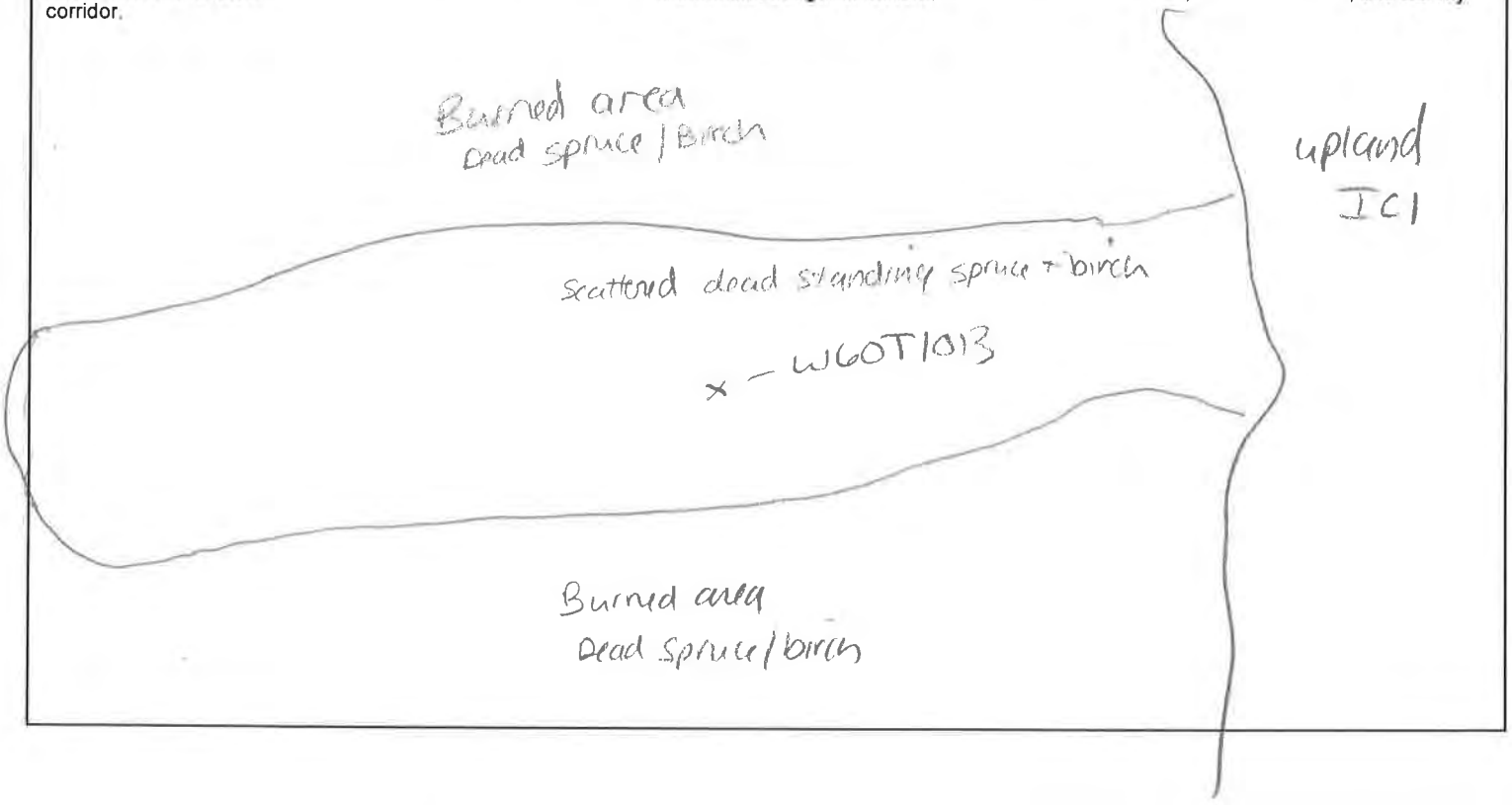
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 184	Map #: 119 Map Date: 5/27
Date: 06-03-2014	Project Name & No.: Alaska LNG 26221306		Feature Id: W60TI013	
Investigators: Valerie Watkins, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 688.45		
Latitude: 61° 59' 13.66"		Longitude: -150° 11' 50.83"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 11	Picture No.: P_W60T1013_E_W_pit_plan		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 3-5%	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes ✓ No____
Hydric Soil Present? Yes ✓ No____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes ✓ No____	Alaska Vegetation Classification (Viereck): II B2, III A2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')			
1. Betula neoalaskana	15	Y	FACU
2. Alnus ssp.	3		FAC
3. Salex bebbiana	5	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 23			
50% of total cover: 11.5	20% of total cover: 4.6		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	94	X 3 =	282
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	94 (A)		282 (B)

PI = B/A = 3.0

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis Canadensis	65	Y	FAC
2. Equisetum arvens	5		FAC
3. Equisetum sylvaticum	1		FAC
4. Streptopus amplexifolius	T		FACU
5. Rubus idaeus	T		
6.			
7.			
8.			
9.			
10.			
Total Cover: 71			
50% of total cover: 35.5	20% of total cover: 14.2		

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

Conductivity: 18

SOIL Date 06-03 Feature ID WBOTI013 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-11	—	—	—	—	—	—	Fibric/hemic	Organics
11-17	10YR 3/2	70	5YR 3/4	30	C	M	Silt loam	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) X 12"		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

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

Restrictive Layer (if present): Type: Frozen Depth (inches): 17 inches

Hydric Soil Present (Y/N): Y

Notes: Faint hydrogen sulfide odor at 12"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) X 12"	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): Y	Depth (in): 0-10	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 6"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes: Water seeping into pit at 3"
Pockets of standing water throughout site

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 15 Tall shrub (2-6m) 3 Short shrub (0.5-2m) 5 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 31 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%) X 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__X__ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches__X__ Continuous Cover_____

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

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

HGM Class (P): Slope_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.95

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated X 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) X

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

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

Crew Chief QA/QC check: MW GPS Technician QA/QC check: MM QA/QC DEC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60TI013 Field Target: 184 Date: 06-03-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X [signature] — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X [signature] — **Signature / Date**

QAQC
DEC

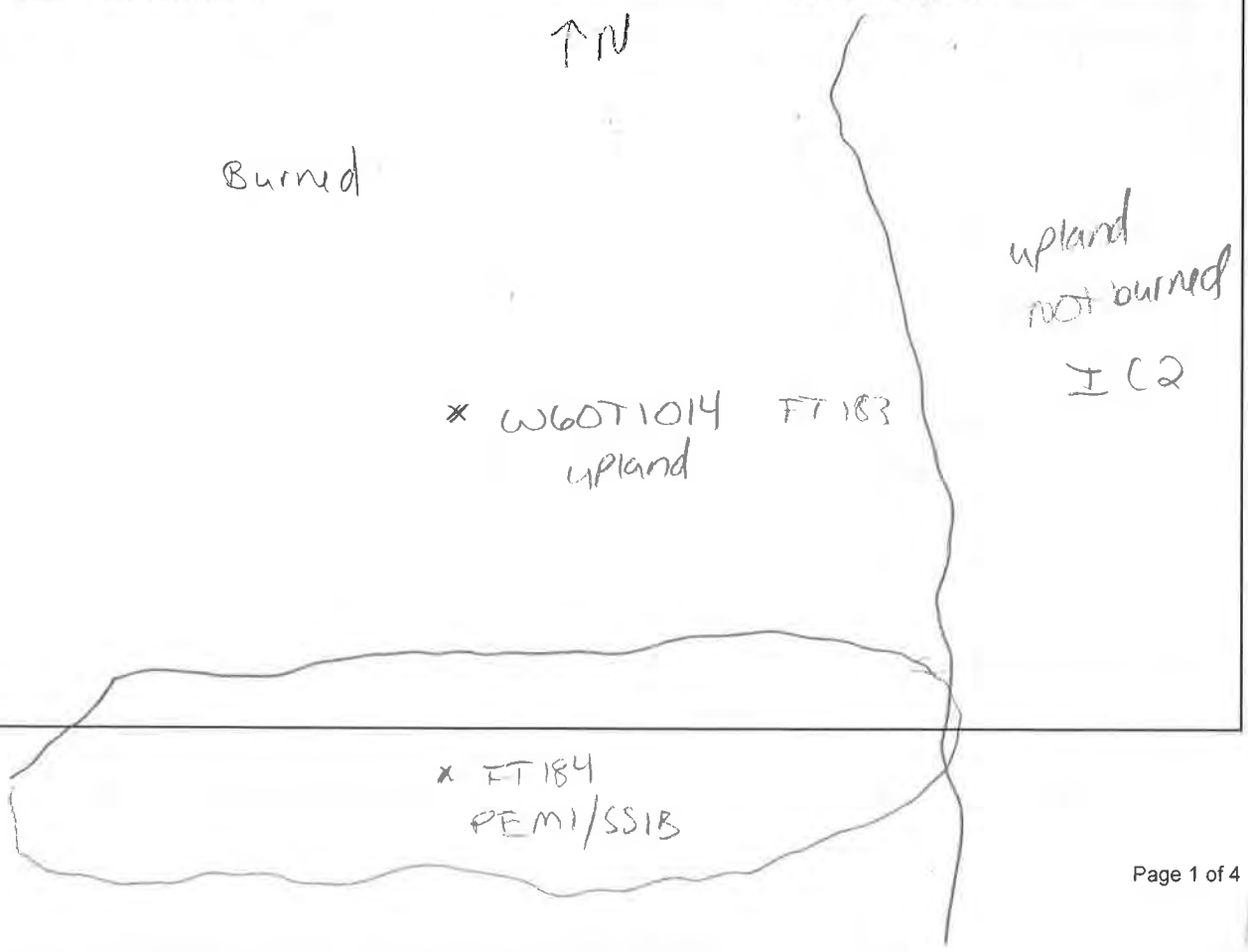
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 183	**Map #:** 119 **Map Date:** 5/27/14
Date: 6/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI014
Investigators: Valerie Watkins, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 688.4	
Latitude: 61° 59' 16.79"	**Longitude:** -150° 11' 50.14"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 12	**Picture No.:** P_W60TI014_S_N_pit_plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): slight slope
Slope (%): 3 - 5	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): IIB2, IIC2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes:)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FACU
2. Vaccinium vitis-idaea	1		FAC
3. Picea mariana	5		FACW
4. Rhododendron tomentosum	1		FACW
5. Ribes laxiflorum	T		FAC
6.			
7.			
8.			
9.			
Total Cover: 37			
50% of total cover: 18.5	20% of total cover: 7.4		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	6	X 2 =	12
FAC species	21	X 3 =	63
FACU species	45	X 4 =	180
UPL species	0	X 5 =	0
Column Totals:	72	(A)	255 (B)

PI = B/A = 3.54

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	20	Y	FAC
2. Chamerion angustofolium	10	Y	FACU
3. Cornus canadensis	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 35			
50% of total cover: 17.5	20% of total cover: 7		

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-04 Feature ID W00TI014 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4	—	—	—	—	—	—	Fibric	Organics
4-6	2.5YR 2.5/3	100	—	—	—	—	Loamy Sand	
6-11	10YR 5/8	100	—	—	—	—	Loamy Sand	
11-16	10YR 5/6	100	—	—	—	—	Loamy Sand	
16-21	2.5Y 4/4	100	—	—	—	—	Silt Loam	

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

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

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

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

Hydric Soil Present (Y/N): N

Notes: Dry sandy soils

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

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

Notes: NO saturation. very dry

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES	P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none)_____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

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

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: GPS Technician QA/QC check:

QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60TI014 Field Target: 0183 Date: 06-04-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
DEE

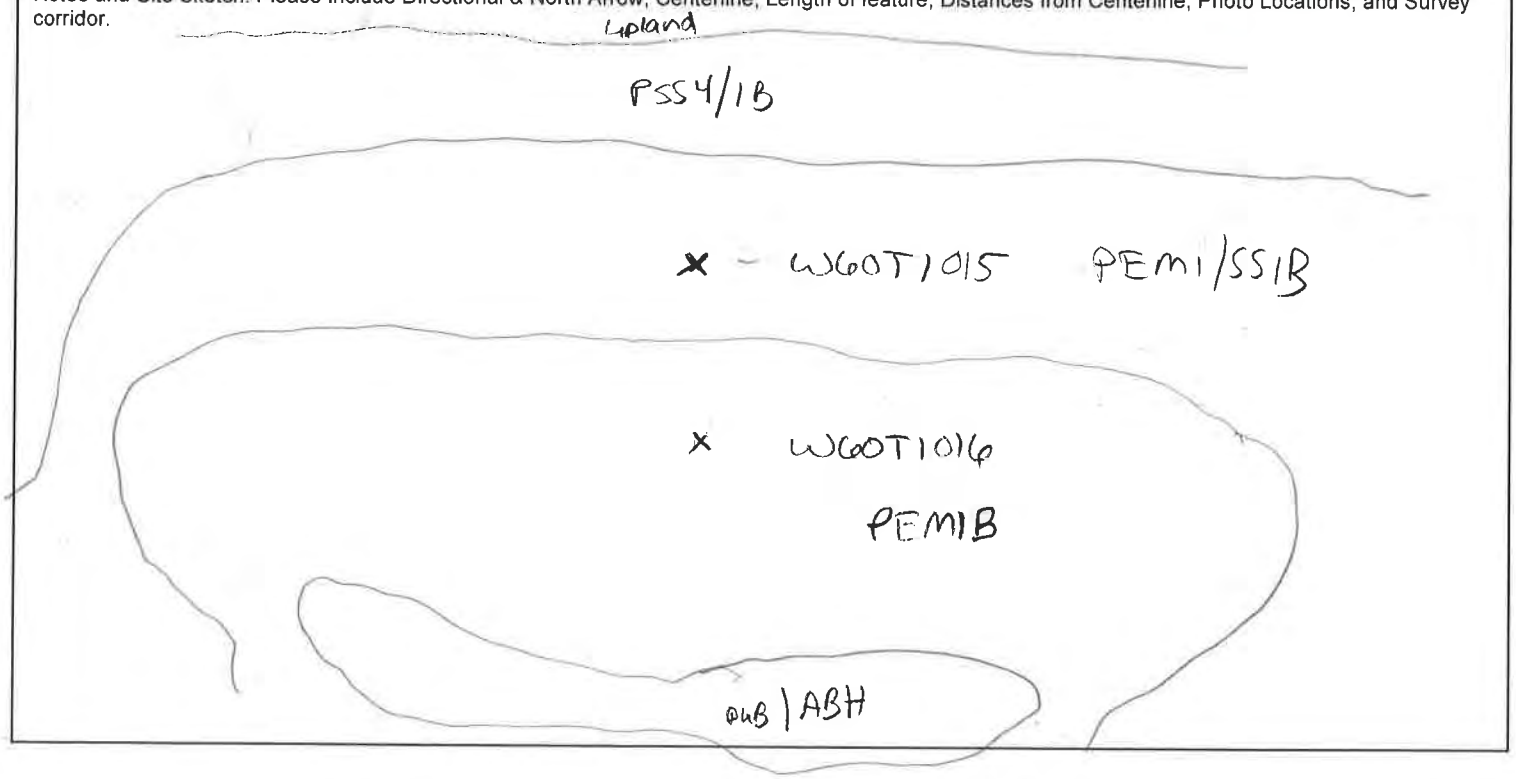
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 181	**Map #:** 118 **Map Date:** 5/27/14
Date: 10/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI015
Investigators: Valerie Watkins, Zac Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 685.3	
Latitude: 62°01'55.09''	**Longitude:** -150°11'48.59		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 13	**Picture No.:** P_W60TI015_E.W_pit_plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): slight hummocks
Slope (%): 0-3	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes ✓ No_____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes ✓ No_____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	10	Y	FAC
2. picea mariana	8		FACW
3. Rhododendrom tomentosum	15	Y	FACW
4. Vaccinium oxycoccus	2		OBL
5. Andromeda polifolia	6		FACW
6. Empetrum nigrum	1		FAC
7. Chamaedaphne calyculata	8		FACW
8.			
9.			
Total Cover: 50			
50% of total cover: 25	20% of total cover: 10		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 62	X 1 =	62
FACW species: 47	X 2 =	94
FAC species 11	X 3 =	33
FACU species 0	X 4 =	0
UPL species 0	X 5 =	0
Column Totals: 120	(A)	189 (B)

PI = B/A = 1.58

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. ~~Andromeda polifolium~~			
2. Carex rotundata	60	Y	OBL
3. Rubus Chamaemorus	10		FACW
4. Chamaedaphne calyculata			~~FACW~~
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 70			
50% of total cover: 35	20% of total cover: 14		

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % 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

SOIL Date 06-04-14 Feature ID WGOTI 0015 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-11							Fibric	organics
11-22							Fibric/hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 4		
Saturation Present (Y/N): (includes capillary fringe) X	Depth (in): 0		

Notes: Site is saturated to surface, water table at 4 inches

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__5__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__5__ Dwarf shrub (<0.5m) __45__ Tall herb (≥1m) __0__ Short herb (<1m) __70__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent 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__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW

GPS Technician QA/QC check: ym

QA QC Here

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W00T1015 Field Target: 181 Date: 06-04-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
Dec

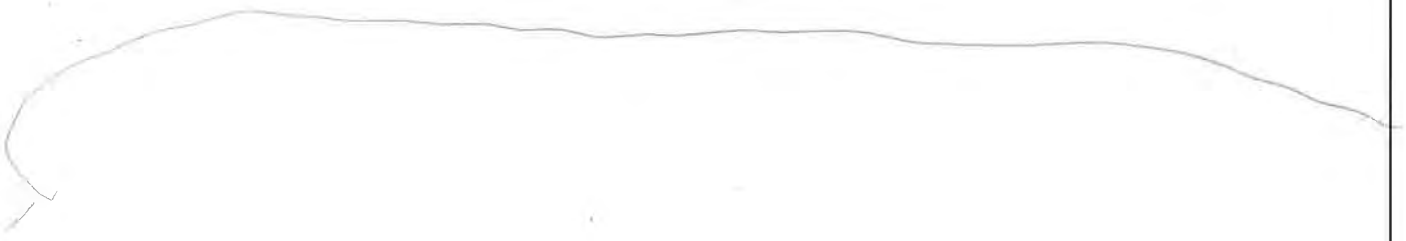
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 182	Map #: 118 Map Date: 5/27/14
Date: 6/4/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60TI016
Investigators: Valerie Watkins, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 685.3	
Latitude: 62° 01' 54.04"	Longitude: 150° 11' 49.75"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 13	Picture No.: P_W60TI016_E_W_pit_plug	

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): slight hummocks	
Slope (%): 0-3		Local relief (concave, convex, none): slightly concave	
Pre-mapped Alaska LNG/NWI classification: PEMIF		Soil Map Unit Name: —	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)	
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)		
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes X No_____		Is the Sampled Area within a Wetland? Yes X No_____	
Hydric Soil Present? Yes X No_____		Wetland Type: PEMIB	
Wetland Hydrology Present? Yes X No_____		Alaska Vegetation Classification (Viereck): III A2	

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



see sight sketch for W60TI015

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	10	Y	FAC
2. Andromeda polifolia	5		FACW
3. Chamaedaphne Calyculata	2		FACW
4. Rhododendron tomentosum	8	Y	FACW
5. Vaccinium oxycoccus	2		OBL
6. Picea mariana	1		FACW
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: 10 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	70	X 1 =	70
FACW species:	8	X 2 =	16
FAC species	10	X 3 =	30
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	88	(A)	116 (B)

PI = B/A = 1.31

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex Rotundata	40	Y	OBL
2. Menyanthes trifoliata	T		OBL
3. Carex limosa	30	Y	OBL
4. Tricophorum caespitosum	8		OBL
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 78			
50% of total cover: 39	20% of total cover: 15.6		

Hydrophytic Vegetation Indicators:

√ Dominance Test is > 50%

√ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % 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

SOIL Date 06-04 Feature ID W60TJ016 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-13							Fibric	organics
13-22							Fibric/hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): N/A	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 1		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: No surface water - but water table at about 1 inch. Wetter than W60T1015.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__1__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__15__ Dwarf shrub (<0.5m) __2__ Tall herb (≥1m) __0__ Short herb (<1m) __78__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: ZM QAQC ZGG

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60TI016 Field Target: 182 Date: 06-04-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade	X Zoe Meade
Wetland Scientist (print)	**Signature / Date**
X Valerie Watkins	X Valerie Watkins
Field Crew Chief (print)	**Signature / Date**

QA QC
DEC

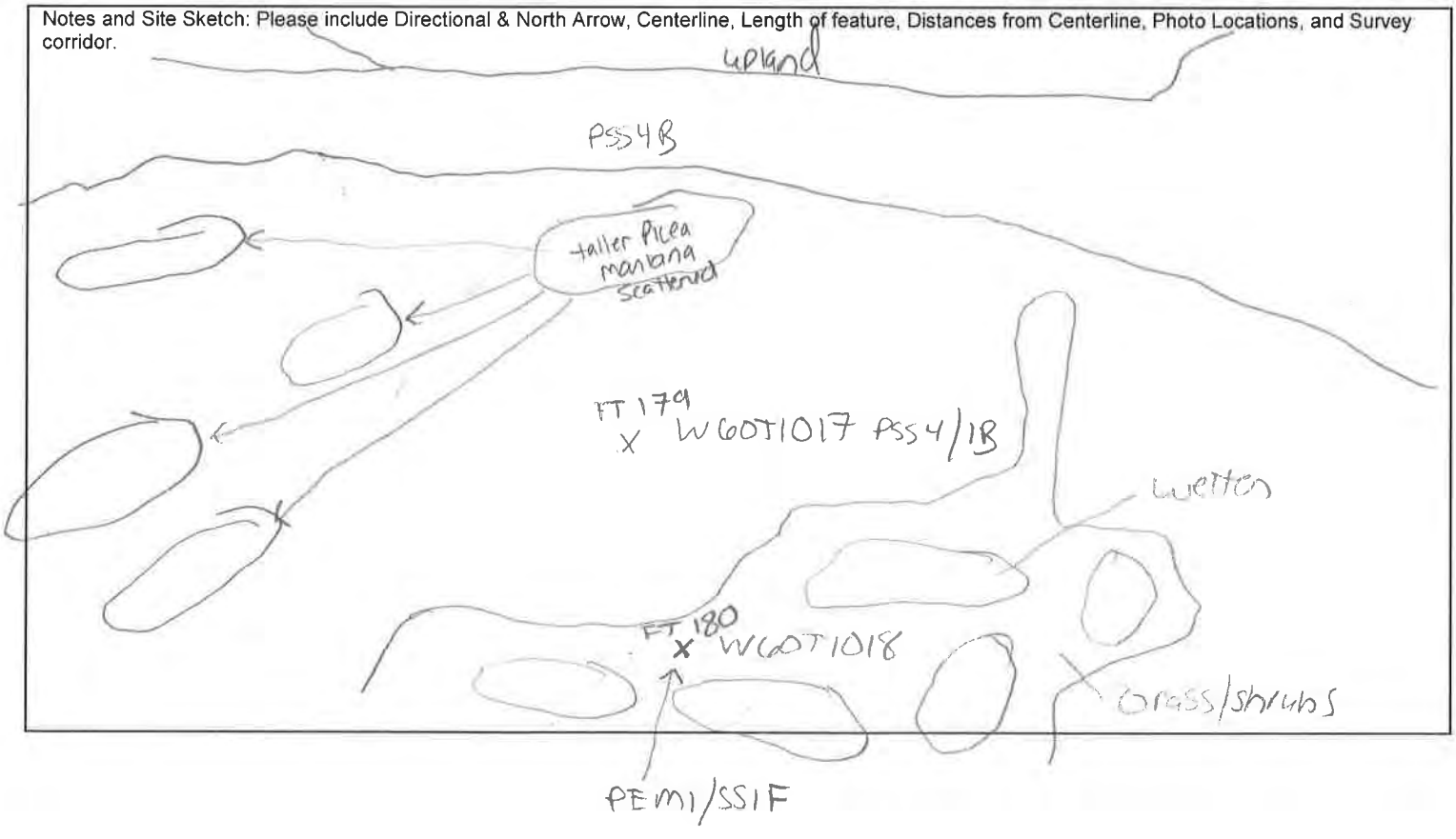
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 179	**Map #:** 117 **Map Date:** 5/27/14
Date: 6/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI017	
Investigators: Valerie Watkins, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 685		
Latitude: 62° 02' 06.77"		**Longitude:** -150° 11' 35.01"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 14	**Picture No.:** P_W60T1017_E_W_pit_plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Hummocks
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 4/1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II A 3, II C 2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (20')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Picea mariana	40	Y	FACW
2. betula nana	10		FAC
3. Rhodadron tomentosum	6		FACW
4. Empetrum nigrum	2		FAC
5. Rosa acicularis	T		FACU
6. Andromeda polifolia	3		FACW
7. Ribes Triste	4		FAC
8. Dasiphora fruticosa	15		FAC
9.			
Total Cover: ~~80~~ 80			
50% of total cover: 40.0	20% of total cover: 16.0		

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: 67	X 1 =	67
FACW species: 52	X 2 =	104
FAC species 16	X 3 =	48
FACU species 2	X 4 =	8
UPL species 0	X 5 =	0
Column Totals: 137 (A)		227 (B)

PI = B/A = 1.65

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex limosa	5		OBL
2. Rubus chamaemorus	3		FACW
3. trientalis europaea	2		FACU
4. ~~Dasiphora fruticosa~~ 2m	~~—~~	~~—~~	~~FAC~~
5. unknown herb	T		—
6. Equisetum fluviatile	1		OBL
7. Trichophorum caespitosa	50	Y	OBL
8. Carex aquatilis	10		OBL
9. Carex gynocrates	1		OBL
10. Viola spp.	T		—
~~Carex gynocrates~~ 2m Total Cover: 72 ~~T~~			~~OBL~~
50% of total cover: 36	20% of total cover: 14.4		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

60 % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-04 Feature ID W60T1017 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-14							Fibric	organics
14-19							Hemic	organics
19-22							Sapric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): Y	Depth (in): 6 inches	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 2"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: surface water is ~6 inches and only in scattered pockets around site.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved__X__ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__40__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m)__40__ Tall herb (≥1m)__0__ Short herb (<1m)__74__ Moss-Lichen__60__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.08

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: rw GPS Technician QA/QC check: zm QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1017 Field Target: 179 Date: 06-04-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
ZEE

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 180	Map #: 117 Map Date: 5/27/14
Date: 06-04-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1018
Investigators: Valerie Watkins, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 685	
Latitude: 62° 02' 06.77"		Longitude: -150° 11' 35.01"	Datum: WGS84
Logbook No.: 1	Logbook Page No.: 15	Picture No.: P_W60T1018	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1F	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	Is the Sampled Area within a Wetland? Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: PEM1/SS1 ~~F~~ B ~~X Too many shrubs for "F"~~
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A3, II C2

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

See site sketch for W60T1017

Wettest area should be mapped as PEM1F

PEM1/SS1F

UW and DEE

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Dasiphora fruticosa	25	Y	FAC
2. Betula nana	5		FAC
3. Andromeda polifolia	2		FACW
4. Vaccinium oxycoccus	1		OBL
5. Myrica gale	3		OBL
6. Spiraea Stevenii	5		FACU
7.			
8.			
9.			
Total Cover: 41			
50% of total cover: 20.5	20% of total cover: 8.2		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	136	X 1 =	136
FACW species:	2	X 2 =	4
FAC species	30	X 3 =	90
FACU species	6	X 4 =	24
UPL species	0	X 5 =	0
Column Totals:	174 (A)		254 (B)

PI = B/A = 1.46

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Trichophorum Caespitosum	70	Y	OBL
2. Menyanthes trifoliata	10		OBL
3. trientalis europaea	1		FACU
4. Equisetum fluviatile	2		OBL
5. Drosera rotundifolia	5		OBL
6. Carex rotundata	5		OBL
7. Utricularia macrorhiza	40	Y	OBL
8.			
9.			
10.			
Total Cover: 138			
50% of total cover: 66.5	20% of total cover: 26.6		

*other carex may be present at site but no seed heads found for identification

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

40 % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

50 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 6/4/14 Feature ID WetOT1018 Soil Pit Required (Y/N) N

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: No soil pit required. Standing water throughout site.

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

Surface Water Present (Y/N): Y	Depth (in): 10 inches	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes: Surface water throughout site

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 41 Tall herb (≥1m) 0 Short herb (<1m) 93 Moss-Lichen 40 Floating 0 Submerged 40

Number of Wetland Types (M): 4 **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even X

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water~~X~~ VW <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover__X__ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____X Small Scattered Patches_____ Continuous Cover_____

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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.27

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: ZM QAQC NZ

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1018 Field Target: 180 Date: 06-04-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QA QC
DEC

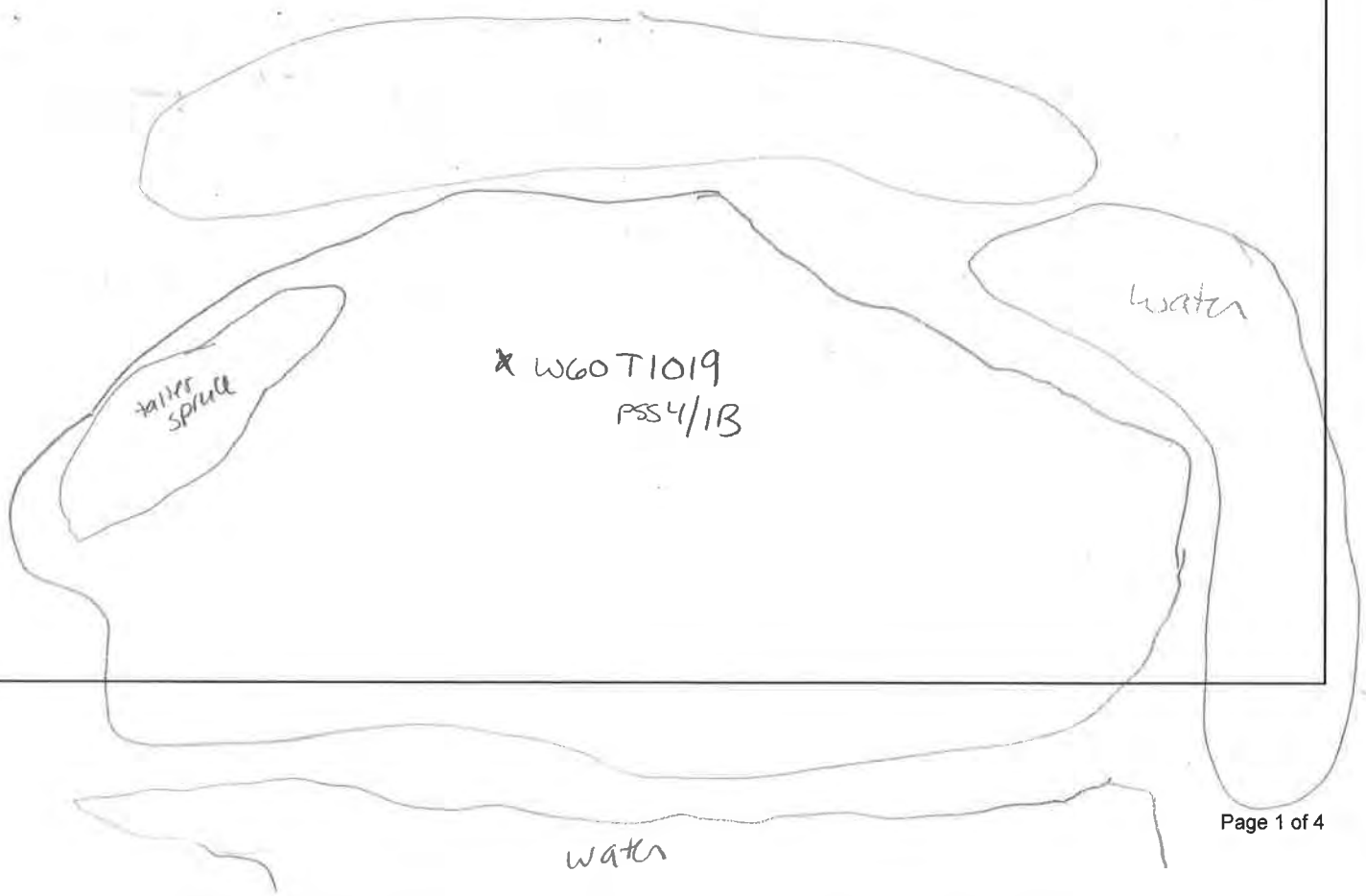
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 177	**Map #:** 116 **Map Date:** 5/27/14
Date: 06-05-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1019	
Investigators: Valerie Watkins, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 684		
Latitude: 62° 02' 52.69"		**Longitude:** -150° 10' 42.71"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 17	**Picture No.:** P_W60T1019_E_W_pt_plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0 - 2	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIA3, IIC2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			
Total Cover: 5			
50% of total cover: 2.5	20% of total cover: 1		
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	50	Y	FACW
2. Empetrum nigrum	30	Y	FAC
3. Rhododendron tomentosum	20		FACW
4. Betula nana	5		FAC
5. Andromeda polifolia	8		FACW
6. Chamaedaphne calyculata	5		FACW
7. Vaccinium oxycoccus	3		
8.			
9.			
Total Cover: 121			
50% of total cover: 60.5	20% of total cover: 24.2		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 34 (A)

Total Number of Dominant Species Across All Strata: 34 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	41	X 1 =	41
FACW species:	98	X 2 =	196
FAC species	35	X 3 =	105
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	174 (A)		342 (B)

PI = B/A = 1.97

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex microglochin	35	Y	OBL
2. Rubus Chamaemorus	10		FACW
3. Drosera rotundifolia	1		OBL
4. Tricophorum caespitosum	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 51			
50% of total cover: 25.5	20% of total cover: 10.2		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

5 % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05-14 Feature ID WG0T1019 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-13							Fibric	organics
13-22							Fibric/sapric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 15 inches		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 1		

Notes: water seeping into pit at 8"

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 50 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 71 Tall herb (≥1m) 0 Short herb (<1m) 51 Moss-Lichen 60 Floating 0 Submerged 0

Number of Wetland Types (M): 5 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even X

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** —

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

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

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

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: QA QC SEE

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WG0T1019 Field Target: 177 Date: 6/5/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — X Zoe Meade

Wetland Scientist (print) — **Signature / Date**

X Valerie Watkins — X Valerie Watkins

Field Crew Chief (print) — **Signature / Date**

QAQC
DSM

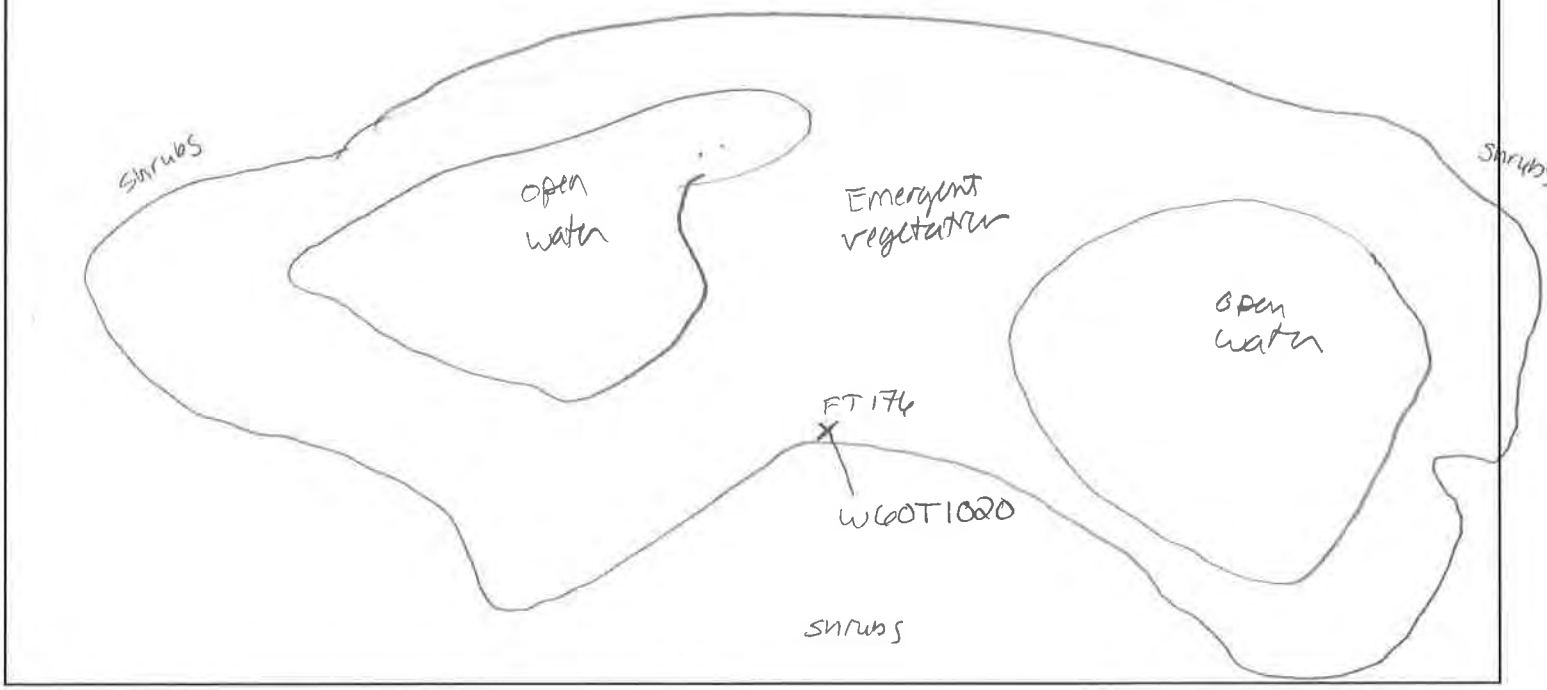
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 176	**Map #:** 116 **Map Date:** 5/27/14
Date: 6/5/14	**Project Name & No.:** Alaska LNG 26221306	**Feature Id:**	W60T1020
Investigators: Valerie Watkins, Zoe Meadl			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 684	
Latitude: 62° 02' 52.98"	**Longitude:** -150° 10' 41.79"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 17	**Picture No.:** P_W60T1020_N-E only 2 photos	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PUB/ABH	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PUB/ABH
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III D1

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



x W60T1019 PSS4/1B

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	2		FAC
2. Andromeda polifolia	10	Y	FACW
3. Rhododendron tomentosum	2		FACW
4. Vaccinium oxycoccus	1		OBL
5. Myrica gale	4	Y	OBL
6. Empetrum nigrum	1		FAC
7.			
8.			
9.			
Total Cover: 20			
50% of total cover: 10	20% of total cover: 4		

Cinc fen?

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (w 6) (A)

Total Number of Dominant Species Across All Strata: 3 (6) (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	91	X 1 =	91
FACW species:	12	X 2 =	24
FAC species	4	X 3 =	12
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	107 (A)		127 (B)

PI = B/A = 1.18

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. trichophorum caespitosum	15	Y	OBL
2. carex rotundata	15	Y	OBL
3. Menyanthes trifoliata	15	Y	OBL
4. Drosera rotundifolia	10		OBL
5. Comarum palustre	1		OBL
6. Carex limosa	20	Y	OBL
7. Rubus arcticus	1		FAC
8. Utricularia macrohiza	10		OBL
9.			
10.			
Total Cover: 87			
50% of total cover: 48.5	20% of total cover: 17.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

30 % Cover of Wetland Bryophytes

30 Total Cover of Bryophytes

70 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05-14 **Feature ID** W60T1020 **Soil Pit Required (Y/N)** N

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes

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

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

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

Restrictive Layer (if present): Type: [redacted] Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: No pit required due to standing water on site

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

Surface Water Present (Y/N): Y	Depth (in): 0	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: standing water throughout site over 4 inches

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m) __20__ Tall herb (≥1m) __0__ Short herb (<1m) __77__ Moss-Lichen__30__ Floating__10__ Submerged__10__

Number of Wetland Types (M): __5__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)__X__ 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__X__ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____

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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking__X__ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent 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** __5.5__

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: ym QAQC DCC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WBDT1020 Field Target: 176 Date: 06-05-14

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?

   } no test pit dug.

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Wahlund — **Field Crew Chief (print)**

X Valerie Wahlund — **Signature / Date**

QAQC
WEG

Vegetation Classification Data Form

Site Description		
Date: 06-05-14	Project Name & #: Alaska LNG 26221306	Field Target: ~~W60~~ 176
Investigators: Valerie Watkins, Zoe Meade		Feature ID: W60 T1 021
Latitude: 62° 09' 52.98"	Longitude: -150° 10' 41.79"	Datum: WGS84
Logbook #: 1	Logbook Page #:	Picture #: P_W60T1021 - veg-veg

Location Description:

North of field target 176

Common Species Observed (Scientific Name)

Betula neoalaskana	
Picea mariana	

Percent Cover of Dominant Structure Level: 80 %

Habitat Description:

Upland

Alaska Vegetation Classification: Level I, Level II, Level III

IC2	IIC2	

Notes:

Field Crew Chief: [signature]

Field Scientist/Technician Zoe Meade

QAQC
DEC

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

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

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

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21
16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water.	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

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

Feature ID: W60T1021 Field Target: 176 Date: 06-05-14

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

1. **General Information**
   - ☐ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade — **Field Technician (print)**

X Zoe Meade — **Signature**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature**

QAQC
AEE

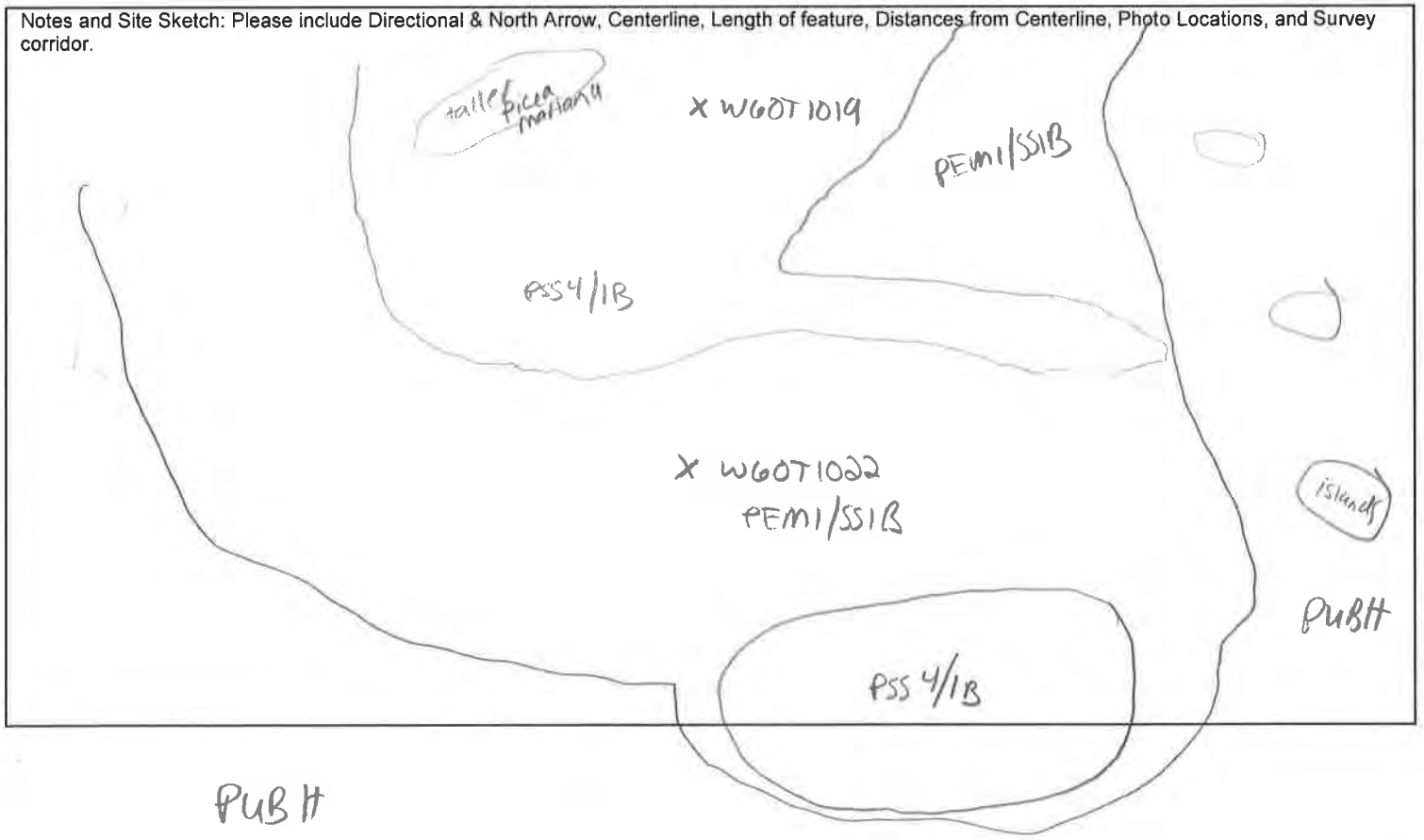
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 178	**Map #:** 116 **Map Date:** 5/27/14
Date: 06-04-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1022
Investigators: Valerie Watkins, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 684	
Latitude: 60° 02' 51.63"	**Longitude:** -150° 10' 44.18"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 18	**Picture No.:** P_W60T1022.W_SE, pit_plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A2, II C2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes:)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (20')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	15	Y	FAC
2. Andromeda polifolia	8	Y	FACW
3. Rhododendron tomentosum	2		FACW
4. Chamaedaphne calyculata	5		FACW
5. vaccinium oxycoccus	1		OBL
6.			
7.			
8.			
9.			
Total Cover: 31			
50% of total cover: 15.5	20% of total cover: 6.2		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	114	X 1 =	114
FACW species:	15	X 2 =	30
FAC species	15	X 3 =	45
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	144	(A)	189 (B)

PI = B/A = 1.31

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex rotundata	20		OBL
2. tricophorum caespitosum	60	Y	OBL
3. Drosera rotundifolia	8		OBL
4. Carex limosa	25	Y	OBL
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 113			
50% of total cover: 56.5	20% of total cover: 22.6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

10 % Bare Ground

70 % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05 Feature ID W60T1022 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-22							Fibric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:

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

Surface Water Present (Y/N): Y	Depth (in): ~~0~~ 1-2"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes: saturation + water table to surface. Scattered pockets of standing water 1-2" deep.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m) __31__ Tall herb (≥1m) __0__ Short herb (<1m) __115__ Moss-Lichen __60__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __5__ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)__X__ 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__X__ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent 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)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** __4.4__

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: ZM QHQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1022 Field Target: 178 Date: 06-04-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QA QC

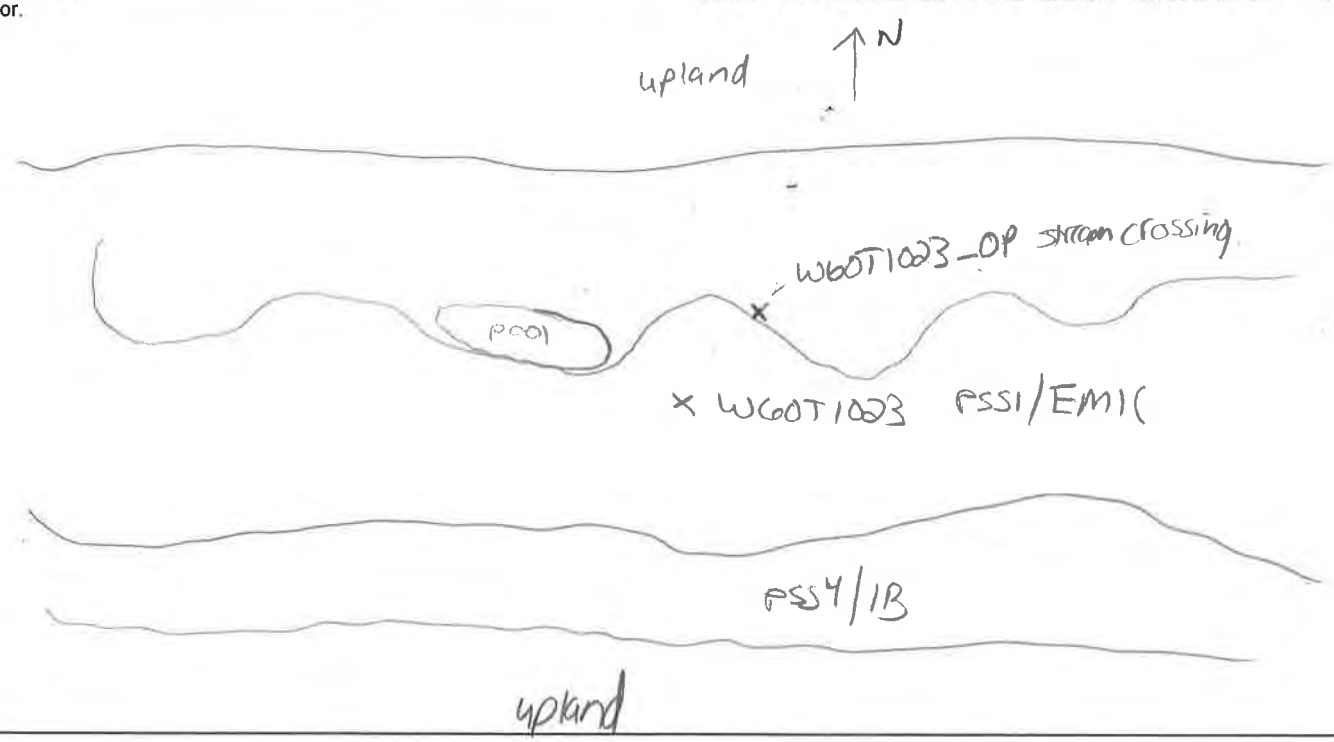
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 173	**Map #:** 115 **Map Date:** 5/23/14
Date: 06-05-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1023
Investigators: Valerie Watkins, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 683.2	
Latitude: 62° 03' 28.95"	**Longitude:** 150° 10' 01.65"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 19	**Picture No.:** P_W60T1023_E_W_pit_plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): ~~PEMIC~~ 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEMIC	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS 1/EM1C
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II C 2, III A 3

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	2		FACW
2. Betula nana	60	Y	FAC
3. Myrica gale	50	Y	OBL
4. Vaccinium uliginosum	10		FAC
5. Spiraea stevenii	5		FACU
6. Betula neoalaska	6		FAC U
7. Salex ~~fuscesen~~	1		FACW
8. fuscescens			
9.			

Total Cover: 134

50% of total cover: 67 20% of total cover: 26.8

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	88	X 1 =	88
FACW species:	3	X 2 =	6
FAC species	110	X 3 =	330
FACU species	11	X 4 =	44
UPL species	0	X 5 =	0
Column Totals:	212	(A)	468 (B)

PI = B/A = 2.20

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	3		OBL
2. Carex aquatilis	35	Y	OBL
3. Calamagrostis canadensis	40	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 78

50% of total cover: 39 20% of total cover: 15.6

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05 Feature ID W60T1023 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-9							fibric	organics
9-22							hemic-sapric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 4 inches	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:
Water seeping into pit at approximately 4 inches
Surface water in stream + pool only - not on site

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_8_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_125_ Dwarf shrub (<0.5m) _1_ Tall herb (≥1m) _0_ Short herb (<1m) _70_ Moss-Lichen_0_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _2_ | **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%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

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_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _X_ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_ 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_X_

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_X_ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_X_

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_ **pH Reading** 5.4

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

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

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: JM QA QC DC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WX20T1023 Field Target: 173 Date: 6/5/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X [signature] — **Signature / Date**

X Valerie Gratkin — **Field Crew Chief (print)**

X [signature] — **Signature / Date**

@40C
DEQ

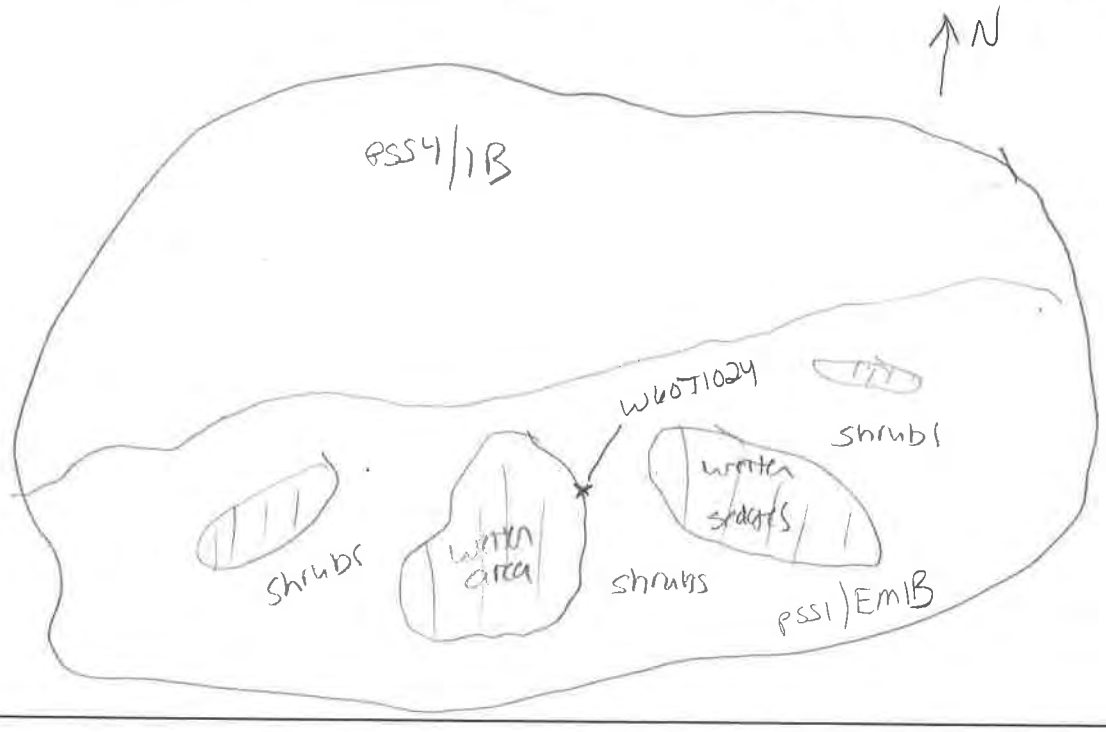
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)_____ **Other** (explain) corridor			**Field Target:** 174	**Map #:** 115 **Map Date:** 5/27/14
Date: 06-05-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1024	
Investigators: Valerie Watkins, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 683.3		
Latitude: 62° 03' 25.53"	**Longitude:** -150° 10' 06.90"			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 20	**Picture No.:** P_W60T1024_E-W-pit-plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1/SS4B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1 / EM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II C 2 / III A 2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: _____

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	45	Y	FAC
2. ~~Comarum palustre~~ 2m			~~FACW~~
3. Chamaedaphne calyculata	20	Y	FACW
4. Rhododendron tomentosum	10		FACW
5. Picea mariana	15		FACW
6. Andromeda polifolia	2		FACW
7. Vaccinium oxycoccus	1		OBL
8. Empetrum nigrum	4		FAC
9. Vaccinium uliginosum	1		FAC

Total Cover: 99

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	51	X 1 =	51
FACW species:	47	X 2 =	94
FAC species	53	X 3 =	159
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	151	(A)	304 (B)

PI = B/A = 2.01

Vaccinium vitis-idaea 1 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	2		FAC
2. Carex rotundata	10		OBL
3. Carex microglochin	40	Y	OBL
4. Carex limosa	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 62

50% of total cover: 31 20% of total cover: 12.4

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

30 % 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

SOIL	Date 06-05-14 Feature ID W60T1 024	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
0-8	—		—		—	—	Fibric	organics
8-13	—		—		—	—	Sapric-Hemic	organics
13-22	2.5Y 5/4	100	—		—	—	silt loam	

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 13 inches of saturated organics over mineral soil
underlying mineral soil is too light

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

Surface Water Present (Y/N): N	Depth (in): N/A	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 1	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_15_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_75_ Dwarf shrub (<0.5m)_0_ Tall herb (≥1m)_0_ Short herb (<1m)_102_ Moss-Lichen_30_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _3_ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_X_ Continuous Cover_____

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)_X_ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _X_ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent 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_X_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_X_ Connected Upstream & Downstream_____ Unknown_____

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

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check: WMM QAQC DEE

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1024 Field Target: 174 Date: 6/5/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade

Wetland Scientist (print)

X Zoe Meade

Signature / Date

X Valerie Watkins

Field Crew Chief (print)

X Valerie Watkins

Signature / Date

QAQC
DEE

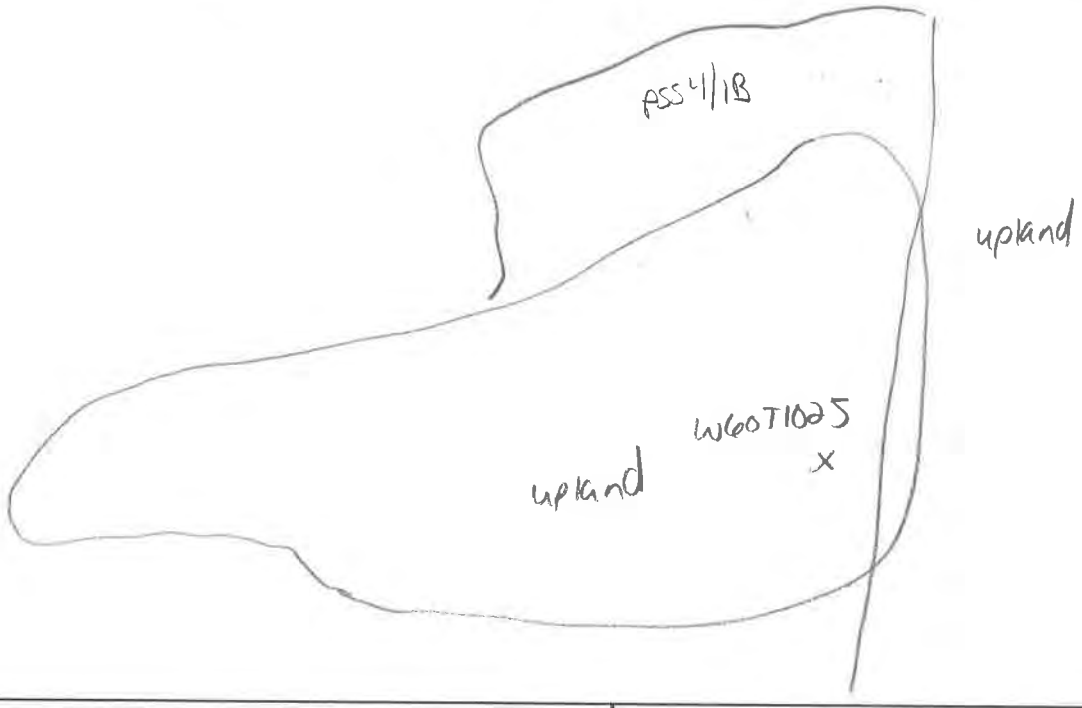
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 175	**Map #:** 115 **Map Date:** 5/27/14
Date: 06-05-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1025
Investigators: Valerie Watkins, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 683.3	
Latitude: 62° 03' 24.64"	**Longitude:** 150° 10' 06.96"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 21	**Picture No.:** P_W60T1025_S_W_pt_plug	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 3-5	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PF04/6S4B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): IA2, IIB2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	35	Y	FACW
2.			
3.			
4.			

Total Cover: 35

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	3		FAC
2. Empetrum nigrum	2		FAC
3. Menziesia ferruginea	40	Y	FACU
4. Picea mariana	10		FACW
5. Betula neoalaskana	8		FACU
6.			
7.			
8.			
9.			

Total Cover: 63

50% of total cover: 31.5 20% of total cover: 12.6

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	45	X 2 =	90
FAC species	21	X 3 =	63
FACU species	56	X 4 =	224
UPL species	0	X 5 =	0
Column Totals:	122	(A)	377 (B)

PI = B/A = 3.1

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	8	Y	FAC
2. cornus canadensis	2	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 10

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

Hydrophytic Vegetation Indicators:

* VW Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05 Feature ID W60TI025 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-6	—	—	—	—	—	—	Fibric	organics
6-7	10 YR 4/1						Silt loam	
7-10	5 YR 2.5/2						Sandy loam	
10-15	10 YR 3/6	92	2.5 YR 2.5/4	8	C	PL	Sandy loam	few gravels
15-22	10 YR 3/4						Sandy loam	few gravels

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

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

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

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

Hydric Soil Present (Y/N): N

Notes: 10YR 3/6 ← 10YR 4/1 → 5YR 2.5/2

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

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 15	

Notes: NO hydrology indicators present.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m)_____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

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

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: MW GPS Technician QA/QC check: ym QAQC 2022

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: UW60T1025 Field Target: 175 Date: 6/5/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

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

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

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

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

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

X Zoe meade — X [signature] 6/5/14

Wetland Scientist (print) — **Signature / Date**

X Valerie Watkins — X 6/5/14

Field Crew Chief (print) — **Signature / Date**

QAQC
DEE

Vegetation Classification Data Form

Site Description		
Date: 06-05-14	Project Name & #: Alaska LNG 26221306	Field Target: 173
Investigators: Valerie Watkins, Zoe Meade		Feature ID: W60T1026
Latitude: 62° 03' 27.36"	Longitude: -150 10' 04.50"	Datum: WGS84
Logbook #: 1	Logbook Page #: 22	Picture #: P-W60T1026_E_W

Location Description:

South of FT 173

Common Species Observed (Scientific Name)

Menziesia ferruginea	
Betula neoalaskana	
Picea mariana	

Percent Cover of Dominant Structure Level: 60

Habitat Description:

Spruce birch forest

Alaska Vegetation Classification: Level I, Level II, Level III

IC2	IIC2	

Notes:

Field Crew Chief: VM

Field Scientist/Technician: ZM

QAQC
MG

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

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

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

1a	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b	Trees over 3 meters (10 ft) tall are absent or nearly so, Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b	Shrubs less than 1.5 meters (5 ft) tall	12
11 a	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11 b	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b	Dominant vegetation growing submerged in water or floating on the water surface but not emerging above the water	III.D Aquatic herbaceous 21
16a	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b	Forbs or bryophytes dominant	18
17a	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp	III.A.1 Dry graminoid herbaceous
17b	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp or *Eriophorum* spp., tussocks often present	III.A.2 Mesic graminoid herbaceous
17c	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21 b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

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

Feature ID: WAOST1026 Field Target: 173 Date: 6/5/14

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

1. **General Information**
   - [x] Location data recorded?
   - [x] Photo taken and photo number recorded?
2. **Location Description**
   - [x] Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - [x] Scientific name of common species recorded?
   - [x] Percent cover of dominant structure level noted?
4. **Habitat Description**
   - [x] Habitat described?
5. **Classification**
   - [x] All three levels of classification recorded?
6. **Field Log Book**
   - [x] Field form entries consistent with log book?
   - [x] Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade — **Field Technician (print)**

X Zoe Meade — **Signature**

X Valerie Westkamp — **Field Crew Chief (print)**

X Valerie Westkamp — **Signature**

QAQC
JEG

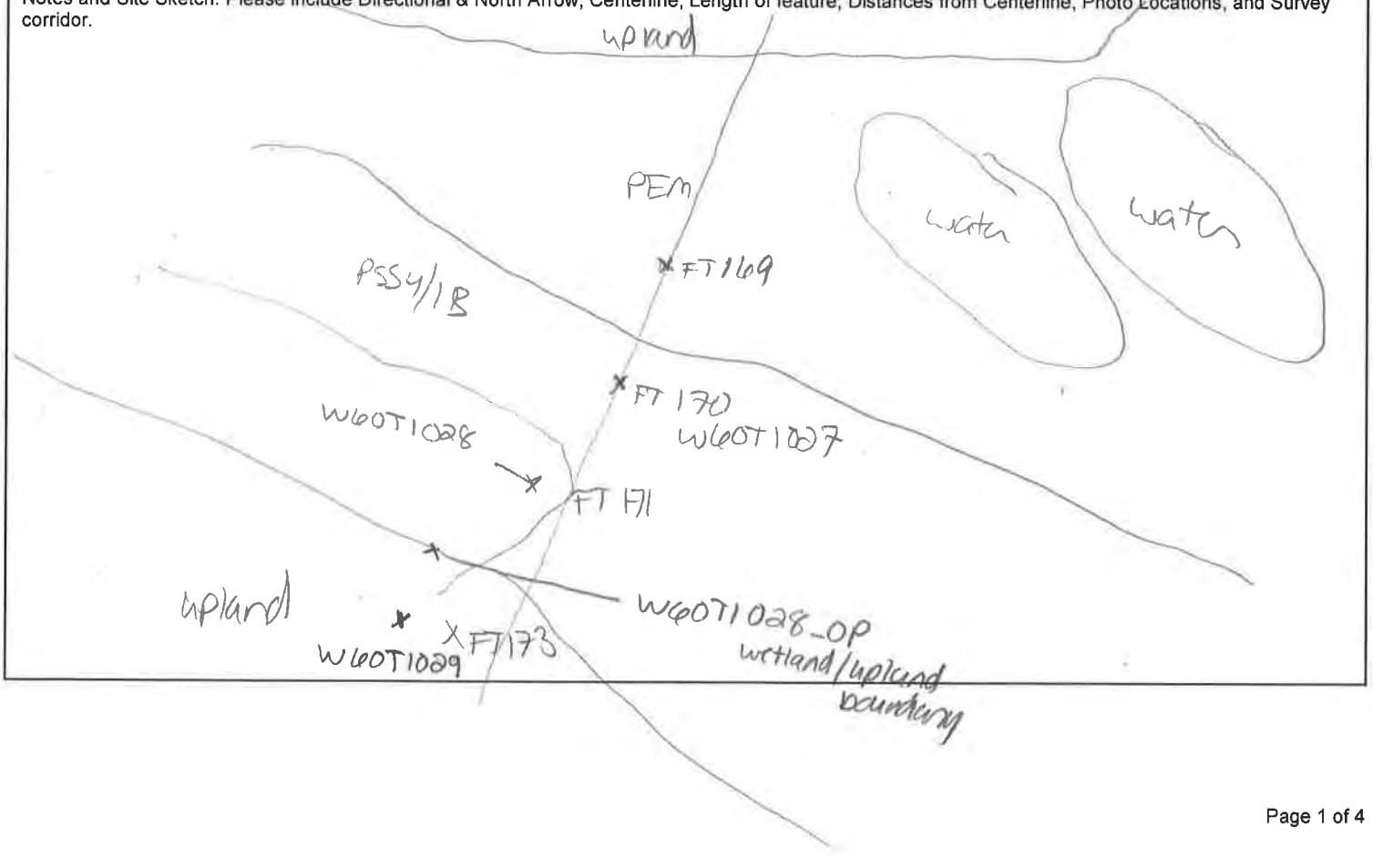
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 170	**Map #:** 114 **Map Date:** 5/27/14
Date: 06-06-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1027	
Investigators: Valerie Watkins, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 682.7		
Latitude: 62° 03' 52.06"	**Longitude:** -150° 09' 34.34"			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 23	**Picture No.:** P_W60T1027_E_W_pit_plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks, slight
Slope (%): 0-3	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIA2, IIC2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			

Total Cover: 5

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	FACW
2. Betula nana	10		FAC
3. Rhododendron tomentosum	8		FACW
4. Empetrum nigrum	15		FAC
5. Andromeda polifolia	4		FACW
6. Chamaedaphne calyculata	6		FACW
7. Vaccinium oxycoccus	1		OBL
8.			
9.			

Total Cover: 84

50% of total cover: 42 20% of total cover: 16.8

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	36	X 1 =	36
FACW species:	73	X 2 =	146
FAC species	26	X 3 =	78
FACU species	1	X 4 =	4
UPL species	0	X 5 =	0
Column Totals:	136	(A)	264 (B)

PI = B/A = 1.94

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus Chamaemorous	10		FACW
2. Equisetum sylvaticum	1		FAC
3. Drosa rotundifolia	T		OBL
4. Carex microglochin	35	Y	OBL
5. Geocaulon lividum	1		FACU
6. trichophorum caespitosum	5		OBL
7.			
8.			
9.			
10.			

Total Cover: 52

50% of total cover: 26 20% of total cover: 10.4

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % 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

SOIL Date 06-06-14 Feature ID W60T1027 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10	—	—	—	—	—	—	Fibric	organics
10-22	—	—	—	—	—	—	Fibric-hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 9		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: Saturated to surface. No standing water on site.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved__X__ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__5__ Sapling (<5 dbh, <6m tall)__40__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__34__ Dwarf shrub (<0.5m)__20__ Tall herb (≥1m)__0__ Short herb (<1m)__32__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check:

QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1027 Field Target: 170 Date: 06-06-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade — X [signature]

Wetland Scientist (print) — **Signature / Date**

X Valerie Watkins — X [signature]

Field Crew Chief (print) — **Signature / Date**

QAQC
DEE

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 171	**Map #:** 114 **Map Date:** 05/27/14
Date: 06-06-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1028	
Investigators: Valerie Watkins, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 682.7		
Latitude: 60° 03' 51.94"		**Longitude:** -150° 09' 36.16"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 23	**Picture No.:** P_W60T1028_E_W-pit-plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-5	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PFO4/SS4B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO4/SS4B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): I A 2, II A 2

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

28

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	35	Y	FACW
2.			
3.			
4.			
Total Cover: 35			
50% of total cover: 17.5	20% of total cover: 7		
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	10		FAC
2. Rhododendron tomentosum	T		FACW
3. Vaccinium vitis-idaea	5		FAC
4. Alnus ssp.	15	Y	FAC
5. Empetrum nigrum	1		FAC
6. Picea mariana	20	Y	FACW
7. Chamaedaphne calyculata	T		FACW
8. Vaccinium uliginosum	5		FAC
9.			
Total Cover: 56			
50% of total cover: 28	20% of total cover: 11.2		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 1	X 1 =	1
FACW species: 65	X 2 =	130
FAC species 78	X 3 =	234
FACU species 6	X 4 =	0
UPL species 0	X 5 =	0
Column Totals: 144	(A)	365 (B)

PI = B/A = 2.53

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	5		FACW
2. Equisetum arvens	30	Y	FAC
3. unidentified herb	T	—	—
4. (Maianthemum ssp.)	4		FAC
5. Calamagrostis Canadensis	8		FAC
6. Equisetum fluviatile	1		OBL
7. Carex ssp.	1		—
8.			
9.			
10.			
Total Cover: 49			
50% of total cover: 24.5	20% of total cover: 9.8		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

5 % Bare Ground

15 % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Alnus not identified to species. All species are FAC.

WETLAND DETERMINATION DATA FORM

SOIL Date 06-06 Feature ID W60T1028 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-9							Fibric	organics, lots of roots
9-22							Fibric/hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): Y	Depth (in): 1-2 depth	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 1		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: Surface water in scattered pockets throughout plot.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking____ Forested-Deciduous-Needle-leaved X Forested-Deciduous-Broad-leaved____ Forested-Evergreen-Needle-leaved X Scrub Shrub-Deciduous-Needle-leaved____ Scrub Shrub-Deciduous-Broad-leaved____ Scrub Shrub-Evergreen-Broad-leaved____ Scrub Shrub-Evergreen-Needle-leaved____ Emergent-Non-persistent____ Emergent-Persistent____ Aquatic Bed____

Percent Cover (P): Tree (>5 dbh, >6m tall) 35 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 15 Dwarf shrub (<0.5m) 6 Tall herb (≥1m) 0 Short herb (<1m) 49 Moss-Lichen 15 Floating 0 Submerged 0

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

Vegetation Density/Dominance (P): Sparse (0-20%)____ Low Density (20-40%)____ Medium Density (40-60%)____ High Density (60-80%) X 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 X N/A____

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

Presence of Islands (M): Absent (none) ____ One or Few____ Several to Many ____ N/A X

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____ Flat X Lacustrine Fringe____ Depressional ____ Riverine ____ Estaurine Fringe____

SOIL VARIABLES

Soil Factors (P): Soil Lacking____ Histosol:Fibric X Histosol:Hemic____ Histosol: Sapric____ Mineral: Gravelly____ Mineral: Sandy____ Mineral: Silty____ Mineral: Clayey____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet____ No Inlet/Perennial Outlet____ Intermittent Inlet/No Outlet____ Intermittent Inlet/Intermittent Outlet____ Intermittent Inlet/Perennial Outlet____ Perennial Inlet/No Outlet____ Perennial Inlet/Intermittent Outlet____ Perennial Inlet/Perennial Outlet____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate____ Fluvaquent Soils Sediment Created____

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

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

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

Water pH (P): No surface water____ Circumneutral (5.5-7.4)____ Alkaline (>7.4)____ Acid (<5.5) X **pH Reading** 5.3

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed____ Intermittent Spring____ Perennial Spring____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below____ Only Connected Above____ Connected Upstream & Downstream X Unknown____

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

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

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

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature] QAQC Dea

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1028 Field Target: 171 Date: 06-06-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Wattenbarger — **Field Crew Chief (print)**

X Valerie Wattenbarger — **Signature / Date**

QA QC
DEQ

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) corridor			**Field Target:** 172	**Map #:** 114 **Map Date:** 5/27/14
Date: 06-05-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI029	
Investigators: Valerie Watkins, Joe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 682.7		
Latitude: 62°03'50.66"	**Longitude:** 150°09'31.12"		**Datum:** WGS84	
Logbook No.: 1	**Logbook Page No.:** 24	**Picture No.:** P_W60T1029_E-W		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): slight hummocks
Slope (%): 0-5	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ~~X~~ VW No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IC2, IIB2

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

see site sketch for site W60T1027

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FACU
2. Picea mariana	15	Y	FACW
3.			
4.			

Total Cover: 45

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus ssp.	40	Y	FAC
2. Menziesia ferruginea	15	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: ~~40~~ 55

50% of total cover: ~~20~~ 27.5 (nw) 20% of total cover: ~~8~~ 11

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: ~~5~~ 6 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~0.6~~ 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	15	X 2 =	30
FAC species	80	X 3 =	240
FACU species	96	X 4 =	384
UPL species	0	X 5 =	0
Column Totals:	191 (A)		654 (B)

PI = B/A = 3.4

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	30	Y	FAC
2. Equisetum arvense	10		FAC
3. Pryopteris expansa	50	Y	FACU
4. trientalis europaea	1		FACU
5. ~~Menziesia ferruginea~~ (vw)	~~15~~		~~FACU~~
6.			
7.			
8.			
9.			
10.			

Total Cover: ~~106~~ 91

50% of total cover: ~~53~~ 45.5 (nw) 20% of total cover: ~~21.2~~ 18.2

Hydrophytic Vegetation Indicators:

~~*~~ (no) (nw) Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

10 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): ~~Y~~ N (nw)

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-06 Feature ID WEOT1 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3	—	—	—	—	—	—	Fibric	organics
3-13	10YR 3/3	98	7.5YR 3/4	15	C	PL/M	silt loam	W/ large cobbles 50%
13-22	10YR 4/3	85	7.5YR 3/4	5	C	M	silt loam	
	10YR 2/2	10						

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

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

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

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

Hydric Soil Present (Y/N): N

Notes:

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N	
Water Table Present (Y/N): Y 2m	Depth (in): 19		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 14		

Notes: saturation present - but not within 12 inches

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix
Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____
Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____
Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____
Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____
Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____
Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____
Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____
Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____
Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____
Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____
HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES
Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES
Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____
Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____
Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____
Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____
Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____
Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____
Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____
Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____
Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____
Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)
Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____
Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____
Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____
Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: WW GPS Technician QA/QC check: ZM QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WG0T1029 Field Target: 172 Date: 6/6/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

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

5. Functions and Values

- [ ] N/A Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

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

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
WLE

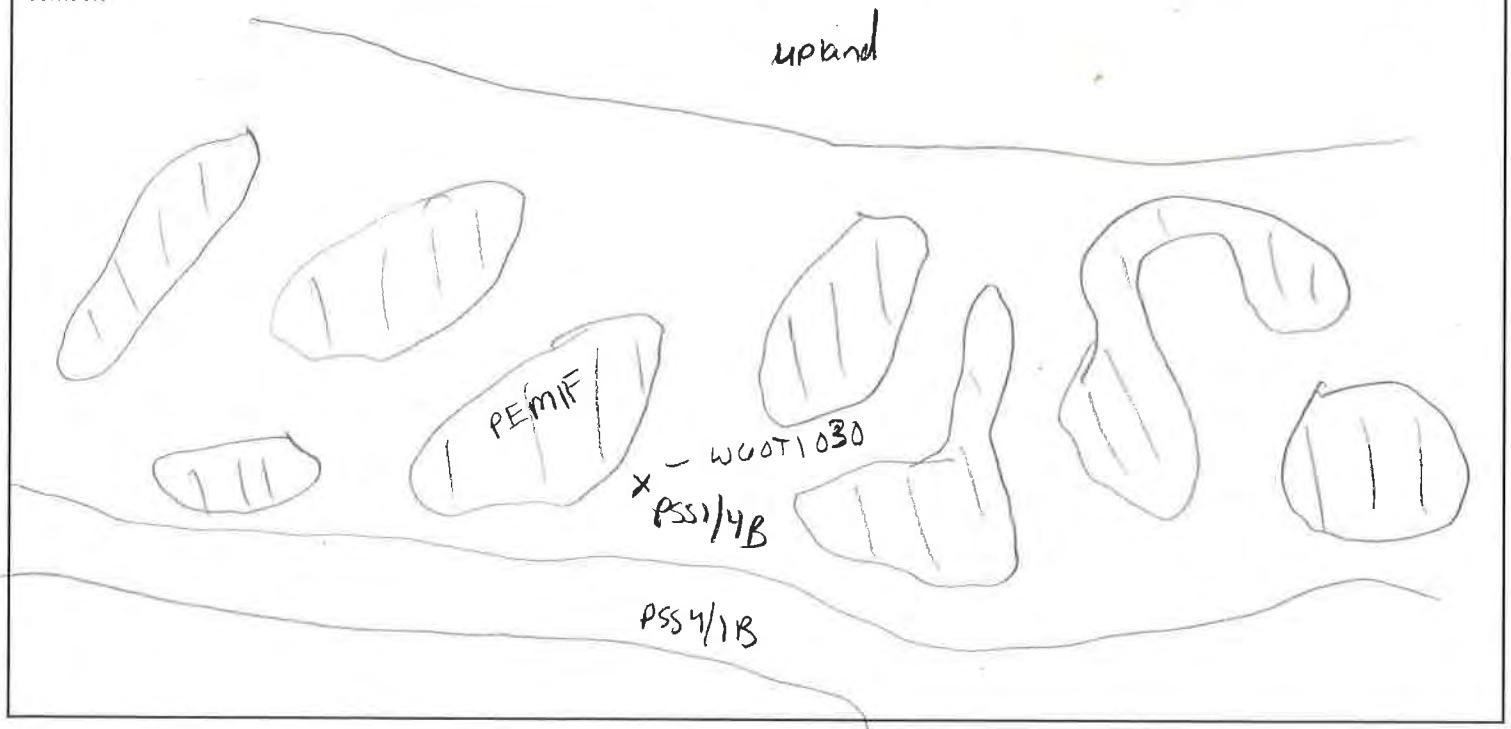
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 169	Map #: 114 Map Date: 5/27/14
Date: 6/5/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1030	
Investigators: Valerie Watkins, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 662.7		
Latitude: 62° 03' 52.72"	Longitude: -150° 09' 35.02"		Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 25	Picture No.: P_W60T1030_E_W_pit_plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummock
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEMIB / F	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 1/4 B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~II C2, II A3~~ II A2, II C2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	25	Y	FAC
2. Rhododendron tomentosum	6		FACW
3. Dasiphora fruticosa	6		FAC
4. Empetrum nigrum	2		FAC
5. picea mariana	20	Y	FACW
6. Spirea stevenii	3		FACU
7. Andromeda polifolia	2		FACW
8. Myrica gale	4		OBL
9.			
Total Cover: 68			
50% of total cover: 34	20% of total cover: 13.6		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 26	X 1 =	26
FACW species: 30	X 2 =	60
FAC species 65	X 3 =	195
FACU species 5	X 4 =	20
UPL species 0	X 5 =	0
Column Totals: 126	(A)	301 (B)

PI = B/A = 2.39

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	5		OBL
2. Rubus arcticus	2		FAC
3. Equisetum pratense	2		FACW
4. Trientaliseuropaea	1		FACU
5. Cornus canadensis	2		FACU
6. Menyantnes trifoliata	1		OBL
7. trichophorum caespitosum	10		OBL
8. Carex limosa	6		OBL
9. Calamagrostis Canadensis	30	Y	FAC
10.			
Total Cover: 59			
50% of total cover: 29.5	20% of total cover: 11.8		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

75 % Cover of Wetland Bryophytes

75 Total Cover of Bryophytes

8 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-05-14 Feature ID W60T1030 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10							Fibric	organics
10-22							Fibric-hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): Y	Depth (in): 2-4 inches	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 4		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:
Water seepage at 4 inches
Pockets of standing water

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 48 Tall herb (≥1m) 0 Short herb (<1m) 59 Moss-Lichen 75 Floating 0 Submerged 0

Number of Wetland Types (M): 4

Evenness of Wetland Type Distribution (M): Even ____Highly Uneven ____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_X_ 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_X_ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

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_____ Flat_____ Lacustrine Fringe_____ Depressional _X_ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_X_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_X_ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_ **pH Reading** 5.1

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

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

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW

GPS Technician QA/QC check:

QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1030 Field Target: 169 Date: 6/6/14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade — X Zoe Meade

Wetland Scientist (print) — **Signature / Date**

X Valerie Watkins — X Valerie Watkins

Field Crew Chief (print) — **Signature / Date**

QAQC DEC

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

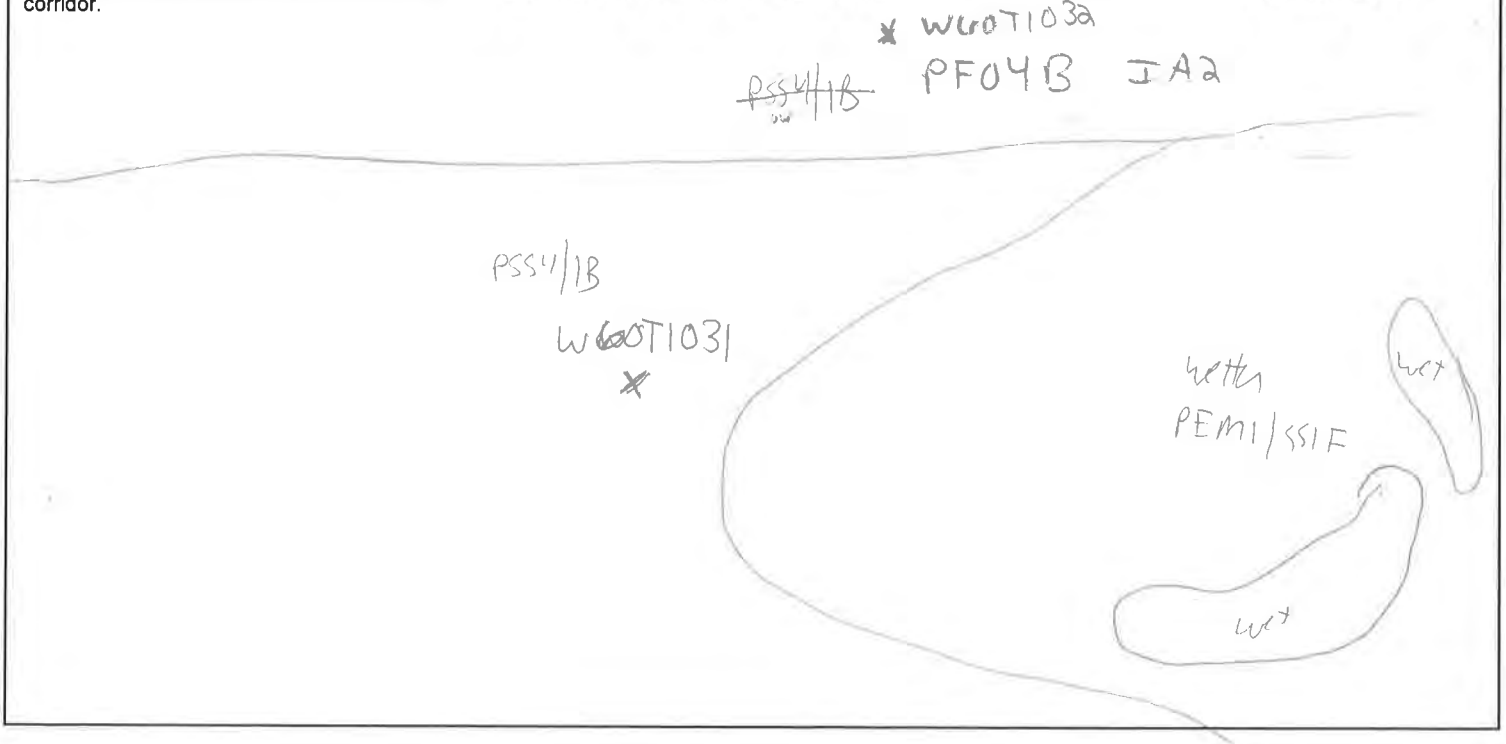
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) corridor			**Field Target:** 167	**Map #:** 113 **Map Date:** 5/27/14
Date: 6/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1031	
Investigators: Valerie Watkins, Dan LaPlant, Zoe Meadi				**Team No.:** WX01
State: Alaska	**Region:** Alaska	**Milepost:** 683.3		
Latitude: 62° 07' 20.24"		**Longitude:** 150° 09' 50.58"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 26	**Picture No.:** P_W607T1031_SW-NE_pit_plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3%	Local relief (concave, convex, none): slight concave
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II.A2, II.C2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	2 *		FACW
2.			
3.			
4.			
Total Cover: —			
50% of total cover: —	20% of total cover: —		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Picea mariana	40	Y	FACW
2. Rhododendron tomentosum	10		FACW
3. Betula nana	8		FAC
4. Chamaedaphne calyculata	5		FACW
5. Vaccinium oxycoccus	2		OBL
6. Empetrum nigrum	6		FAC
7. Vaccinium vitis-idaea	2		FAC
8. ~~Spirea stevenii~~ nm			~~FACW~~
9.			
Total Cover: 75			
50% of total cover: 37.5	20% of total cover: 15		

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:	43	X 1 =	43
FACW species:	65	X 2 =	130
FAC species	18	X 3 =	54
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	126 (A)		227 (B)

PI = B/A = 1.80

* Tree stratum combined with saplings because under 5% absolute cover.

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	8		FACW
2. Equisetum fluviatile	1		OBL
3. Carex microglochin	40	Y	OBL
4. Maianthemum ssp.	2		FAC
5. Geocaulon lividum	1		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: 52			
50% of total cover: 26	20% of total cover: 10.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % 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):

false solomon seal

WETLAND DETERMINATION DATA FORM

SOIL Date 06-08-14 Feature ID W60T10 31 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0"-10							Fibric	organics
10-22							Fibric-Hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 10	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved__X__ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__2__ Sapling (<5 dbh, <6m tall)__40__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__13__ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) __0__ Short herb (<1m) __52__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __Y__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VWJ

GPS Technician QA/QC check:

QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1031 Field Target: 167 Date: 06-08-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
WEC

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 166	**Map #:** 113 **Map Date:** 5/27
Date: 06-08-14	**Project Name & No.: Alaska LNG 26221306**			**Feature Id:** W60T1032
Investigators: Valerie Watkins, Dan LaPlant, Zoe Meade				**Team No.:** W60
State: Alaska	**Region: Alaska**	**Milepost:** 678-3		
Latitude: 62° 07' 22.76"		**Longitude:** -150° 09' 49.31"		**Datum: WGS84**
Logbook No.: 1	**Logbook Page No.:** 26	**Picture No.:** P-W60T1032-W-E-pit-plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS 4/1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PFO4B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IA2

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

See site sketch for W60T1031

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	50	Y	FACW
2.			
3.			
4.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron groenlandicum	5	X	FAC
2. Betula nana	4		FAC
3. Alnus ssp.	10	Y	FAC
4. Vaccinium vitis- idaea	2		FAC
5. Rhododendron tomentosum	4		FACW
6. empetrum nigrum	2		FAC
7. Picea mariana	10	Y	FACW
8. Betula neoalaskana	2		FACU
9. Menziesia ferruginea	2		FACU

Total Cover: 51

50% of total cover: 25.5 20% of total cover: 10.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 7 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	15	X 1 =	15
FACW species:	119	X 2 =	238
FAC species	36	X 3 =	108
FACU species	6	X 4 =	24
UPL species	0	X 5 =	0
Column Totals:	176	(A)	385 (B)

PI = B/A = 2.18

Vaccinium uliginosum 10 Y FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	55	Y	FACW
2. Equisetum arvens	2		FAC
3. Geocaulon lividium	2		FACU
4. Equisetum sylvaticum	1		FAC
5. Carex microglochin	15	Y	OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 75

50% of total cover: 37.5 20% of total cover: 15

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % 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

SOIL Date 06-08 Feature ID W60T1032 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10	—	—	—	—	—	—	Fibric	organics
10-23	—	—	—	—	—	—	Fibric/hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 23 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 8		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: water seeping into ~~surface~~ pit at 7"

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved__X__ 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)__50__ Sapling (<5 dbh, <6m tall)__10__ Tall shrub (2-6m)__10__ Short shrub (0.5-2m)__2__ Dwarf shrub (<0.5m) __35__ Tall herb (≥1m) __0__ Short herb (<1m) __20__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __4__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent 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__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__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: QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WGOT1032 Field Target: 166 Date: 06-08-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe meade — **Wetland Scientist (print)**

X Zoe meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QAQC
WEZ

Vegetation Classification Data Form

Site Description		
Date: 6/8/14	Project Name & #: Alaska LNG 26221306	Field Target: 166
Investigators: Valerie Watkins, Dan LaPlant, Zoe Mady		Feature ID: W60T1033
Latitude: 60° 07' 23.71"	Longitude: -150° 09' 52.48"	Datum: WGS84
Logbook #: 1	Logbook Page #: 26	Picture #: P_W60T1033_NW_SW

Location Description:

north of W60T1033 in upland area

Common Species Observed (Scientific Name)

Betula neoalaskana	Picea mariana
Alnus spp.	
Calamagrostis canadensis	
Dryopteris expansa	

Percent Cover of Dominant Structure Level: 45%

Habitat Description:

Birch/spruce forest

Alaska Vegetation Classification: Level I, Level II, Level III

I C 2		

Notes:

Field Crew Chief: VW Field Scientist/Technician ZM

QA QC Data

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

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

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

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A. Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21
16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

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

Feature ID: WLeOT1033 Field Target: Help Date: 6/8/14

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

1. **General Information**
   - ☒ Location data recorded?
   - ☒ Photo taken and photo number recorded?
2. **Location Description**
   - ☒ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☒ Scientific name of common species recorded?
   - ☒ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☒ Habitat described?
5. **Classification**
   - ☒ All three levels of classification recorded?
6. **Field Log Book**
   - ☒ Field form entries consistent with log book?
   - ☒ Logbook clearly identifies the Field Target ID and Feature ID?

X Zoe Meade — **Field Technician (print)**

X [signature] — **Signature**

X Valerie Watkins — **Field Crew Chief (print)**

X [signature] — **Signature**

QA-QC
DEG

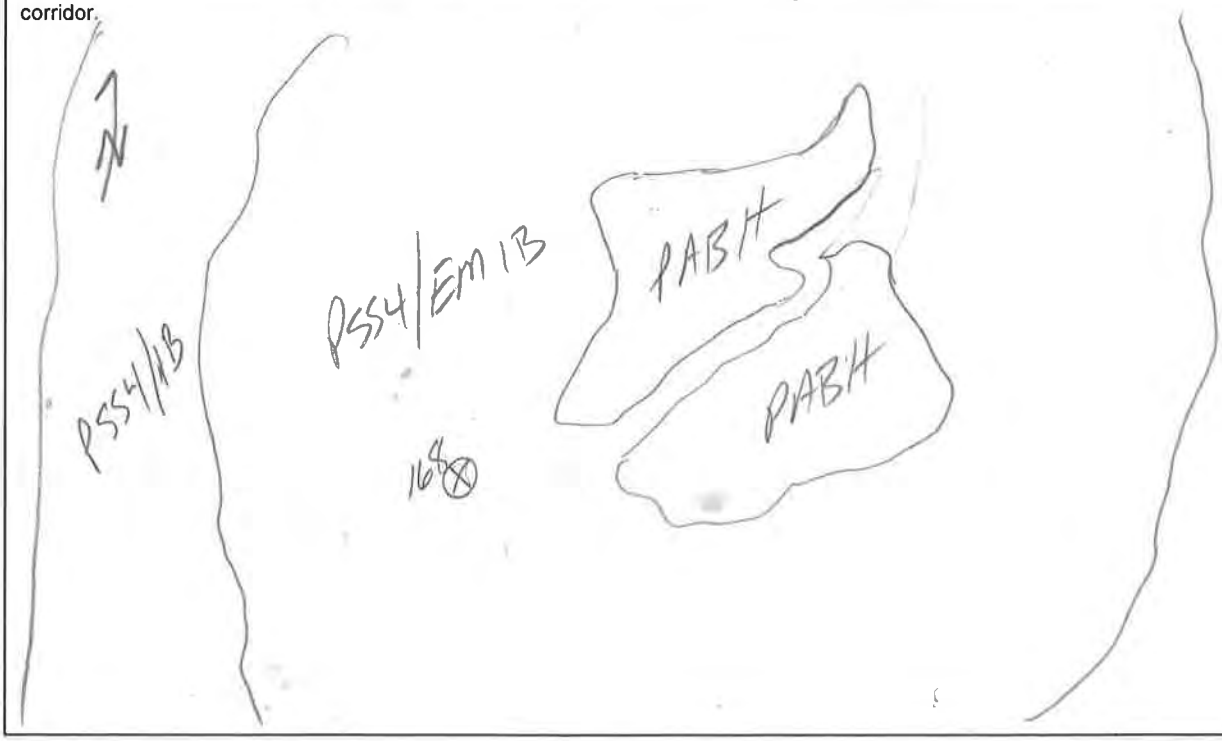
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) corridor			**Field Target:** 168	**Map #:** 113 **Map Date:** 5/27/14
Date: 6/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1034	
Investigators: Valerie Watkins, Joe Meade, Dan du Plant				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 678.3		
Latitude: 62° 07' 20.37"		**Longitude:** -150° 09' 49.00"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 27	**Picture No.:** P_W60T1034 - N-S_pit-plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEMIF	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No_____ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4/EM 1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II A 3, III A 2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron tomentosum	8	Y	FACW
2. Picea mariana	20	Y	FACW
3. Betula nana	15	Y	FAC
4. Andromeda polifolia	6		FACW
5. Vaccinium oxycoccus	2		OBL
6. Empetrum nigrum	1		FAC
7. Spirea stevenii	1		FACW
8. Chamaedaphne Calyculata	1		
9.			
Total Cover: 54			
50% of total cover: 27	20% of total cover: 6.8		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	37	X 1 =	37
FACW species:	34	X 2 =	68
FAC species	16	X 3 =	48
FACU species	3	X 4 =	12
UPL species	0	X 5 =	0
Column Totals:	90	(A)	165 (B)

PI = B/A = 1.83

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	2		FACU
2. Trientalis europaea	T		FACU
3. Tricophorus Caespitosum	25	Y	OBL
4. Carex limosa	5		OBL
5. Carex microglochin	5		OBL
6. Equisetum fluviatile	T		OBL
7. Viola ssp.	T		FAC
8. Menyanthes trifoliata	T		OBL
9.			
10.			
Total Cover: 37			
50% of total cover: 18.5	20% of total cover: 7.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

85 % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 6/8/14 Feature ID WL60T1034 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-9							Fibric	
9-22							Fibric/hemic	

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 11		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: water table may rise higher.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking____ Forested-Deciduous-Needle-leaved____ Forested-Deciduous-Broad-leaved____ Forested-Evergreen-Needle-leaved____ Scrub Shrub-Deciduous-Needle-leaved____ Scrub Shrub-Deciduous-Broad-leaved____ Scrub Shrub-Evergreen-Broad-leaved____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent____ Emergent-Persistent____ Aquatic Bed____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 34 Tall herb (≥1m) 0 Short herb (<1m) 37 Moss-Lichen 85 Floating 0 Submerged 0

Number of Wetland Types (M): 4 | **Evenness of Wetland Type Distribution (M):** Even ____ Highly Uneven ____ Moderately even X

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover____ 26-75% Scattered or Peripheral Cover____ >75% Scattered or Peripheral Cover____ N/A____

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

Presence of Islands (M): Absent (none) ____ One or Few____ Several to Many ____ N/A X

Cover Distribution of Dominant Layer (P): No Veg.____ Solitary, Scattered Stems____ 1 or More Large Patches; Parts of Site Open X Small Scattered Patches____ Continuous Cover____

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) X High (small groupings, diverse and interspersed)____

HGM Class (P): Slope____ Flat____ Lacustrine Fringe____ Depressional X Riverine ____ Estaurine Fringe____

SOIL VARIABLES

Soil Factors (P): Soil Lacking____ Histosol:Fibric X Histosol:Hemic____ Histosol: Sapric____ Mineral: Gravelly____ Mineral: Sandy____ Mineral: Silty____ Mineral: Clayey____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet____ No Inlet/Perennial Outlet____ Intermittent Inlet/No Outlet____ Intermittent Inlet/Intermittent Outlet____ Intermittent Inlet/Perennial Outlet____ Perennial Inlet/No Outlet____ Perennial Inlet/Intermittent Outlet____ Perennial Inlet/Perennial Outlet____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate____ Fluvaquent 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 X Circumneutral (5.5-7.4)____ Alkaline (>7.4)____ Acid (<5.5)____ **pH Reading** ____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed____ Intermittent Spring____ Perennial Spring____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below____ Only Connected Above____ Connected Upstream & Downstream X Unknown____

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

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

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

Crew Chief QA/QC check: VW

GPS Technician QA/QC check: ZM

QAQC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1034 Field Target: 168 Date: 06-08-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade	X 06-08-14
Wetland Scientist (print)	**Signature / Date**
X Valerie Westkins	X Valerie Westkins
Field Crew Chief (print)	**Signature / Date**

QAQC
DCE

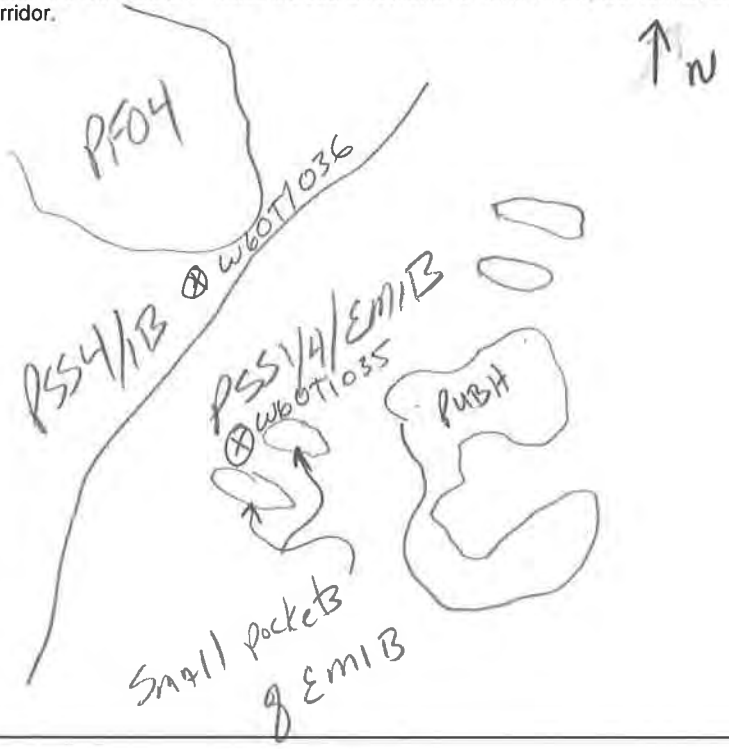
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: ~~104~~ 165	Map #: 112 Map Date: 5/27/14
Date: 06-08-14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60T1035
Investigators: Valerie Watkins, Zoe Meade, Dan La Plant				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 677.4		
Latitude: 62.08' 08.48"		Longitude: 150.09'55.26"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 27	Picture No.: P_W60T1035_SW-SE_pit_plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): slight hummocks
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PAB/EM1H	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 1/4 / EM1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C 2, III A 3

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (20')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	20	Y	FAC
2. Spiraea stevenii	1		FACU
3. Rhododendron tomentosum	8		FACW
4. Picea mariana	15	Y	FACW
5. Andromeda polifolia	3		FACW
6. Vaccinium oxycoccus	2		OBL
7.			
8.			
9.			
Total Cover: 49			
50% of total cover: 24.5	20% of total cover: 9.8		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: 87	X 1 = 87
FACW species: 27	X 2 = 54
FAC species 21	X 3 = 63
FACU species 3	X 4 = 12
UPL species 0	X 5 = 0
Column Totals: 138 (A)	216 (B)

PI = B/A = 1.57

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Trientalis europaea	1		FACU
2. Menyanthes trifoliata	2		OBL
3. Cornus canadensis	2		FACU
4. Trichophorum caespitosa	50	Y	OBL
5. unidentified herb	1		—
6. Carex microglochin	5		OBL
7. Rubus Chamaemorous	1		FACW
8. Calamagrostis Canadensis	1		FAC
9. Drosera rotundifolia	3		OBL
10. Carex limosa	15		OBL
Total Cover: 91			
50% of total cover: 45.5	20% of total cover: 18.2		
Carex chordorrhiza	10	—	OBL
Equisetum fluviatile	T	—	OBL

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

8 % Bare Ground

60 % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-08-14 Feature ID W60T1035 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-11	—	—	—	—	—	—	Fibric	organics
11-25	—	—	—	—	—	—	hemic	organic

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 25 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 10		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__X__ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__15__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m)__14__ Tall herb (≥1m)__0__ Short herb (<1m)__91__ Moss-Lichen__60__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __5__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg_____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____

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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__X__ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: MW GPS Technician QA/QC check: QAQC NCS

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60TI035 Field Target: ~~064~~ 1605 VW Date: 6/8/2014

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

1. **Site Description**
   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?
2. **Vegetation**
   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?
3. **Soil**
   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?
4. **Hydrology**
   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?
5. **Functions and Values**
   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?
6. **Field Logbook**
   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?
7. **Maps**
   - ☑ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Valerie Watkins — **Field Crew Chief (print)**

X Valerie Watkins — **Signature / Date**

QA QC DEC

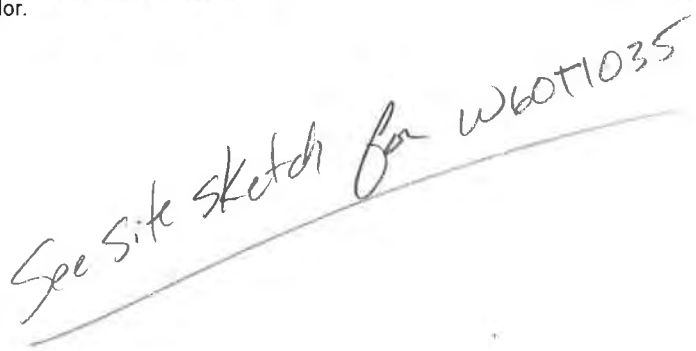
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) corridor			Field Target: 164	Map #: 112 Map Date: 5/27/14
Date: 06-08-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1036	
Investigators: Valerie Watkins, Zoe Meade, Dan La Plant				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 68		
Latitude: 62° 08' 09.00"		Longitude: -150° 09' 54.90"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 28	Picture No.: P_W60T1036_E_W_pt-plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): flat
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS 4/1B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIA2, IIC2

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



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes:)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0 20% of total cover: 0			
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	55	Y	FACW
2. Betula nana	40	Y	FAC
3. Chamaedaphne calyculata	5		FACW
4. Andromeda polifolia	3		FACW
5. Rhododendron tomentosem	20		FACW
6. Empetrum nigrum	3		FAC
7. Vaccinium oxycoccus	1		OBL
8. Spiraea stevenii	2		FACU
9. Myrica gale	1		OBL
Total Cover: 130			
50% of total cover: 65 20% of total cover: 26			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 6 (A)

Total Number of Dominant Species Across All Strata: 36 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	28	X 1 =	28
FACW species:	88	X 2 =	176
FAC species	46	X 3 =	138
FACU species	4	X 4 =	16
UPL species	0	X 5 =	0
Column Totals:	166	(A)	358 (B)

PI = B/A = 2.16

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Menyanthes trifoliata	1		OBL
2. Trichophorum caespitosum	15	Y	OBL
3. Trientalis europaea	T	—	FAC
4. Calamagrostis canadensis	3		FAC
5. Cornus canadensis	2		FACU
6. Rubus chamaemorous	5	Y	FACW
7. Carex aquatilis	5	Y	OBL
8. Carex microglochin	5	Y	OBL
9.			
10.			
Total Cover: 36			
50% of total cover: 18 20% of total cover: 7.2			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

65 % Cover of Wetland Bryophytes

65 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-08-14 Feature ID WC0T10 36 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-12	—	—	—	—	—	—	Fibric	organics
12-22	—	—	—	—	—	—	hemic	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: 22 inches of saturated organics

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

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 8		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved__X__ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__55__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__40__ Dwarf shrub (<0.5m)__35__ Tall herb (≥1m)__0__ Short herb (<1m)__36__ Moss-Lichen__65__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __5__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: VW GPS Technician QA/QC check:

QA QC

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1036 Field Target: 164 Date: 6/8/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade	X Zoe Meade
Wetland Scientist (print)	**Signature / Date**
X Valerie Watkins	X Valerie Watkins
Field Crew Chief (print)	**Signature / Date**

QAQC
WEE

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 103	**Map #:** 112 **Map Date:** 5/21/14
Date: 06-09-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1037
Investigators: Dan Laplant, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 677.4	
Latitude: 62° 08' 10.34"	**Longitude:** 150° 09' 55.05"		**Datum:** WGS84
Logbook No.: 002	**Logbook Page No.:** 4	**Picture No.:** P_W60T103 ;E, NW, pit, plug	

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 0 - 3	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS 4/1B	Soil Map Unit Name: –
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO4B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IA2

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

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	60	Y	FACW
2.			
3.			
4.			

Total Cover: 60

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamaedaphne calyculata	3		FACW
2. Betula nana	40	Y	FAC
3. Rhododendron tomentosum	5		FACW
4. Picea mariana	40	Y	FACW
5. Empetrum nigrum	30	Y	FAC
6.			
7.			
8.			
9.			

Total Cover: 118

50% of total cover: 59 20% of total cover: 23.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4.5 (A)

Total Number of Dominant Species Across All Strata: 4.5 (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:	116	X 2 =	232
FAC species	117	X 3 =	351
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	233	(A)	583 (B)

PI = B/A = 2.50

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	2		FAC
2. Rubus Chamaemorous	6		FACW
3. Geocaulon lividium	T		FACU
4. Similacina stellata	5		FAC
5. Carex capillaris	2		FACW
6. Carex microchaeta	40	Y	FAC
7.			
8.			
9.			
10.			

False solomon's seal (star flowered)

Total Cover: 55

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

85 % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL	Date 06-09 Feature ID W60T1037 (SA)	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0 - 8							Hemic	organics
8 - 17							Fibric	organics
17 - 22							Sapric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:

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

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y see photo	Depth (in):		
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 0		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved__X__ 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)__60__ Sapling (<5 dbh, <6m tall)__40__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__48__ Dwarf shrub (<0.5m) __30__ Tall herb (≥1m) __0__ Short herb (<1m) __55__ Moss-Lichen__85__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __1__ | **Evenness of Wetland Type Distribution (M)**: Even __1__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)__X__ 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__X__

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

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic__X__ Histosol: Sapric__X__ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: [signature]

GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1037 Field Target: 163 Date: 6/9/2014

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X [signature] — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X [signature] 6/9/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) X			**Field Target:** 153	**Map #:** 107 **Map Date:** 5/27/14
Date: 06-11-14	**Project Name & No.: Alaska LNG 26221306**			**Feature Id:** W60T1038
Investigators: Dan La Plant, Zoe Meade				**Team No.:** W60
State: Alaska	**Region: Alaska**	**Milepost:** 109.5		
Latitude: 62° 14' 33.86"		**Longitude:** 150° 15' 05.00"		**Datum: WGS84**
Logbook No.: 002	**Logbook Page No.:** 009	**Picture No.:** P_W, NE, Pit, plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): flood plain
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1C	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C 1

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

See Sketch in Logbook 002 page 009.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Myrica gale	90	Y	OBL
2. Alnus ssp.	6		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 96

50% of total cover: 48 20% of total cover: 18

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	92	X 1 =	92
FACW species:	46	X 2 =	92
FAC species	81	X 3 =	243
FACU species	1	X 4 =	4
UPL species	0	X 5 =	0
Column Totals:	220	(A)	431 (B)

PI = B/A = 1.96

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	75	Y	FAC
2. Equisetum fluviatile	T		OBL
3. Rubus chamaemorous	6		FACW
4. viola palustris	40	Y	FACW
5. Trientalis europaea	1		FACU
6. Comarum palustre	2		OBL
7. Athyrim cyclosorum	T		FAC
8. Oxytropis deflexa ?	T		FACU
9.			
10.			

Total Cover: 124

50% of total cover: 62 20% of total cover: 24.8

pea family
↑ Pendant Pod locoweed

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 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

SOIL Date 06-11-14 **Feature ID** W60T1038 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
0 - 3	—	—	—	—	—	—	Fibric	organics
3 - 11	10YR 3/3	100					Sandy silt	
11 - 22	10YR 3/1	100					Fine sand	

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

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

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

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

Hydric Soil Present (Y/N): Y

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

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

Surface Water Present (Y/N): Y	Depth (in): 2	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 17"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 10	

Notes: pit next to stream bed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__5__ Short shrub (0.5-2m)__90__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __75__ Short herb (<1m) __0__ Moss-Lichen__0__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **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%)__X__ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine __X__ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy__X__ 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__X__

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs__X__ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.75

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits__X__ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1038 Field Target: 153 Date: 06-11-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Zoe Meade — **Wetland Scientist (print)**

X — **Signature / Date**

X Dom LaPlant — **Field Crew Chief (print)**

X — **Signature / Date** 6/11/2014

WETLAND DETERMINATION DATA FORM

Soils check FT 103

SOIL Date 7/8/14 Feature ID _____ **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-7	10YR 3/3	60	—	—	—	—	Fibric	Organic 40%
7-10	10YR 3/3	100	coarse sand	—	—	—	Coarse sand	
10-20	4/5 GY	85	10YR 4/6	15	C	PL	Fine sandy loam	

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:

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

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

Notes:

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) X			**Field Target:** 152	**Map #:** 106 **Map Date:** 5/27/14
Date: 06-11-14	**Project Name & No.: Alaska LNG 26221306**			**Feature Id:** W60T1089
Investigators: Dan LaPlant, Zoe Meade				**Team No.:** W60
State: Alaska	**Region: Alaska**	**Milepost:** 112.55		
Latitude: 62° 17' 08.60"		**Longitude:** 150° 14' 51.10"		**Datum: WGS84**
Logbook No.: 002	**Logbook Page No.:** 010	**Picture No.:** P_E, SW, pit, plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): floodplain
Slope (%): 0 - 2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1C
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II C 2

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

See sketch in Logbook 2 page 010.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes:)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Myrica gale	50	Y	OBL
2. populus balsamifera	3		FACU
3. Salex pulchra	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 58			
50% of total cover: 29	20% of total cover: 11,6		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	52	X 1 =	52
FACW species:	5	X 2 =	10
FAC species	75	X 3 =	225
FACU species	3	X 4 =	12
UPL species	0	X 5 =	0
Column Totals:	135 (A)		299 (B)

PI = B/A = 2.21

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex aquatilis	2		OBL
2. Calamagrostis canadensis	75	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 77			
50% of total cover: 38.5	20% of total cover: 15.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-11 Feature ID W60T1039 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2								organics
2-11	10YR 4/2						Sandy silt	
11-16+							gravel	saturated @ 8"

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: * Rechecked soil on 7/9/14 by S. Christopher. See logbook CW60-3. Confirmed Alaska Redox.

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

VW

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 10		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking 0 Forested-Deciduous-Needle-leaved ____ Forested-Deciduous-Broad-leaved ____ Forested-Evergreen-Needle-leaved ____ Scrub Shrub-Deciduous-Needle-leaved ____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved ____ Scrub Shrub-Evergreen-Needle-leaved ____ Emergent-Non-persistent ____ Emergent-Persistent ____ Aquatic Bed ____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 50 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 50 Short herb (<1m) 0 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 2

Evenness of Wetland Type Distribution (M): Even X Highly Uneven ____ Moderately even ____

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

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

Plant Species Diversity (P): Low (< 5 plant species) X Medium (5-25 species) ____ 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 X Continuous Cover ____

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

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

HGM Class (P): Slope ____ Flat ____ Lacustrine Fringe ____ Depressional ____ Riverine X Estaurine Fringe ____

SOIL VARIABLES

Soil Factors (P): Soil Lacking ____ Histosol:Fibric ____ Histosol:Hemic ____ Histosol: Sapric ____ Mineral: Gravelly X 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 X Intermittent Inlet/Perennial Outlet ____ Perennial Inlet/No Outlet ____ Perennial Inlet/Intermittent Outlet ____ Perennial Inlet/Perennial Outlet ____

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

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

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

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

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

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

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

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed ____ Intermittent Spring ____ Perennial Spring ____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated ____ Wetlands within 400m, Not Connected ____ Only Connected Below X 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) X

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

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1039 Field Target: 152 Date: 06-11-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X Dan LaPlant 6/11/2014 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

FT 152
soils check

SOIL Date 7/9/14 Feature ID_____ Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1								Organic
1-12	5Y 4/1	90	7.5YR 4/6	10	C	PL	Med. sandy loam	

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

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

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

Restrictive Layer (if present): Type: Rock cobble Depth (inches): 12

Hydric Soil Present (Y/N): Y

Notes:
* drainage feature ODD ranks to creek. No bed or bank

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

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

Notes:

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			2000' study corridor	
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X			Field Target: 151	Map #: 106 Map Date: 5/27/14
Date: 06-11-2014	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1040	
Investigators: Dan LaPlant, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 112.7		
Latitude: 62° 17' 17.69"		Longitude: 150° 14' 58.10		Datum: WGS84
Logbook No.: 002	Logbook Page No.: 011	Picture No.: P_S, W, pit, plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummocky
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PEM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A ± 2 (use site logbook)

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

placed lath at recorded GPS location.

See sketch in Logbook 02 page 011.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	10	X 1 =	10
FACW species:	85	X 2 =	170
FAC species	3	X 3 =	9
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	98 (A)		189 (B)

PI = B/A = 1.93

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	85	Y	FAC
2. Equisetum arvense	3		FAC
3. Comarum palustre	T		OBL
4. Carex aquatalis	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 98			
50% of total cover: 49	20% of total cover: 19.6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-11-14 Feature ID W60T1040 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1								organics
1-15	10YR 5/2	75	10 YR 3/6	25	C	PL, M	Silty clay	
15-22	10 YR 6/2	90	10 YR 3/6	10	C	PL	Silty clay	

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: * Soil rechecked on 7/9/14 by S. Christopher. See Logbook W60-3 Confirmed Alaska Redox

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

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): 22	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): 18	

Notes: evidence of standing water from earlier in the season

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent X Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 98 Short herb (<1m) 0 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M):** Even X Highly Uneven _____ Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg_____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X 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_____ Fluvaquent Soils Sediment Created_____

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

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

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

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

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated X 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) X

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

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1040 Field Target: 151 Date: 06-11-14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X [signature] 2/11/2014 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

FT 151
Soils check

SOIL Date 7/9/14 **Feature ID**_____ **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4	10 YR 4/2	95	10 YR 5/8	5	C	PL	Silt loam	
4-20	5 Y 5/1	90	10 YR 4/6	10	C	PL	Silt loam	

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes: Tall Cal can, (5'+) meadow

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

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

Notes:

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 161	**Map #:** 111 **Map Date:** 5/27/14
Date: 06-30-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1041	
Investigators: SWB Christoph ZOE Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 674.4 (pipe)		
Latitude: 62° 10' 05.09"		**Longitude:** 150° 11' 42.20"		**Datum:** WGS84
Logbook No.: 003	**Logbook Page No.:** 27	**Picture No.:** P-N,S,		

SITE PARAMETERS		
Subregion: ~~DA~~ Southcentral		Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0-3		Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PSS 4/1 B		Soil Map Unit Name: NA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?		No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?		No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS 4/EM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II A2, ~~II C 2~~ III A 2

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

See PAGE 22

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	FACW
2. Rhododendron tomentosum	2		FACW
3. Betula nana	7		FAC
4. Chamaedaphne calyculata	3		FACW
5. Empetrum nigrum	15	X	FAC
6. Andromeda polifolia	T		FACW
7. Vaccinium uliginosum	1		FAC
8.			
9.			

Total Cover: 68

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	29	X 1 =	29
FACW species:	66	X 2 =	132
FAC species	4	X 3 =	12
FACU species	1	X 4 =	4
UPL species		X 5 =	
Column Totals:	100	(A)	177 (B)

PI = B/A = 1.77

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	15	X	FACW
2. Equisetum hyemale	3		FACW
3. pedicularis labridorica	T		FACW
4. drosera rotundifolia	4		OBL
5. Geocaulon lividum	1		FACU
6. Equisetum fluviatile	3		FACW
7. Carex microglochin	25	X	OBL
8. Spiranthes romanzofiana	T		OBL
9.			
10.			

Total Cover: 49

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

— % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 6/30/14 Feature ID W60T | 641 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20							Fibric	organics

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:
Hydric soil observed

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

Surface Water Present (Y/N): N	Depth (in): N/A	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 3		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:
Field Indicators of Hydrology observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall) 40 Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) 20 Tall herb (≥1m) _____ Short herb (<1m) 480 Moss-Lichen 100 Floating_____ Submerged_____

Number of Wetland Types (M): 2 **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%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

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

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

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W160 T1 041 Field Target: 161 Date: 06-30-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Joe Christopher — **Field Crew Chief (print)**

X — 6/30/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
~~Outside~~ 2000' corridor				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X			**Field Target:** 160	**Map #:** 110 **Map Date:** 5/27/14
Date: 06-13-14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI042	
Investigators: Dan La Plant, Zoe Meade				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 673.25		
Latitude: 62° 11' 18.42"		**Longitude:** 150° 12' 57.52"		**Datum:** WGS84
Logbook No.: 002	**Logbook Page No.:** 017	**Picture No.:** P_SE, W, pit, plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-1	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1/4EM1F
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

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

See sketch in Logbook 002 page 018.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	20	Y	FAC
2. Myrica gale	10	Y	OBL
3. Picea mariana	10	Y	FACW
4. Rhododendron tomentosum	T		FACW
5. Dasiphora fruticosa	5		FAC
6. Chamaedaphne calyculata	5		FACW
7. Vaccinium oxycoccus	2		OBL
8.			
9.			

Total Cover: 52

50% of total cover: 26 20% of total cover: 10.4

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:	120	X 1 =	120
FACW species:	15	X 2 =	30
FAC species	43	X 3 =	129
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	178	(A)	279 (B)

PI = B/A = 1.57

* no seed heads on juncus ssp., unable to identify species.

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum fluviatile	40	Y	OBL
2. Valariana capitata	14		FAC
3. Comarum palustre	4		OBL
4. drosera rotundifolia	1		OBL
5. Juncus ssp.	60	Y	OBL
6. Carex aquatilis	3		OBL
7. Calamagrostis canadensis	4		FAC
8.			
9.			
10.			

Total Cover: 126

50% of total cover: 63 20% of total cover: 25.2

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

30 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-13-14 **Feature ID** W60T1042 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0 - 8							Histic	Fibric
8 - 16+							Fibric	Hemic

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:

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

Surface Water Present (Y/N): Y	Depth (in): 0	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 10 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 42 Tall herb (≥1m) 0 Short herb (<1m) 126 Moss-Lichen 80 Floating 0 Submerged 0

Number of Wetland Types (M): 3 **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%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic X Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.68

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

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

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

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

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: W60T1042 Field Target: 160 Date: 6/13/14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

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

5. **Functions and Values**

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

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

7. **Maps**

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

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

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade 6/13/14 — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X [signature] 6/13/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)_____ Other (explain) corridor			Field Target: 159	Map #: 110 Map Date: 5/27/14
Date: 06-13-14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60T1043
Investigators: Dan LaPlant, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 673.2		
Latitude: 62° 11' 19.09"		Longitude: 150° 12' 48.50"		Datum: WGS84
Logbook No.: 002	Logbook Page No.: 019	Picture No.: P_ W, E, Pit, Plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flood plain
Slope (%): ~~X~~ < 2%	Local relief (concave, convex, none): Level
Pre-mapped Alaska LNG/NWI classification: PF04B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PF04/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): I C II.

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

See Sketch in Logbook 002, Page 019.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	15	Y	FACU
2. Picea glauca	15	Y	FACU
3. Picea mariana	5		FACW
4.			

Total Cover: 35

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	30	Y	FACW
2. Empetrum nigrum	T		FAC
3. Betula neo alaskana	15	Y	FACU
4. Vaccinium vitis-idaea	T		FAC
5. Vaccinium uliginosum	5		FAC
6. Alnus ssp.	T		FAC
7. Rosa asicularis	T		FACU
8.			
9.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

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:	25	X 1 =	25
FACW species:	60	X 2 =	120
FAC species	30	X 3 =	90
FACU species	45	X 4 =	180
UPL species	0	X 5 =	0
Column Totals:	160	(A)	415 (B)

PI = B/A = 2.59

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamaerion angustofolium	T		FACU
2. Rubus chamaemorous	25	Y	FACW
3. Comarum palustre	15	Y	OBL
4. Calamagrostis canadensis	10		FAC
5. Equisetum arvense	15	Y	FAC
6. Geocaulon lividium	T		FACU
7. Cornus canadensis	T		FACU
8. Carex aquatalis	10		OBL
9.			
10.			

Total Cover: 75

50% of total cover: 37.5 20% of total cover: 15

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

85 % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-13-14 Feature ID W60T1043 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
6 - 10							Histic	organics Fibric
10 - 22							Fibric	organics Hemic

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

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

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

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

Hydric Soil Present (Y/N): Y

Notes:

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

Surface Water Present (Y/N): Y	Depth (in): 1	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved__X__ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 35 Sapling (<5 dbh, <6m tall) 45 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 5 Tall herb (≥1m) 0 Short herb (<1m) 75 Moss-Lichen 85 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **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%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine __X__ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs__X__

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.62

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__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: DZ

GPS Technician QA/QC check: JM

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1043 Field Target: 159 Date: 6/13/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Joe Meade X Joe Meade 6/13/14

Wetland Scientist (print) **Signature / Date**

X Dan LaPlant X [signature] 6/13/14

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X			Field Target: 154	Map #: 108 Map Date: 5/27/14
Date: 06-14-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1044	
Investigators: Dan La Plant, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 108.5		
Latitude: 62° 13' 52.85"		Longitude: 150° 14' 25.76"		Datum: WGS84
Logbook No.: 002	Logbook Page No.: 025	Picture No.: P_W, S, pit, plug		

2000' ft study corridor

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 0-3	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IC1

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

See Sketch in Logbook 002 page 026.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neo alaskana	90	Y	FACU
2.			
3.			
4.			

Total Cover: 90

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus idaeus	3		FACU
2. Betula neo alaskana	15	Y	FACU
3. Alnus ssp.	20	Y	FAC
4. Rosa acicularis	T		FACU
5. Spiraea stevenii	T		FACU
6.			
7.			
8.			
9.			

Total Cover: 38

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

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 40 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	107	X 3 =	321
FACU species	170	X 4 =	680
UPL species	0	X 5 =	0
Column Totals:	277	(A)	1001 (B)

PI = B/A = 3.61

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	85	Y	FAC
2. Cornus canadensis	20		FACU
3. Dryopteris expansa	30	Y	FACU
4. Gymnocarpium dryopteris	10		FACU
5. Chamerion angustifolium	2		FACU
6. Calamagrostis canadensis	2		FAC
7.			
8.			
9.			
10.			

Total Cover: 149

50% of total cover: 74.5 20% of total cover: 29.8

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-14-14 Feature ID W60T1044 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2								organics
2-8	10YR 3/6	100					silt loam	
8-9								organics
9-9.5								Ash
9.5-15.5	10YR 5/6	100					silt loam	
15.5-20	10YR 5/4	50	10YR 3/3	50	C	PL	silt loam	

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

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

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

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

Hydric Soil Present (Y/N): N

Notes:

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

Surface Water Present (Y/N): NO	Depth (in): N/A	**Wetland Hydrology Present (Y/N):** N	
Water Table Present (Y/N): No	Depth (in): N/A		
Saturation Present (Y/N): (includes capillary fringe) No	Depth (in): N/A		

Notes:

WETLAND DETERMINATION DATA FORM

upland

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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

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

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

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

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1044 Field Target: 154 Date: 06-14-14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade 06-14-14 — **Signature / Date**

X [illegible] LaPlant — **Field Crew Chief (print)**

X [illegible] 6/14/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION					2000' study corridor
Survey Type: Centerline___ Access Road (explain)_____ Other (explain) X				Field Target: 155	Map #: 108 Map Date: 5/27/14
Date: 06-14-14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60T1045	
Investigators: Dan LaPlant, Zoe Meade					Team No.: W60
State: Alaska	Region: Alaska		Milepost: 118.5		
Latitude: 62° 13' 52.94"		Longitude: 150° 14' 23.73"			Datum: WGS84
Logbook No.: 002	Logbook Page No.: 027		Picture No.: P_W, S, pit, plug		

SITE PARAMETERS	
Subregion: interior	Landform (hillslope, terrace, hummocks, etc.): hummock
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II A2., II B2

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

See Sketch Logbook 002 page 026.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus ssp.	40	Y	FAC
2. Betula nana	15		FAC
3. Spirea stevenii	5		FACU
4. Myrica gale	40	Y	OBL
5. Rosa acicularis	5		FACU
6. Picea mariana	15		FAC
7.			
8.			
9.			

Total Cover: 120

50% of total cover: 60 20% of total cover: 24

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:	100	X 1 =	100
FACW species:	0	X 2 =	0
FAC species	120	X 3 =	360
FACU species	10	X 4 =	40
UPL species	0	X 5 =	0
Column Totals:	230	(A)	500 (B)

PI = B/A = 2.17

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	10		OBL
2. Equisetum fluviatile	25	Y	OBL
3. Calamagrostis Canadensis	50	Y	FAC
4. Trientalis europaea	T		FACU
5. Carex aquatilis	25	Y	OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 110

50% of total cover: 55 20% of total cover: 22

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

15 % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 06-14-14 Feature ID W60T1045 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3								organics
3-7							Histic	organics
7-14							Fibric	organics
14-23							Sapric	organics, densly packed

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

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

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

Restrictive Layer (if present): Type: Sapric organics Depth (inches): 14+

Hydric Soil Present (Y/N): Y

Notes: water table above sapric layer, saturated to surface.

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

Surface Water Present (Y/N): Y	Depth (in): 0	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 13 and above	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X 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) 40 Short shrub (0.5-2m) 65 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 50 Short herb (<1m) 60 Moss-Lichen 15 Floating 0 Submerged 0

Number of Wetland Types (M): 4 **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%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

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

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems X 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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) X High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric X Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5) X **pH Reading** 5.40

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

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

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

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: W60T1045 Field Target: 155 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. **Maps**

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — **Wetland Scientist (print)**

X Zoe Meade — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X [signature] 6/14/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)___ Other (explain) X 2000' corridor			Field Target: 156	Map #: 108 Map Date: 5/27/14
Date: 06-14-14	Project Name & No.: Alaska LNG 26221306			Feature Id: W60T1046
Investigators: Dan LaPlant, Zoe Meade				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 118.5		
Latitude: 62° 13' 53.13"		Longitude: 150° 14' 21.87"		Datum: WGS84
Logbook No.: 002	Logbook Page No.: ~~028~~ 27	Picture No.: P_N, S, pit, plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0-2	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: PEM 1F	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation___, Soil___, or Hydrology___ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No___	**Is the Sampled Area within a Wetland?** Yes X No___
Hydric Soil Present? Yes X No___	**Wetland Type:** PSS 1F
Wetland Hydrology Present? Yes X No___	Alaska Vegetation Classification (Viereck): II C 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See Sketch in Logbook 002 page 026.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Chamaedaphne calyculata	15		FACW
2. Betula nana	60	Y	FAC
3. Myrica gale	15		OBL
4. Dasiphora fruticosa	15		FAC
5. Vaccinium oxycoccus	1		OBL
6.			
7.			
8.			
9.			
Total Cover: 106			
50% of total cover: 53	20% of total cover: 21.2		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	89	X 1 =	89
FACW species:	15	X 2 =	30
FAC species	82	X 3 =	246
FACU species	2	X 4 =	8
UPL species	0	X 5 =	0
Column Totals:	188	(A)	373 (B)

PI = B/A = 1.98

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	T		OBL
2. Trientalis europaea	2		FACU
3. Valariana capitata	2		FAC
~~4. Menyanthes trifoliata~~	—	—	~~OBL~~
5. Drosera rotundifolia	T		OBL
6. Equisetum fluviatile	3		OBL
7. Eriophorum angustofolium	T		OBL
8. Carex gynocrates	50	Y	OBL
9. carex aquatilis	20	Y	OBL
10. Rubus ssp.	5		FAC
Total Cover: 82			
50% of total cover: 41	20% of total cover: 16.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

85 % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 06-14-14 **Feature ID** W60T1046 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							organics	
2-12							Histic	Fibric
12-22							Fibric	Humic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: ~ Depth (inches): ~

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 0	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_0_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m)_106_ Tall herb (≥1m)_0_ Short herb (<1m)_82_ Moss-Lichen_85_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _4_ **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_X_ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _X_ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_X_

Dead Woody Material (P): Low Abundance (0-25% of surface) _X_ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_X_ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _X_ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_X_ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _X_

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent 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)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_ **pH Reading** 5.28

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_X_

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_X_

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: W60T1046 Field Target: 156 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [x] Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — **Wetland Scientist (print)**

X [signature] 6/14/14 — **Signature / Date**

X Dan LaPlant — **Field Crew Chief (print)**

X [signature] 6/14/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 162	**Map #:** 111 **Map Date:** 5/21/14
Date: 6/30/14	**Project Name & No.:** Alaska LNG 26221306	**Feature Id:** W60TI047	
Investigators: Joe Christopher, Zoe Meade			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 674.8 (LNG)	
Latitude: 62° 10' 03.86"	**Longitude:** 150° 11' 34.30"		**Datum:** WGS84
Logbook No.: 003	**Logbook Page No.:** 023	**Picture No.:** P_ N, S, ground	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): TERRACE
Slope (%): 0 - 2	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PEM1F	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEM 1 F
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See page 22

See map 1 of 1 and 22

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 2.6)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: 0

50% of total cover: 0 20% of total cover: 0

Sapling/Shrub Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamaedaphne calyculata	2	~~Y~~ * N	FACW
2. Betula nana	1	~~Y~~ * N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: ~~3~~

50% of total cover: ~~1.5~~ 20% of total cover: ~~.6~~

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: ~~3~~ 1 (A)

Total Number of Dominant Species Across All Strata: ~~3~~ 1 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	109	X 1 =	109
FACW species:	2	X 2 =	4
FAC species	1	X 3 =	3
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	112	(A)	116 (B)

PI = B/A = 1.03

* Shrub Stratum added to herb Stratum since there was < 5% cover.

VEGETATION (use scientific names of plants)

Herb Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex rotundata	90	Y	OBL
2. Carex magellanica	15		OBL
3. Drosera rotundifolia	4		OBL
4. Eriophorum vaginatum	T		FACW
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: ~~105~~ 112

50% of total cover: ~~52.5~~ 56 20% of total cover: ~~21~~ 22.4

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

— % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

15 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/20/14 Feature ID WL01047 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-18								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Assume Histosol - standing H2O + lots Sphagnum

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) Y
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 1-2	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_X_____ 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) 3 Tall herb (≥1m) _____ Short herb (<1m) 105 109 Moss-Lichen 102 Floating_____ Submerged_____

Number of Wetland Types (M): 2 **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 X 26-75% Scattered or Peripheral Cover X >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

Dead Woody Material (P): Low Abundance (0-25% of surface) X Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings) X Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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)_____ Alkaline (>7.4)_____ Acid (<5.5) X **pH Reading** 4.0

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60TI047 Field Target: 162 Date: 06-30-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. **Maps**

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — X [signature] 6/30/14

Wetland Scientist (print) — **Signature / Date**

X Joe Christoph — X [signature] 6/30/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ Access Road (explain)___ Other (explain) X		Field Target: 162	Map #: 111 Map Date: 5/27/14
Date: 06-30-14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1048
Investigators: Joe Christopher, Zoe Meade			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 674.8 (LNG)	
Latitude: 62° 10' 03.04"	Longitude: 150° 11' 31.99"		Datum: WGS84
Logbook No.: 003	Logbook Page No.: 23	Picture No.: P_W_-5, P_P	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0-3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation X, Soil___, or Hydrology___ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No___	Is the Sampled Area within a Wetland? Yes X No___
Hydric Soil Present? Yes X No___	Wetland Type: PFO1/4B (2)
Wetland Hydrology Present? Yes X No___	Alaska Vegetation Classification (Viereck): IC2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Spruce + Birch morphologically adapted to wetland by growing multiple trunks + Buttressed Root Balls.

See PAS 91 for Diagram

Plot taken just outside 300'

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	20	X	FAC*
2. Picea glauca	20	X	FAC
3.			
4.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Menziesia ferruginea	8	X	FACU
2. Vaccinium vitis-idaea	1		FAC
3. Alnus ssp.	7	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 16

50% of total cover: 8 20% of total cover: 3.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	5	X 1 =	5
FACW species:	3	X 2 =	6
FAC species	133	X 3 =	399
FACU species	10	X 4 =	40
UPL species	0	X 5 =	0
Column Totals:	151	(A)	450 (B)

Pi = B/A = 2.98

*moved Bet.neo & Pic.gla. to fac due to morphological adaptations.

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	75	X	FAC
2. Calamagrostis canadensis	10		FAC
3. Cornus canadensis	2		FACU
4. Carex ssp.	3		—
5. Comarum palustre	5		OBL
6. Rubus Chamaemorous	3		FACW
7.			
8.			
9.			
10.			

Total Cover: 98

50% of total cover: 49 20% of total cover: 19.6

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

X Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

30 Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 06-30-14 Feature ID WOT1048 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-18	—	—	—	—	—	—	Hemic	organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Hemic Soils 00cm to 18"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5)
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 3	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 4	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes: Pockets of standing H2O Between Birch & spruce & Under Buttressed Birch Root Ball.

WETLAND DETERMINATION DATA FORM

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 10
Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent 10 Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 40 Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____
Dwarf shrub (<0.5m) 10 Tall herb (≥1m) _____ Short herb (<1m) 90 Moss-Lichen 30 Floating_____ Submerged_____

Number of Wetland Types (M): 1 | **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) X
Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings) X Moderate (broken irregular rings)_____
High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic X Histosol: Sapric_____
Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X
Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____
Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow X Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5) X **pH Reading** 4.6

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X
Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____
Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID WOT1048 Field Target: 162 Date: 6/30/14

For all items not checked, please provide detailed explanation in the notes section of data form.

-pre-map upl → P401/413

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☐ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☐ Cover calculations are complete and correct?
- ☐ All dominant species have been determined and recorded per strata?
- ☐ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☐ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. Photos

- ☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — **Wetland Scientist (print)**

X Zemeade 06/30/14 — **Signature / Date**

X [illegible] — **Field Crew Chief (print)**

X [illegible] 6/30/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)___ Other (explain) X 2000' corridor			Field Target: 157	Map #: 109 Map Date: 5/27/14
Date: 7/8/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1049	
Investigators: Joe Christopher, Zoe Meade, Val Watkins, Abigayle Fisher			Team No.: W60	
State: Alaska	Region: Alaska	Milepost: 107.8 (PH)		
Latitude: 62° 13' 15.61"	Longitude: 150° 14' 05.88"		Datum: WGS84	
Logbook No.: 003	Logbook Page No.: 046	Picture No.: P_ N, S, pit, plug		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0 - 2	Local relief (concave, convex, none): concave, slight
Pre-mapped Alaska LNG/NWI classification: ~~Upland~~ PSS4/1B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS 4/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIA3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

P. 46 for Logbook sketch.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10	Y	FACW
2.			
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron tomentosum	40	Y	FACW
2. Betula nana	25	Y	FAC
3. Empetrum nigrum	15		FAC
4. Vaccinium oxycoccus	2		OBL
5. Vaccinium vitis-idaea	TR		FAC
6. Chamaedaphne calyculata	7		FACW
7. Picea mariana	20		FACW
8. Andromeda polifolia	1		FACW
9.			

Total Cover: 110

50% of total cover: 55 20% of total cover: 22

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	11	X 1 =	11
FACW species:	88	X 2 =	176
FAC species	40	X 3 =	120
FACU species	3	X 4 =	12
UPL species	0	X 5 =	0
Column Totals:	142 (A)		319 (B)

PI = B/A = 2.25

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	10	Y	FACW
2. Geocaulon lividum	3		FACU
3. ~~Drosera~~ Drosera rotundifolia	1		OBL
4. Carex microglochin	8	Y	OBL
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 22

50% of total cover: 11 20% of total cover: 4.4

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 7/8/14 Feature ID W60T1049 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20	—	—	—	—	—	—	Fibric	organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Histic soils observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 7	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved__X__ 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)__16__ Sapling (<5 dbh, <6m tall)__20__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__88__ Dwarf shrub (<0.5m) __2__ Tall herb (≥1m) __0__ Short herb (<1m) __22__ Moss-Lichen__100__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __3__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)__X__ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____

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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1049 Field Target: 157 Date: 07-08-14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — X [signature] 7/8/14

Wetland Scientist (print) — **Signature / Date**

X Joe Christopher — X [signature] 7/8/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X			**Field Target:** 158	**Map #:** 109 **Map Date:** 5/27/14
Date: 7/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1050	
Investigators: JC, VW, ZM, AF + exxon crew				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 167.8		
Latitude: 62° 13' 14.94"		**Longitude:** 150° 14' 09.38"		**Datum:** WGS84
Logbook No.: 003	**Logbook Page No.:** 047	**Picture No.:** P_ N, S, Pit, Plug		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0 - 1	Local relief (concave, convex, none): Flat/Slight concave
Pre-mapped Alaska LNG/NWI classification: PEM 1/B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PEM 1/SS4E
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A 3, II A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Sketch on pg. ~~W0447~~ 46

200' corridor

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	15	Y	FACW
2. Rhododendron tomentosum	6	Y	FACW
3. Vaccinium oxycoccus	1		OBL
4. Betula nana	3		FAC
5. Andromeda polifolia	1		FACW
6. Empetrum nigrum	2		FAC
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: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 73	X 1 =	73
FACW species: 27	X 2 =	54
FAC species 5	X 3 =	15
FACU species 0	X 4 =	0
UPL species 0	X 5 =	0
Column Totals: 105	(A)	142 (B)

PI = B/A = 1.35

* picea + shrubs on humps
* no seed heads on car agu

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Trichophorum caespitosum	65	Y	OBL
2. Pedicularis labradorica	1		FACW
3. Rubus chamaemorous	4		FACW
4. Carex rotundata	2		OBL
5. Carex aquatilis	4		OBL
6. Drosera rotundifolia	1		OBL
7.			
8.			
9.			
10.			
Total Cover: 77			
50% of total cover: 38.5	20% of total cover: 15.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

– % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 7/8/14 Feature ID WGO T1050 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20	—	—	—	—	—	—	Fibric	organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 1-2	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ 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)__12__ Dwarf shrub (<0.5m) __1__ Tall herb (≥1m) __0__ Short herb (<1m) __77__ Moss-Lichen__100__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __3__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)__X__ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A__X__ (NA)

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 3.79

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1050 Field Target: 158 Date: 7/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade — X Zoe Meade 7/8/14

Wetland Scientist (print) — **Signature / Date**

X Joe Christopher — X [signature] 7/8/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			2000' corridor
Survey Type: Centerline____ Access Road (explain)_____ Other (explain) X		Field Target: 150	Map #: 105 Map Date: 5/27/14
Date: 7/9/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T10~~53~~051
Investigators: JC, ZM, AF			Team No.: W60
State: Alaska	Region: Alaska	Milepost: 113	
Latitude: 62° 17' 24.04"		Longitude: 150° 15' 04.40"	Datum: WGS84
Logbook No.: 003	Logbook Page No.: 052	Picture No.: P_N, S, pit, plug	

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): tussocks
Slope (%): 0 - 2	Local relief (concave, convex, none): ~~Flat~~ concave
Pre-mapped Alaska LNG/NWI classification: PEM1B	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	Is the Sampled Area within a Wetland? Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: PEM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A~~3~~2 ~~2~~ not emergent

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Pg 52 Sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	25	X 1 =	25
FACW species:	0	X 2 =	0
FAC species	92	X 3 =	276
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	117 (A)		301 (B)

PI = B/A = 2.57

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex aquatilis	15		OBL
2. Comarum palustre	10		OBL
3. Calamagrostis Canadensis	80	Y	FAC
4. Equisetum sylvaticum	12		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 117			
50% of total cover: 58.5	20% of total cover: 23.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 7/9/14	Feature ID W60T1053	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10	ORGANICS	95	10YR 2/1	5	C	PL	silt loam	10YR 2/1 is Matrix for min
10-20	5Y 5/1	60	10YR 5/8	40	C	PL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) ____	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) X	Alaska Redox (A14) X	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) ____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Could classify as H. Epipedon or Alaska Redox
0-10 10YR 2/1 is mineral matrix, no Redox in this layer

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) ____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) ____
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) X
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) ____	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) X 12" ~14"	Notes: Glistening walls at 12-14"	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 12	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 10	

Notes: glistening walls

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __80__ Short herb (<1m) __37__ Moss-Lichen__0__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) __X__ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty__X__ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)__X__

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__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1053-101 Field Target: 150 Date: 7/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Zoe Meade	X 7/9/14
Wetland Scientist (print)	**Signature / Date**
X Joe Christopher	X 7/9/14
Field Crew Chief (print)	**Signature / Date**

WETLAND DETERMINATION DATA FORM

6.49

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 205	**Map #:** 4 **Map Date:** 8/29/14
Date: 9/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1052	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 675.35		
Latitude: 68° 12' 30.087	**Longitude:** -150° 14' 15.5291		**Datum:** WGS84	
Logbook No.: W60-34	**Logbook Page No.:** 6-7	**Picture No.:** P-W60T1-001-002-VP, -003 Water		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): hummocks/fuss.
Slope (%): 0	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: n/a	Soil Map Unit Name: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEMIE
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~IA2~~ III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 6-7

Sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium oxycoccus	10 %	Y	obl
2. Salix fuscescens	20 %	Y	FacW
3. Alnus fruticosa	3 %		Fac
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 33			
50% of total cover: 16.5	20% of total cover: 6.6		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 115	X 1 =	115
FACW species: 21	X 2 =	42
FAC species 8	X 3 =	24
FACU species _____	X 4 =	_____
UPL species _____	X 5 =	_____
Column Totals: 144	(A)	181 (B)

PI = B/A = 1.25

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. carex aquatilis	90%	X	OBL
2. Comarum palustre	15%		obl
3. Calamagrostis canadensis	5 %		Fac
4. Equisetum hyemale	1%		FacW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 111			
50% of total cover: 55.5	20% of total cover: 22.2		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 9/4/14 Feature ID WetOT1052 Soil Pit Required (Y/N) N

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
NOT	TAKEN		Standing				H2O	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes) X

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type:_____ Depth (inches):_____

Hydric Soil Present (Y/N): Y

Notes:
Hyd soils Assumed from standing water & veg

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): Y	Depth (in): @ 2-4"	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: Approx 6-12" tussocks & hummocks

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__3__ Tall shrub (2-6m)__—__ Short shrub (0.5-2m)__—__ Dwarf shrub (<0.5m) __20 30__ Tall herb (≥1m) __90__ Short herb (<1m) __71__ Moss-Lichen__100__ Floating__—__ Submerged__—__

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__X__ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches__X__ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____ estimate

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet__X__ 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 __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.49

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__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:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1052 Field Target: 205 Date: 9/4/14

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? N/A
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X 9/4/14

Wetland Scientist (print) Signature / Date

X Joe Christophe X 9/4/14

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 20 C	**Map #:** 5 **Map Date:** 8/29/14
Date: 9/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1053	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 676.1		
Latitude: 62° 11' 54.52		**Longitude:** 150° 14' 06.07		**Datum:** WGS84
Logbook No.: W60-34	**Logbook Page No.:** 8	**Picture No.:** W60T1053+1001-004, N, S,		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Hillside
Slope (%): 25 to	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: UPL	Soil Map Unit Name: NA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** UPLAND
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): IC2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See PAGE 9

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	15	Y	FACW
2. Betula neoalaskana	40	Y	FAC
3.			
4.			

Total Cover: 55

50% of total cover: 27.5 20% of total cover: 11.0

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Sheperdia canadensis	10		FACU
2. Viburnum edule	15	Y	FACW
3. [illegible]			(UPL)
4. Oplopanics horridis	35	Y	FAC
5. rosa acicularis	3		FACU
6.			
7.			
8.			
9.			

Total Cover: 63

50% of total cover: 31.5 20% of total cover: 12.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 20% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	—	X 2 =	—
FAC species	3	X 3 =	9
FACU species	120	X 4 =	480
UPL species	0	X 5 =	0
Column Totals:	123	(A)	489 (B)

PI = B/A = 3.97

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. rubus arcticus	3	Y	FAC
2. Dryopteris expansa	1	+	FACU
3. Equisetum sylvaticum	1	+	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: 1.0

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

— % 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

SOIL Date 9/4/14 Feature ID WetTL053 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Fibric	Dry
4-7	2.5Y 6/1	100					Fine SL	
7-12	7.5YR 4/4	100					SL	
12-18	10YR 4/6	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Dry spodosol.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes: No Field Indicators of hydrology observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m)_____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (<5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1053 Field Target: 2016 Date: 9/4/14

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?

QL
VW

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)?

N/A

X Jennifer Anderson — Wetland Scientist (print)

X [signature] 9/4/14 — Signature / Date

X Joe Christopher — Field Crew Chief (print)

X [signature] 9/4/14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 207	**Map #:** 6 **Map Date:** 8/29/14
Date: 9/4/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1054
Investigators: JC/JA			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 677.5	
Latitude: 62° 10' 44.10		**Longitude:** 150° 13' 21.34	**Datum:** WGS84
Logbook No.: W60-34	**Logbook Page No.:** 17	**Picture No.:** 001-004 P.S. P.P	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Open forest
Slope (%): 0	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: n/a	Soil Map Unit Name: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO1/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): I B 2, II B2, ~~III B2~~

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PASED

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	20%	Y	FacW ~~U~~
2. Picea glauca	3%		FacU
3.			
4.			

Total Cover: 23

50% of total cover: 11.5 20% of total cover: 4.6

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus fruticosa	15%	Y	Fac
2. Picea glauca	1%		FacU
3. oplopanax horridus	3%		FacU
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 19

50% of total cover: 9.5 20% of total cover: 3.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: ~~4~~ 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~100~~ 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species ~~152~~ 139	X 3 =	~~456~~ 396
FACU species ~~127~~	X 4 =	~~28~~ 108
UPL species	X 5 =	
Column Totals: 159	(A)	~~484~~ 504 (B)

PI = B/A = ~~3.0~~ 3.17

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. athyrium cyclosorum	10%	Y	Fac
2. calamagrostis canadensis	35%	Y	Fac
3. Equisetum arvense	~~10~~ 10%		Fac
4. Equisetum sylvaticum	7%		Fac
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 117

50% of total cover: 58.5 20% of total cover: 23.4

Hydrophytic Vegetation Indicators:

- X Dominance Test is > 50%
- ~~X~~ Prevalence Index is ≤ 3.0
- X Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

– % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):
Birch adaptations so converted indicator status to fac

OK

WETLAND DETERMINATION DATA FORM

SOIL Date 9/4/14 Feature ID WBOT1054 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Fibric	Organic
4-7	10YR 4/1						SL	saturated
7-20	5Y 5/1	70%	10YR 4/6	30	C	PL	SL	saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) X	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: None Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:
Of. root channels

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) X	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 16"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved__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) 95 33 Sapling (<5 dbh, <6m tall) 1 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 3 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) T Short herb (<1m) M Moss-Lichen 10 Floating — Submerged —

Number of Wetland Types (M): 3 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)__X__ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): ~~Absent~~ (none) __X__ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems__X__ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____ JK

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) __X__ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ 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__X__ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent__X__ Poorly Developed (6in.)_____ 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__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed__X__ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WDOT1054 Field Target: 207 Date: 6/4/14

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?

QC VW

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 9/4/14

Wetland Scientist (print) — Signature / Date

X Dr Christopher — X [signature] 9/4/14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 208	**Map #:** 7 **Map Date:** 8/29/14
Date: 9/5/2014	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1055	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 679.36		
Latitude: 62° 09' 17.51	**Longitude:** 150° 12' 29.91		**Datum:** WGS84	
Logbook No.: W60-4	**Logbook Page No.:** 11	**Picture No.:** W60T1055_001-004_N,S		

SITE PARAMETERS		
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Depression/Floodplain	
Slope (%): 0-3	Local relief (concave, convex, none): Concave	
Pre-mapped Alaska LNG/NWI classification: PUT	Soil Map Unit Name: NA	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)	
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)	
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)	

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes ✓ No_____	**Is the Sampled Area within a Wetland?** Yes ✓ No_____		
Hydric Soil Present? Yes ✓ No_____	**Wetland Type:** Rem. 155/13		
Wetland Hydrology Present? Yes ✓ No_____	Alaska Vegetation Classification (Viereck): III A1, I B2		

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See PASL 11 Logbook

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: —

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (20 15)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus fruticosa	40%	Y	Fac
2. aplopanax horridus	3%		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: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 5	X 2 =	10
FAC species 159	X 3 =	477
FACU species 3	X 4 =	12
UPL species	X 5 =	
Column Totals: 167	(A)	499 (B)

PI = B/A = 2.99

Reduce plot size to 15' to not include upland forest adjacent. Depression wetland

VEGETATION (use scientific names of plants)

Herb Stratum (20 15)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Athyrium cyclosorum	7%		Fac
2. calamagrostis canadensis	95%	Y	Fac
3. equisetum sylvaticum	10%		Fac
4. equisetum arvense	7%		Fac
5. viola langsdorfii	5%		FacW
6.			
7.			
8.			
9.			
10.			

Total Cover: 124%

50% of total cover: 62 20% of total cover: 24.8

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

1 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 9/5/14 Feature ID WL00T1055 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-9"	10YR 3/2	90	7.5YR 4/6	10	C	PL	Fibric	Saturated
9-20	↓	↓	↓	↓	↓	↓	Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) Y	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): Y	Depth (in): 1-2"	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 10"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0		

Notes: Isolated pockets of H_2O
- located in depression next to Creek.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__—__ Sapling (<5 dbh, <6m tall)__—__ Tall shrub (2-6m)__40__ Short shrub (0.5-2m)__3__ Dwarf shrub (<0.5m) __—__ Tall herb (≥1m) __95__ Short herb (<1m) ~~[illegible]~~ 29 Moss-Lichen__—__ Floating__—__ Submerged__—__

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__X__ 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__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty__X__ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet__X__ 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_____ Fluvaquent 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_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs__X__ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow__X__ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__0__ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.29

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed__X__ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)__X__ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WJOT1055 Field Target: 209 Date: 9/13/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   ☑ Site description, site parameters and summary of findings are complete?
   ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   ☐ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   ☑ Vegetation names are entered legibly for all strata present?
   ☐ Cover calculations are complete and correct?
   ☐ All dominant species have been determined and recorded per strata?
   ☐ Indicator status is correct for each species?
   ☐ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   ☑ Soil profile is complete?
   ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   ☑ Appropriate hydrology indicators are marked?
   ☐ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   ☑ 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?

QC VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson 9/4/14 — Signature / Date

X Joe Christoph — Field Crew Chief (print)

X 9/4/14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 209	**Map #:** 8 **Map Date:** 8/29/14
Date: 9/5/2014	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1055 56	
Investigators: JC, JA				**Team No.:** W(60)
State: Alaska	**Region:** Alaska	**Milepost:** 681.15		
Latitude: 62° 08' 06.60		**Longitude:** 150° 13' 43.79		**Datum:** WGS84
Logbook No.: W60-#6 4	**Logbook Page No.:** 12	**Picture No.:** W60T1055_001-004, N; S.		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Muskeg
Slope (%): 0	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification:	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1 EMIX E 9/1.
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): ~~IIA3~~ IIC2, IIIA3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

POP 12

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: —			
50% of total cover: _____ 20% of total cover: _____			
Sapling/Shrub Stratum (_____)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Andromeda polifolia	7		FacW
2. Betula nana	15		Fac
3. Rhododendrum groenlandicum	5%		Fac
4. Myrica gale	55%	Y	obl
5. pedicularis lapponica	1%		facW
6. vaccinium oxycoccus	1%		obl
7. chamaephne calyculata	15%		FacW
8.			
9.			
Total Cover: 99			
50% of total cover: 49.5 20% of total cover: 19.8			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 53 (A)

Total Number of Dominant Species Across All Strata: 53 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	81	X 1 =	81
FACW species:	23	X 2 =	46
FAC species	69	X 3 =	207
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	173 (A)		334 (B)

PI = B/A = 1.9

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	10%	~~Y~~ N	obl
2. Carex microchaeta	45%	Y	Fac
3. Carex lenticularis	15%	Y	obl
4. Equistem Arvense	3%	~~Y~~ N	Fac
5. calamagrostis canadensis	1%		Fac
6.			
7.			
8.			
9.			
10.			
Total Cover: 7.4			
50% of total cover: 37 20% of total cover: 14.8			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/5/14	Feature ID W60[illegible]56	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20							Fibric	Organic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) ____	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) ____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: None Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10) X	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) ____
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) ____
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) ____	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): N	Depth (in): 0	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m)_____ Short shrub (0.5-2m) 99 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 74 Moss-Lichen 100 Floating_____ Submerged 2

Number of Wetland Types (M): 3 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even: X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover X 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) X High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature]

GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1056 Field Target: 209 Date: 9/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☐ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

QC VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson 9/5/14 — Signature / Date

X [illegible] — Field Crew Chief (print)

X [illegible] 9/5/14 — Signature / Date

Vegetation Classification Data Form

Site Description

Date: 9/5/14	Project Name & #: Alaska LNG 26221306	Field Target: 211
Investigators: SC / JA		Feature ID: W60T1057 ~~VEG~~
Latitude: 62° 6' 16.64''	Longitude: 150° 13 29.44'	Datum: WGS84
Logbook #: W60-4	Logbook Page #: 12/13	Picture #: W60T1057. 001, 002 (N/S)

Location Description:

Forested ~~OBL/FAC~~ Wetland = PFO1/SS1B

Common Species Observed (Scientific Name)

~~Picea~~ Alnus spp	Viola Langsdorfii
Betula neoAlaskana (FAC)	~~A~~Thyrium cyclosorum
Calamagrostis canadensis	
Equisetum arvense	

Percent Cover of Dominant Structure Level: 40%

Habitat Description:

morph. Adapted Birch, alder forest PFO1/SS1E

Alaska Vegetation Classification: Level I, Level II, Level III

I, II	B; B	2, 2

I B2
II B2

Notes:

Pockets of standing water around root balls

Field Crew Chief: _____ Field Scientist/Technician _____

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I Forest	A Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II Scrub	A Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III Herbaceous	A Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more ..... I. Forest 2

1b. Trees over 3 meters (10 ft) tall are absent or nearly so, Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant 7

I. Forest

2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species ..... I A Needleleaf forest 3

2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species 4

3a. Tree canopy of 60-100 percent cover ..... I.A.1 Closed needleleaf forest

3b. Tree canopy of 25-59 percent cover ..... I.A.2 Open needleleaf forest

3c. Tree canopy of 10-24 percent cover ..... I A 3 Needleleaf woodland

4a. Over 75 percent of tree cover contributed by broadleaf species ..... I.B Broadleaf forest 5

4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the **tree cover** 6

5a. Tree canopy of 60-100 percent cover ..... I.B.1 Closed broadleaf forest

5b. Tree canopy of 25-59 percent cover ..... I.B.2 Open broadleaf forest

5c. Tree canopy of 10-24 percent cover ..... I.B.3 Broadleaf woodland

6a. Tree canopy of 60-100 percent cover ..... I.C.1 Closed mixed forest

6b. Tree canopy of 25-59 percent cover. ..... I.C.2 Open mixed forest

6c. Tree canopy of 10-24 percent cover ..... I.C.3 Mixed woodland

7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall) 8

7b. Vegetation herbaceous (may have up to 25 percent shrub cover) 15

II. Scrub

8a. Vegetation with at least 10 percent cover of dwarf trees ..... II A Dwarf tree scrub 9

8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees 10

9a. Dwarf tree canopy of 60-100 percent cover ..... II.A.1 Closed dwarf tree scrub

9b. Dwarf tree canopy of 25-59 percent cover ..... II.A.2 Open dwarf tree scrub

9c. Dwarf tree canopy of 10-24 percent cover ..... II A 3 Dwarf tree scrub woodland

10a Shrubs more than 1.5 meters (5 ft) tall ..... II B Tall scrub 11

10b Shrubs less than 1.5 meters (5ft) tall 12

11 a Shrub canopy cover greater than 75 percent ..... II.B.1 Closed tall scrub

11 b Shrub canopy cover of 25-74 percent ..... II B 2 Open tall scrub

12a Shrubs 20 centimeters to 1.5 meters tall ..... II C Low scrub 13

12b Shrubs under 20 centimeters in height ..... II D Dwarf scrub 14

13a Shrub canopy cover greater than 75 percent ..... II C I Closed low scrub

13b Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present ..... II C 2 Open low scrub

14a Dryas species dominant in the dwarf shrub layer ..... II.D.1 Dryas dwarf scrub

14b. Ericaceous species dominant in the dwarf shrub layer ..... II D 2 Ericaceous dwarf scrub

14c Willow species dominant in the dwarf scrub layer ..... II D 2 Willow dwarf scrub

III. Herbaceous

15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation 16

15b Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water ..... III.D Aquatic herbaceous 21

16a. Grasses, sedges, or rushes (graminoid) plants dominant ..... III.A Graminoid herbaceous 17

16b Forbs or bryophytes dominant 18

17a Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp ..... III A.I Dry graminoid herbaceous

17b On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp or *Eriophorum* spp.; tussocks often present ..... III A 2 Mesic graminoid herbaceous

17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens ..... III.A.3 Wet graminoid herbaceous

18a Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails) ..... III.8 Forb herbaceous 19

18b Vegetation dominated by mosses or lichens ..... III C Bryoid herbaceous 20

19a. On dry sites, usually rocky and well drained; mostly tundra sites ..... III.B.1 Dry forb herbaceous

19b. On moist sites but without standing water, mostly within forested areas ..... III.B.2 Mesic forb herbaceous

19c On wet sites, usually with standing water for part of the year ..... III.B.3 Wet forb herbaceous

20a Vegetation cover dominated by mosses ..... III.C.1 Bryoid moss

20b Vegetation cover dominated by lichens ..... III.C.2 Bryoid lichen

21a Vegetation submerged or floating in fresh water. ..... III.D.1 Freshwater aquatic herbaceous

21 b. Vegetation submerged or floating in brackish water ..... III D.2 Brackish water aquatic herbaceous

21c Vegetation submerged or floating in salt water ..... III D 3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: WI071057 Field Target: 211 Date: 9/5/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☐ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X	X
Field Technician (print)	Signature
X Joe Christopher	X
Field Crew Chief (print)	Signature

QC VW

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 210	**Map #:** 10 **Map Date:** 8/29/14
Date: 9/6/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60TI058
Investigators: JC, JA			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 683.3	
Latitude: 62° 06' 23.2355		**Longitude:** 150° 13' 31.52	**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 15	**Picture No.:** W60TI058_001-002_N;S.	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Muskeg
Slope (%):	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: —	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PEM1/SS1 ~~E~~ F ~~OH~~
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A3, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 15 IN LOGBOOK

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: ~

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10%		FacW
2. Dasiphora fruticosa	25%	Y	Fac
3. Myrica gale	15%	Y	Obl
4. Betula nana	7%		Fac
5.			
6.			
7.			
8.			
9.			

Total Cover: ~~53~~ 57

50% of total cover: 28.5 20% of total cover: ~~10.6~~ 11.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	~~102~~ 114	X 1 =	~~102~~ 114
FACW species:	13	X 2 =	26
FAC species	37	X 3 =	111
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	~~152~~ 164 (A)		~~244~~ 251 (B)

PI = B/A = ~~1.6~~ 1.53

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	1%		Fac
2. Cornus suecica	1%		~~Fac~~
3. rubus arcticus	3%		Fac
4. Viola langsdorfii	3%		FacW
5. eriophorum angustifolium	12%		Obl
6. Thecophorium caespitosum	80%	Y	Obl
7. Equisetum fluviatile	7%		Obl
8. Parnassia palustris	T		FacW
9.			
10.			

Total Cover: 107

50% of total cover: 53.5 20% of total cover: 21.4

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

~~102~~ % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

~~45~~% % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

III A3, II C2

WETLAND DETERMINATION DATA FORM

SOIL Date 7/6/14 Feature ID WOT1058 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
			NO pit - Assume Hydric					

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) ~~X~~	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes) X

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: ~~X~~ Depth (inches): ~~X~~

Hydric Soil Present (Y/N): Y

Notes: NO pit was dug. Standing water & Obligate vegetation present - Assume Histosol. Site similar to other Data points with Histosol

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10) X	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) Y
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5) X			

Surface Water Present (Y/N): Y	Depth (in): 2-6"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent X Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 10 Tall shrub (2-6m) — Short shrub (0.5-2m) ~~2~~ 47 Dwarf shrub (<0.5m) — Tall herb (≥1m) — Short herb (<1m) 10? Moss-Lichen 100 Floating — Submerged —

Number of Wetland Types (M): 3 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover ~~X~~ 26-75% Scattered or Peripheral Cover X >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many X 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) X High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow X Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) P Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.18

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: JC GPS Technician QA/QC check: 9/6/14

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1058 Field Target: 210 Date: 9/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   ☑ Site description, site parameters and summary of findings are complete?
   ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   ☑ Vegetation names are entered legibly for all strata present?
   ☑ Cover calculations are complete and correct?
   ☑ All dominant species have been determined and recorded per strata?
   ☑ Indicator status is correct for each species?
   ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   ☑ Soil profile is complete? NOT NEEDED
   ☐ 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?

QC VW

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X — Signature / Date 9/6/14

X Joe Christopher — Field Crew Chief (print)

X — Signature / Date 9/6/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 212	**Map #:** 10 **Map Date:** 8/29/14
Date: 9/6/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1059	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 683.55		
Latitude: 60° 06' 12.34		**Longitude:** 150° 13' 31.47		**Datum:** WGS84
Logbook No.: W-60 -4	**Logbook Page No.:** 16	**Picture No.:** W60T1059-001-004, N, S		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Hummocks / Forest
Slope (%): 0	Local relief (concave, convex, none): (concave)
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO4 / SSIB
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IA2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Pasc 16

Selected PFO over PSS Because Viereck Code is Primarily Forest + Spruce Trees are Dominant overstory in Habitat.

WETLAND DETERMINATION DATA FORM P

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. picea mariana	30	Y	FacW
2.			
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron groenlandicum	20		Fac
2. Betula nana	65%	Y	Fac
3. Chamaedaphne calyculata	10%		FacW
4. Vaccinium vitis-idaea	3%		Fac
5. Empetrum nigrum	7%		Fac
6. Vaccinium oxycoccus	3%		obl
7. Picea mariana	3%		FacW
8. Betula neoalaskana	1%		FacU
9.			

Total Cover: 112

50% of total cover: 56 20% of total cover: 22.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	13	X 1 =	13
FACW species:	53	X 2 =	106
FAC species	136	X 3 =	408
FACU species	1	X 4 =	4
UPL species		X 5 =	
Column Totals:	203	(A)	531 (B)

PI = B/A = 2.6

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	1%		Fac
2. Rubus chamaemorus	10%		FacW
3. Carex microchaeta	40%	Y	Fac
4. Carex magellanica	10%		obl
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 61

50% of total cover: 30.5 20% of total cover: 12.2

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

MA % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

45 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/16/14	Feature ID W60T1059	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-11							Fibric	organic Saturated
11-20	10Y 2/1						SL	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: None Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) Y
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): Y	Depth (in): 2-3"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_X_ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_X_ 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) 30 Sapling (<5 dbh, <6m tall) 4 Tall shrub (2-6m)_____ Short shrub (0.5-2m) 10 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 61 Moss-Lichen 100 Floating_____ Submerged_____

Number of Wetland Types (M): 3 | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even /

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_X_ 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_X_ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _X_ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_X_

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _X_ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_X_ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ 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_X_ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_A_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_X_ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_X_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_X_ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_ **pH Reading** 4.0

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_X_

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_X_ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WL0071059 Field Target: 212 Date: 9/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☐ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☐ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☐ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☐ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☐ Maps are initialed and dated?

QC
VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ ~~Two photos were taken for each Observation Point (vegetation/site overview)?~~

X Jennifer Anderson — X [signature] 9/7/14

Wetland Scientist (print) — Signature / Date

X Joe Christopher — X [signature] 9/6/14

Field Crew Chief (print) — Signature / Date

Vegetation Classification Data Form

Site Description		
Date: 9/6/14	Project Name & #: Alaska LNG 26221306	Field Target: 213
Investigators: JL \ JA		Feature ID: W60T1060 ~~veg~~
Latitude: 62° 5' 9.51"	Longitude: 150° 12' 46.63"	Datum: WGS84
Logbook #: W40-4	Logbook Page #: 17	Picture #: W60T1060_veg_00-002 N/S

Location Description:

South of FT 212 - Forested Island between pemi/ssiE

Common Species Observed (Scientific Name)

Picea Mariana ~40'	
Anus spp - 6' Tall Closed	
VAccinium ~~Vaccino~~ OVAFolium	
Equisetum Arvense	

Percent Cover of Dominant Structure Level:

Habitat Description:

Forested Wetland PFO4/SS1 ~~CB~~ Jff. - pockets of H_2O

Alaska Vegetation Classification: Level I, Level II, Level III

~~I, II~~	~~A, B~~	~~2, 1~~

I A2
II B1

Notes:

Trees growing on raised roots, adapt to water

Field Crew Chief: [signature]

Field Scientist/Technician [signature]

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so, Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21
16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: W60T1060.vg Field Target: 213 Date: 9/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson X [signature] 9/6/14

Field Technician (print) Signature

X Joe Christopher X [signature] 9/6/14

Field Crew Chief (print) Signature

QC
MW

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 214	**Map #:** 13 **Map Date:** 8/29/14
Date: 9/7/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1061	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 686.75		
Latitude: 62° 03' 39.34		**Longitude:** 150° 12' 14.28		**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 107	**Picture No.:** W60T1061_001_004_N;S,		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Depression / Drainage
Slope (%): 0-1	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** ~~PSS 1/4C~~ PSS1/4C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIB2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAGE 1B

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. picea mariana	5%	Y	Fac W
2.			
3.			
4.			
Total Cover: 5			
50% of total cover: 2.5	20% of total cover: 1		
Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	105%	Y	Fac
2. myrica gale	65%	Y	OBL
3. chamaedaphne calyculata	3%		Fac W
4. spiraea douglasii	5%		Fac W
5. alder spp.	5%		Fac
6.			
7.			
8.			
9.			
Total Cover: 143			
50% of total cover: 71.5	20% of total cover: 28.6		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 19 (A)

Total Number of Dominant Species Across All Strata: ~~5~~ 4 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~80%~~ 100 % (A/B)

VW

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 65	X 1 =	65
FACW species: 13	X 2 =	26
FAC species 100	X 3 =	285
FACU species 3	X 4 =	12
UPL species _____	X 5 =	
Column Totals: 181	(A)	388 (B)

PI = B/A = 2.14

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. calamagrostis canadensis	30%	Y	Fac
2. cornus canadensis	3%	~~Y~~ N	Fac U
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 33			
50% of total cover: 16.5	20% of total cover: 6.6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

NA % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/7/24	Feature ID					Soil Pit Required (Y/N) Y
SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features				
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-9							Fibric	organic
9-110	10YR 2/1	100					SL	sand
10+	Gravel							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: gravel Depth (inches): 18"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) X			

Surface Water Present (Y/N): Y	Depth (in): ~~0~~ 3-6"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved X Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) _____ Tall shrub (2-6m) 5 Short shrub (0.5-2m) 138 133 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 23 33 Moss-Lichen 100 Floating _____ Submerged _____

Number of Wetland Types (M): 2 **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%) X 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 X >75% Scattered or Peripheral Cover X 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 X

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 X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet X no channel

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow X Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.54

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits √ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1061 Field Target: 214 Date: 9/7/14

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?

GL VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X — Signature / Date 9/7/14

X Joe Chapelon — Field Crew Chief (print)

X — Signature / Date 9/7/14

WETLAND DETERMINATION DATA FORM

W60T1062

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 215	Map #: 14 Map Date: 8/21/14
Date: 9/7/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W60T1062	
Investigators: JC, JA				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 687 55		
Latitude: 62° 03' 00.32		Longitude: 150° 12' 34.48		Datum: WGS84
Logbook No.: W60-4	Logbook Page No.: 19	Picture No.: W60T1062_001_004_N,S		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Muskeg
Slope (%): 0	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes X No____	**Wetland Type:** pem1/ss1E ~~F~~
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): III A3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

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WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: —

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	3		Fac
2. Picea mariana	5	Y	Fac W
3. dasiphora fruticosa	7%	Y	Fac
4. myrica gale	5%	Y	Fac W
5. Andromeda polifolia	3%	~~Y~~ N	Fac W
6. Vaccinium oxycoccus	3%		obl
7.			
8.			
9.			

Total Cover: 26

50% of total cover: 13 20% of total cover: 5.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	114	X 1 =	114
FACW species:	14	X 2 =	28
FAC species	18	X 3 =	54
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	146 (A)		196 (B)

PI = B/A = 1.34

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Trichophorum caespitosum	90%	Y	OBL
2. Eriophorum angustifolium	20%		OBL
3. Calamagrostis canadensis	5%		Fac
4. rubus arcticus	3%		Fac
5. galium trifidum	1%		Fac W
6. comarum palustre	1%		OBL
7.			
8.			
9.			
10.			

Total Cover: 120

50% of total cover: 60 20% of total cover: 24

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

100 % Cover of Wetland Bryophytes

_____ Total Cover of Bryophytes

65 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 9/7/14 Feature ID WMTL0602 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-11"							Fibric	organic saturated
11-20"							hemic	organic saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3)
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5) X			

Surface Water Present (Y/N): Y	Depth (in): 0-6"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__76__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __0__ Short herb (<1m) __120__ Moss-Lichen__100__ Floating__0__ Submerged__5__

Number of Wetland Types (M): __3__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover__X__ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__X__ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet__X__ 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 __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.56

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)__X__

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: W10T10102 Field Target: 215 Date: 9/7/14

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?

QC
VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson 9/7/14

Wetland Scientist (print) — Signature / Date

X Lee Christopher — X [signature] 9-7-14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 2110	**Map #:** 14 **Map Date:** 8/29/14
Date: 9/7/14	**Project Name & No.: Alaska LNG 26221306**		**Feature Id:** W60T1063	
Investigators: JC,				**Team No.:** W60
State: Alaska	**Region: Alaska**	**Milepost:** 687.72		
Latitude: 62.02' 55.40		**Longitude:** 150° 12' 41.49		**Datum: WGS84**
Logbook No.: W60-4	**Logbook Page No.:** 20	**Picture No.:** W60T1063_veg-veg-pit-plug		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0 - 1	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** UPLAND
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): IC2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10%		Fac U
2. Betula neoalaskana	65%	Y	Fac U
3.			
4.			

Total Cover: 75

50% of total cover: 37.5 20% of total cover: 15

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Oplopanax horridus	75%	Y	Fac U
2. Alnus spp	5%		Fac U
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 80%

50% of total cover: 40 20% of total cover: 16%

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	
FACW species:	— X 2 =	
FAC species	45 X 3 =	135
FACU species	190 X 4 =	760
UPL species	X 5 =	
Column Totals:	235 (A)	890 (B)

PI = B/A = 3.78

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris Expansa	35%	Y	Fac U
2. Equisetum sylvaticum	45%	Y	Fac
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 80

50% of total cover: 40 20% of total cover: 16%

Hydrophytic Vegetation Indicators:

_____ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

3% % Bare Ground

N/A % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/7/14	Feature ID WGDT1 ok 3	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3							Fib	Dry
3-7	7.5YR 3/4	100					Silt Lm	Dry
7-20	10 [illegible] 4/4	95	7.5YR 4/6	5	C	PL	Silt Loam	moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: None Depth (inches): N/A

Hydric Soil Present (Y/N): ~~X~~ N

Notes: NO hydric soils observed. Redox on pore linings was sufficient for AK redox

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) X	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in):	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W00T1063 Field Target: 216 Date: 9/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☐ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☐ Vegetation names are entered legibly for all strata present?
   - ☐ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☐ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☐ Appropriate hydric soil indicators are marked?

   N/A

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☐ Surface water, water table, and saturation depths are recorded if present? N/A

5. **Functions and Values**

   - ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? N/A

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?

QC
VW

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson 9/7/14

Wetland Scientist (print) — Signature / Date

X Lisa Christian — X [signature] 9/7/14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 217	Map #: 16 Map Date: 8/29/14
Date: 9/7/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W40T1064	
Investigators:				Team No.: W60
State: Alaska	Region: Alaska	Milepost: 688.7		
Latitude: 62° 02' 33.88"		Longitude: 150° 12' 47.96"		Datum: WGS84
Logbook No.: W60-4	Logbook Page No.: 21	Picture No.: W60T1064 _veg-veg-pit-plug		

SITE PARAMETERS	
Subregion: S. Central	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No 4 (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PEMI/SSIE
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): ~~IA3, IIB2~~ III A3, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

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WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	1%	~~Y~~	FacU
2.			
3.			
4.			

Total Cover: ~~4~~

50% of total cover: ~~.05~~ 20% of total cover: ~~0.2~~

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	20%	Y	FAC
2. Picea glauca	1%		FacU
3. Salix Pulchra	5%		FacW
4. Vaccinium ovalifolium	3%		FAC
5. Picea glauca	1		FACU
6.			
7.			
8.			
9.			

Total Cover: ~~29~~ 30

50% of total cover: ~~14.5~~ 15 20% of total cover: ~~5.8~~ 6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: ~~3~~ 2 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~0.667~~ 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	3	X 1 =	3
FACW species:	5	X 2 =	10
FAC species	123	X 3 =	369
FACU species	2	X 4 =	8
UPL species		X 5 =	
Column Totals:	133 (A)		390 (B)

PI = B/A = 2.93

Tree Stratum has <5% cover → added to Shrub Stratum for dominance test

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	100%	Y	Fac
2. Comarum palustre	3%		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 103

50% of total cover: 51.5 20% of total cover: 20.6

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

NA % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

70 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/7/14	Feature ID WGOT1064	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10							Fib.	Sat
10-20	10 YR 2/1	100					SL	Sat
Ice @ 20								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: 20 Depth (inches): Ice

Hydric Soil Present (Y/N): Y

Notes: Ice @ Bottom of Pit

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) X	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): Y	Depth (in): 2-3"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)____ Sapling (<5 dbh, <6m tall)____ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__25__ Dwarf shrub (<0.5m) __—__ Tall herb (≥1m) __—__ Short herb (<1m) __103__ Moss-Lichen__60__ Floating__—__ Submerged__—__

Number of Wetland Types (M): __1__ | **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven __X__Moderately even ____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover__X__ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) __X__ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty__X__ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet__X__ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet__X__ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__X__ Poorly Developed (6in.)_____ 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_____ Restricted Outflow__X__ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 4.57

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__V__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)__X__ Medium (10-100 acres)__X__ 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: W600110164 Field Target: 217 Date: 9/7/14

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?

GL MW

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderssen — X [signature] 9/7/14

Wetland Scientist (print) — Signature / Date

X Joe Christyn — X [signature] 9/7/14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 218	**Map #:** 116 **Map Date:** 8/29/14
Date: 9/7/14	**Project Name & No.: Alaska LNG 26221306**		**Feature Id:** W60T1065	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region: Alaska**	**Milepost:** 688.2		
Latitude: 62°02'31.88		**Longitude:** 150° 12' 48.97		**Datum: WGS84**
Logbook No.: W60-4	**Logbook Page No.:** 29	**Picture No.:** W60T1065-001-004-N;S;		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 0-3	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology X Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology X Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IA1, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Sketch on PAGE 31

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	65%	Y	FACU
2.			
3.			
4.			

Total Cover: 65

50% of total cover: 32.5 20% of total cover: 13

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	15%	Y	FACU
2. Vaccinium vitis idaea	7%	Y	FAC
3. Linnaea borealis	7%	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 29

50% of total cover: 14.5 20% of total cover: 5.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 20% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 7	X 3 =	21
FACU species 94	X 4 =	376
UPL species	X 5 =	
Column Totals: 101	(A)	397 (B)

PI = B/A = 3.93

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	7%	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 7

50% of total cover: 3.5 20% of total cover: 1.4

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0% % Bare Ground

N/A % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 8/7/14 Feature ID 218 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3"							Fibric	dry organic
3-5"	2.5Y 6/1	100					SL	
5-8"	2.5YR 2.5/1	60					Fine (SL)	
8-20"	10YR 4/3	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Spodosol - Acidic soils

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in):	

Notes: NO Field Indicators of Hydrology observed

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WI00T1065 Field Target: 218 Date: 9/7/14

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?

GL
VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson 9/7/14

Wetland Scientist (print) — Signature / Date

X Joe Christoph — X [signature] 9/8/14

Field Crew Chief (print) — Signature / Date

Vegetation Classification Data Form

Site Description

Date: 9/7/14	Project Name & #: Alaska LNG 26221306	Field Target: 219
Investigators: K / JA		Feature ID: GKOT1046 ~~-UG~~
Latitude: 62° 02' 07.66"	Longitude: 150° 12' 54.71"	Datum: WGS84
Logbook #: WGO-4	Logbook Page #: 22-23	Picture #: GKOT1046-UG-001-002

Location Description:

Opening in mixed forest upland

Common Species Observed (Scientific Name)

Betula Neoalaskana	Cornus Canadensis
Picea Glauca	Oplopanix Horridus
Rosa Acicularis	Ribes triste
Calamagrostis Canadensis	Equisetum Silvaticum

Percent Cover of Dominant Structure Level: 50%

Habitat Description:

Open mixed forest

Alaska Vegetation Classification: Level I, Level II, Level III

~~I, II, III~~	~~C, B, A~~	~~2, 2, 1~~

I C2
II B2
III A2

Notes:

Open grassy area surrounded by Birch, w spruce + Alders

Field Crew Chief: _____ Field Scientist/Technician _____

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15

II. Scrub

8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21

16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: WGST1066-14 Field Target: 219 Date: 9/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson — **Field Technician (print)**

X [signature] 9/7/14 — **Signature**

X Joe Christian — **Field Crew Chief (print)**

X [signature] 9/7/14 — **Signature**

QC
VIN

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X		**Field Target:** 221	**Map #:** 13 **Map Date:** 8/29/14
Date: 9/8/14	**Project Name & No.:** Alaska LNG 26221306	**Feature Id:** W60T1067	
Investigators: JC, JA			**Team No.:** WMoD
State: Alaska	**Region:** Alaska	**Milepost:** 689	
Latitude: 62°01'54.43	**Longitude:** 150°12'18.64		**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 24	**Picture No.:** W60T1067_001_004, N, S.	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Hummock
Slope (%): 0-1	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation___, Soil___, or Hydrology___ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No___	**Is the Sampled Area within a Wetland?** Yes Y No___
Hydric Soil Present? Yes X No___	**Wetland Type:** PSS4/EM1B
Wetland Hydrology Present? Yes X No___	Alaska Vegetation Classification (Viereck): ~~IIB2, IIIA3~~ IIA3, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

PAge 24

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	20%		FacW
2. Myrica gale	5%		Obl
3. Rhododendron groenlandicum	5%		Fac
4. Chamaedaphne calyculata	3%		FacW
5. Empetrum nigrum	55%	Y	Fac
6. vaccinium uliginosum	3%		Fac
7. Betula nana	60%	Y	Fac
8.			
9.			

Total Cover: 151

50% of total cover: 75.5 20% of total cover: 31

30.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	65 X 1 =	65
FACW species:	28 X 2 =	56
FAC species	60 X 3 =	180
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals:	153 (A)	301 (B)

PI = B/A = 1.96

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum fluviatile	60%	Y	OBL
2. carex microchaeta	60%	Y	Fac
3. Rubus chamaemorus	5%		FacW
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 125

50% of total cover: 62.5 20% of total cover: 25

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

NA % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 1/8/14	Feature ID W100T1067	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20"							Fibric	organic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) ____	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) ____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: ice Depth (inches): 20"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) ____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) X
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) X
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) ____	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): n	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 2"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_X_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m)_____ Short shrub (0.5-2m) 131 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 125 Moss-Lichen 100 Floating_____ Submerged_____

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_X_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_X_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _X_____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_X_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _X_____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_X_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_X_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_X_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_X_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_X_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_X_____

Watershed Land Use: 0-5% Rural_X_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_X_____

Crew Chief QA/QC check: JL GPS Technician QA/QC check: JGM

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: 4160T1047 Field Target: 221 Date: 9/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

☑ Site description, site parameters and summary of findings are complete?
☑ A detailed site sketch is included in logbook?

2. Vegetation

☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
☑ Vegetation names are entered legibly for all strata present?
☑ Cover calculations are complete and correct?
☑ All dominant species have been determined and recorded per strata?
☑ Indicator status is correct for each species?
☐ Dominance Test and Prevalence Index have been completed?

3. Soil

☑ Soil profile is complete?
☑ Appropriate hydric soil indicators are marked?

4. Hydrology

☑ Appropriate hydrology indicators are marked?
☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
☑ Each logbook page is initialed and dated?

7. Maps

☑ Wetland boundaries have been corrected if necessary?
☑ Maps are initialed and dated?

QL
VW

8. Photos

☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 9/8/14

Wetland Scientist (print) — **Signature / Date**

X Joe Clostner — X [signature] 9/8/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) X			**Field Target:** ~~220~~	**Map #:** 18 **Map Date:** 8/29/14
Date: 9/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T068	
Investigators: JC, JA				**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 689		
Latitude: 62°01'54.17		**Longitude:** 150° 12' 29.94		**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 24-25	**Picture No.:** W60T1068-001-004, N, S.		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Knoll, ridge
Slope (%): 25	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No ~~X~~	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): ~~IC~~ 2, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

gps point ERROR on Viereck & FT # recorded as 221—should be 220

Ridge Runner N to S

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FacU
2. Picea mariana	10	Y	FacW
3. Picea glauca	10	Y	FacU
4.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	15%	Y	FacW
2. Picea glauca	5%		FACU
3. Viburnum vitis-idaea	30%	Y	FAC
4. Empetrum nigrum	10%		Fac
5. Linnaea borealis	3%		FacU
6.			
7.			
8.			
9.			

Total Cover: ~~63~~ 100

50% of total cover: ~~31.5~~ 33 20% of total cover: ~~12.6~~

13.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: ~~3~~ 3 (A)

Total Number of Dominant Species Across All Strata: ~~5~~ 5 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~50%~~ 60 % (A/B)

VW

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:		X 1 =	
FACW species:	25	X 2 =	50
FAC species	40	X 3 =	120
FACU species	51	X 4 =	204
UPL species		X 5 =	
Column Totals:	116	(A)	374 (B)

PI = B/A = 3.2

* Herb stratum has <5% cover → added to shrub stratum for dominance test

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geocaulon lividum	3%	~~Y~~ N	FacU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: ~~3~~

50% of total cover: ~~1.5~~ 20% of total cover: ~~0.6~~

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

___ Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

NA % Cover of Wetland Bryophytes

___ Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): ~~N~~ Y

VW

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 9/8/14	Feature ID W6CT1068	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4"							Fibric	organic dry
4-6"	2.5Y 7/1						silt	bleached (A)
6-10"	2.5YR 2.5/2						med/sand	
10-20"	10YR 4/6						Silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in):	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (<5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: 9/8/14

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W60T1068 Field Target: ~~181~~ 220 Date: 9/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked? NA

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?

QC VW

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Bne

Wetland Scientist (print)

X [signature] 9/8/14

Signature / Date

X Joe Christopher

Field Crew Chief (print)

X [signature] 9/8/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ **Access Road** (explain)_____ **Other** (explain) X		**Field Target:** 23	**Map #:** 21 **Map Date:** 8/9/14
Date: 9/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1069
Investigators: JC/JA			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 150° 19' 13.46"	
Latitude: 61° 46" 04.84"	**Longitude:**		**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 26/27	**Picture No.:** W60T1069_001-004, N, S,	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): TERRACE
Slope (%): 0-3	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification:	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IC2, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

1,000'

- Corridor

PASC 26/27

Beetle Kill Area

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus Tremuloides	15	Y	FacU
2. Picea glauca	10	Y	FacU
3. Betula neoalaskana	5		FacU
4.			
Total Cover: 30			
50% of total cover: 15	20% of total cover: 6.0		

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10	Y	FacU
2. Betula neoalaskana	3		FacU
3. Vaccinium vitis idaea	15	Y	Fac
4. Rhododendron groenlandicum	5		Fac
5. Rosa acicularis	3		FacU
6. Linnaea borealis	1		FacU
7. Vaccinium uliginosum	5		Fac
8. Vaccinium oxalifolium	7		Fac
9. Salix pulchriana	1		Fac
Total Cover: 50			
50% of total cover: 25	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: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: —	X 2 =	—
FAC species 39	X 3 =	117
FACU species 57	X 4 =	228
UPL species	X 5 =	
Column Totals: 96	(A)	345 (B)

PI = B/A = 3.59

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. geocaulon lividum	3		FacU
2. Equisetum sylvaticum	1		Fac
3. Cornus canadensis	7	Y	FacU
4. Calamagrostis canadensis	5	Y	Fac
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 16			
50% of total cover: 8	20% of total cover: 3.2		

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

— % Bare Ground

— % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 9/8/14 Feature ID WBOT069 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							FILL	Dry
4-8	2.5Y 7/1	10					Silt	Bleached A - Tree Throw
8-15	2.5YR 2.5/2	100					COARSE SAND	
15-20	10YR 4/6	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): N/A

Hydric Soil Present (Y/N): ~~Y~~ N

Notes:
Similar soils as WBOT068 Some Tree Throw @ 4-10"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: No ~~Hydric~~ Hydro Indicators	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** N	
Water Table Present (Y/N): N	Depth (in):		
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in):		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WGDT1069 Field Target: 223 Date: 9/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

QC VW

8. **Photos**

☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 9/8/14

Wetland Scientist (print) — **Signature / Date**

X JOE Christopher — X [signature] 9/8/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 224	**Map #:** 11 **Map Date:** 8/29/14
Date: 9/8/14	**Project Name & No.:** Alaska LNG 26221306		**Feature Id:** W60T1070
Investigators: JC, JA			**Team No.:** W60
State: Alaska	**Region:** Alaska	**Milepost:** 709.1	
Latitude: 61° 45' 40.09	**Longitude:** 150° 18' 50.36		**Datum:** WGS84
Logbook No.: W60-4	**Logbook Page No.:** 29	**Picture No.:** W60T1070-001-004_N:S.	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): terrace
Slope (%): 0	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: N/A	Soil Map Unit Name: N/A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** ~~PSS4/1B~~ PSS 3/1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIC2 ; IIIA3?2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

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WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: _____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamaedaphne Calyculata	95%	Y	FacW
2. Vaccinum oxycoccus	40%	Y	Obl
3. Betula nana	25%		Fac
4. Alnus fruticosa	1%		Fac
5. Salix fuscenscens	7%		FacW
6. Picea mariana	1%		FacW
7. Andromeda polifolia	1%		FacW
8. Rhododendron groenlandicum	1%		Fac
9.			

Total Cover: 171

50% of total cover: 85.5 20% of total cover: 34.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	~~50~~ 51 X 1 =	~~50~~ 51
FACW species:	104 X 2 =	208
FAC species	63 X 3 =	189
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals:	~~217~~ 218 (A)	~~447~~ 448 (B)

PI = B/A = ~~2.05~~ 2.06

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	35%	Y	Fac
2. Comarum palustre	10%	Y	Obl
3. Equisetum fluviatile	1%		Obl
4. Equisetum arvense	1%		Fac
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 47

50% of total cover: 23.5 20% of total cover: 9.4

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

N/A % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

_____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 7/8/14 Feature ID W60T070 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-16"							Fibric	Organic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: ice Depth (inches): 16"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) X	Drainage Patterns (B10)	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) Y
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 0"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved X 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) 1 Tall shrub (2-6m) — Short shrub (0.5-2m) 171 Dwarf shrub (<0.5m) — Tall herb (≥1m) — Short herb (<1m) 47 Moss-Lichen 100 Floating — Submerged —

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs X

Degree of Outlet Restriction (P): No Outflow X Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

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: WL60T1070 Field Target: 224 Date: 9/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

QC VW

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X — 9/8/14

Wetland Scientist (print) — **Signature / Date**

X Joe Christopher — X — 9/8/14

Field Crew Chief (print) — **Signature / Date**

Vegetation Classification Data Form

Site Description		
Date: 9/8/14	Project Name & #: Alaska LNG 26221306	Field Target: 225
Investigators: JC, JA		Feature ID: W60T~~10~~071
Latitude: 61°45'36.48	Longitude: 150°18'51.27	Datum: WGS84
Logbook #: W60-4	Logbook Page #:	Picture #: W60T071_001-002-W,S,

Location Description:

Terrace Adj to Kruto Rec Area

Common Species Observed (Scientific Name)

Betula Neoalaskana	Equisetum Sylvaticum
Picea Glauca	Equisetum Arvense
Rosa Acicularis	Ribes Triste
Cornus Canadensis	

Percent Cover of Dominant Structure Level: 60-70%

Habitat Description:

Mixed Forest Upland

Alaska Vegetation Classification: Level I, Level II, Level III

~~1 II~~	~~C B~~	~~3 2~~

I C3
II B2

Notes:

Field Crew Chief: [signature] 9/8/14

Field Scientist/Technician [signature]

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	**I.B.1 Closed broadleaf forest**
5b.	Tree canopy of 25-59 percent cover	**I.B.2 Open broadleaf forest**
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	**II.A.1 Closed dwarf tree scrub**
9b.	Dwarf tree canopy of 25-59 percent cover	**II.A.2 Open dwarf tree scrub**
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	**II.B.1 Closed tall scrub**
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	**II.D.1 Dryas dwarf scrub**
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21
16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

W60T107 [illegible] -veg

Feature ID: [illegible] Field Target: 225 Date: 9/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X	X
Field Technician (print)	**Signature**
X [illegible]	X 9/8/14
Field Crew Chief (print)	**Signature**

QL VW

Vegetation Classification Data Form

Site Description W60TI072

Date: 9/6/14	Project Name & #: Alaska LNG 26221306	Field Target: ~~W60TI058_VEG~~
Investigators: JC/JA		Feature ID: 210
Latitude: 62° 6' 22.20"	Longitude: 150° 13' 24.13"	Datum: WGS84
Logbook #: W60-4	Logbook Page #: 16	Picture #: W60TI058_veg_001-002 P1S

Location Description:

Upland Island Adj to TI058 wetland (210)

Common Species Observed (Scientific Name)

Picea mariana	EG AVV.
Vaccinium ovalifolium	Equisetum Silvaticum
Rosa Acicularis	Betula Neoalaskana
Alnus spp	

Perdent Cover of Dominant Structure Level: 50 %

Habitat Description:

Mixed forest upland (Dry soils)

Alaska Vegetation Classification: Level I, Level II, Level III

~~F~~, II	~~C~~, C	~~3~~, 2

I C3
II C2

Notes:

Field Crew Chief: _____ Field Scientist/Technician _____

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II Scrub	A Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C Low scrub	(1) Closed low scrub (2) Open low scrub
	D Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III Herbaceous	A Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more ..... I Forest 2

1b. Trees over 3 meters (10 ft) tall are absent or nearly so, Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant 7

I Forest

2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species ..... I.A Needleleaf forest 3

2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species 4

3a Tree canopy of 60-100 percent cover ..... I.A 1 Closed needleleaf forest

3b Tree canopy of 25-59 percent cover ..... I.A.2 Open needleleaf forest

3c. Tree canopy of 10-24 percent cover ..... I.A 3 Needleleaf woodland

4a Over 75 percent of tree cover contributed by broadleaf species ..... I B Broadleaf forest 5

4b Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover 6

5a Tree canopy of 60-100 percent cover ..... I B.1 Closed broadleaf forest

5b Tree canopy of 25-59 percent cover ..... I B 2 Open broadleaf forest

5c Tree canopy of 10-24 percent cover ..... I B 3 Broadleaf woodland

6a Tree canopy of 60-100 percent cover ..... I C 1 Closed mixed forest

6b Tree canopy of 25-59 percent cover ..... I.C.2 Open mixed forest

6c Tree canopy of 10-24 percent cover ..... I C 3 Mixed woodland

7a Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall) 8

7b. Vegetation herbaceous (may have up to 25 percent shrub cover) 15

II Scrub

8a. Vegetation with at least 10 percent cover of dwarf trees ..... II A Dwarf tree scrub 9

8b Vegetation with at least 25 percent **cover of shrubs and less than** 10 percent cover of dwarf trees 10

9a. Dwarf tree canopy of 60-100 percent cover ..... II.A.1 Closed dwarf tree scrub

9b Dwarf tree canopy of 25-59 percent cover ..... II.A.2 Open dwarf tree scrub

9c Dwarf tree canopy of 10-24 percent cover ..... II A 3 Dwarf tree scrub woodland

10a Shrubs more than 1.5 meters (5 ft) tall ..... II B Tall scrub 11

10b. Shrubs less than 1.5 meters (5 ft) tall 12

11 a Shrub canopy cover greater than 75 percent. ..... II.B.1 Closed tall scrub

11 b Shrub canopy cover of 25-74 percent ..... II B.2 Open tall scrub

12a Shrubs 20 centimeters to 1.5 meters tall ..... II.C Low scrub 13

12b Shrubs under 20 centimeters in height ..... II.D Dwarf scrub 14

13a. Shrub canopy cover greater than 75 percent ..... II C.1 Closed low scrub

13b Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present ..... II C 2 Open low scrub

14a. Dryas species dominant in the dwarf shrub layer ..... II.D.1 Dryas dwarf scrub

14b Ericaceous species dominant in the dwarf shrub layer ..... II D.2 Ericaceous dwarf scrub

14c Willow species dominant in the dwarf scrub layer ..... II.D.2 Willow dwarf scrub

III Herbaceous

15a Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation 16

15b Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water ..... III.D Aquatic herbaceous 21

16a. Grasses, sedges, or rushes (graminoid) plants dominant ..... III.A Graminoid herbaceous 17

16b Forbs or bryophytes dominant 18

17a Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp ..... III A.1 Dry graminoid herbaceous

17b On moist sites, but usually not with standing water Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp., tussocks often present ..... III A.2 Mesic graminoid herbaceous

17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens ..... III A.3 Wet graminoid herbaceous

18a Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails) ..... III.B Forb herbaceous 19

18b Vegetation dominated by mosses or lichens ..... III.C Bryoid herbaceous 20

19a On dry sites, usually rocky and well drained; mostly tundra sites ..... III.B.1 Dry forb herbaceous

19b. On moist sites but without standing water, mostly within forested areas ..... III.B.2 Mesic forb herbaceous

19c. On wet sites, usually with standing water for part of the year ..... III.B.3 Wet forb herbaceous

20a Vegetation cover dominated by mosses ..... III.C.1 Bryoid moss

20b Vegetation cover dominated by lichens ..... III.C.2 Bryoid lichen

21a. Vegetation submerged or floating in fresh water. ..... III.D.1 Freshwater aquatic herbaceous

21 b. Vegetation submerged or floating in brackish water ..... III.D.2 Brackish water aquatic herbaceous

21c Vegetation submerged or floating in salt water ..... III D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: ~~[illegible]~~ W60T1072 - UC6 Field Target: 210 Date: 9/6/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson X [signature] 9/6/14

Field Technician (print) Signature

X [signature] Christopher X [signature] 9/6/14

Field Crew Chief (print) Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 001	Map #: 1/150 Map Date: 5/27/14
Date: 6/7/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61 LH 001
Investigators: KD, JA			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 403.4	
Latitude: 1850544.70385909	Longitude: 4185419.01413769		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 2	Picture No.: P_W61 LH001_ SP, P, N, S,	

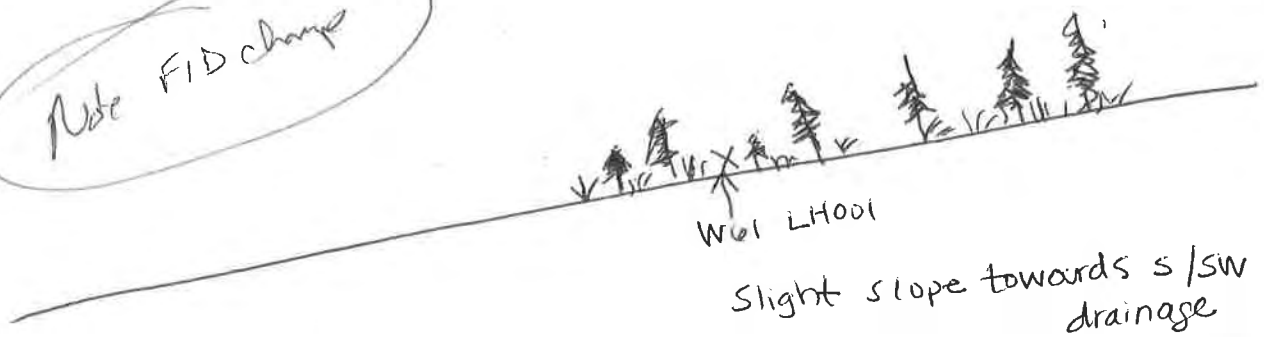
SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 2	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS4/1/F04B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes 10 No____	**Wetland Type:** ~~PSS4/1/F04B~~ PSS4/1/F04B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II B1, 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

No GPS point,
satellite unable to be acquired

Note FID change



Slight slope towards S/SW drainage
low scrub, generally open one story

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	25	Y	Fac W
2. Picea Glauca	10	Y	Fac u
3. Populus tremuloides	1		Fac u
4.			
Total Cover: ~~26~~ 36			
50% of total cover: ~~13~~ 18	20% of total cover: ~~7.2~~ 5		

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	Fac W
2. Picea glauca	35		Fac u
3. Populus tremuloides	5		Fac u
4. Vaccinium uliginosum	55	Y	Fac
5. Vaccinium vitis-idaea	30		Fac
6. Rhododendrum tomentosum	40		Fac W
7. Rosa acicularis	5		Fac u
8. Betula nana	60	Y	Fac
9.			
Total Cover: ~~260~~ 270			
50% of total cover: ~~130~~ 135	20% of total cover: ~~52~~ 54		

Dominance Test worksheet: 5

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~~ 71.4 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 0	X 1 =	0
FACW species: ~~105~~ 110	X 2 =	220
FAC species 185	X 3 =	555
FACU species 109	X 4 =	436
UPL species —	X 5 =	—
Column Totals: 404 (A)		1211 (B)

PI = B/A = 2.99

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis	40	Y	Fac
2. Equisetum Scirpoides	50	Y	Fac u
3. Petasites frigidus	T		Fac W
4. Cornus Canadensis	3		Fac u
5. Equisetum pratense	5		Fac W
6.			
7.			
8.			
9.			
10.			
Total Cover: 98			
50% of total cover: 49	20% of total cover: 19.6		

Hydrophytic Vegetation Indicators:

0 Dominance Test is > 50%

0 Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/21/16 Feature ID WG1LH001 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3								
3-4							Peat	Fibric
4-12"	10YR 4/1	50	10YR 3/3	50	C	M	SCL	Plastic Nature
12"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] Y
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Soil Depth (inches): 12"

Hydric Soil Present (Y/N): Y

Notes: Note: 4-12 layer color change to ~~7.5~~ 7.5YR 5/2 10YR 4/4 after 15 mins of exposure

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** X
Water Table Present (Y/N): Y	Depth (in): 1/2"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): surface	

Notes: WT fill in w/in one minute of exposure of pit

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__X__ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__30 30__ Sapling (<5 dbh, <6m tall)__30__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__1&0__ Dwarf shrub (<0.5m)__30__ Tall herb (≥1m)__0__ Short herb (<1m)__98__ Moss-Lichen__0__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **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%)__X__ 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__X__

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches__X__ Continuous Cover_____

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_____ 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_____ Fluvaquent 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_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: Jennifer Andrus

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WG1CH001 Field Target: CP1 Date: 6/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. **Maps**

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson — Signature / Date

X Kim DEGUTIS — Field Crew Chief (print)

X [signature] 6/7/14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 002	Map #: 1/130 Map Date: 5/27/14
Date: 6/7/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH002
Investigators: K DeGutis, Jenn Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 403.45	
Latitude: 1850643.34982017		Longitude: 4185119.55722399	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 3	Picture No.: P_W61LH002_S; SP; N; S	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 2	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: ~~R4SB~~ PSS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: PSS1/4C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C 1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook, page W61-1, 3



Note: new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			
Total Cover: 5			
50% of total cover: 2.5	20% of total cover: —		

Sapling/Shrub Stratum (30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	40		FACW
2. Salix pulchra	80	Y	FACW
3. Vaccinium uliginosum	65	Y	FAC
4. Rhododendron tomentosum	50		FACW
5. Betula nana	55	Y	FAC
6. Picea glauca	10		FACW
7. Alnus tenuifolia	5		FAC
8. Salix richardsonii	10		FACW
9. Salix glauca	15		FAC
Total Cover: 330			
50% of total cover: 165	20% of total cover: 66		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 200	X 2 =	400
FAC species 235	X 3 =	705
FACU species 10	X 4 =	40
UPL species —	X 5 =	—
Column Totals: 445 (A)		1145 (B)

PI = B/A = 2.57

VEGETATION (use scientific names of plants)

Herb Stratum (5')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	15		FACW
2. Calamagrostis canadensis	95	Y	FAC
3. Carex sp.	T		
4. Petasites frigidus	T		FACW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 110			
50% of total cover: 55	20% of total cover: 22		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

____ % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/7/14 Feature ID W61LH002 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	DRY
1-5	10YR 4/1	100					SL	50% rootlets throughout
5-12	10YR 3/1	70	5YR 3/4	30	C	PL	SL	Distinct, Prominent
12	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1)	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 12+

Hydric Soil Present (Y/N): Y

Notes: Note 1-5" layer resampled approx 30 mins after excavation - note Munsell color as 7.5YR 5/2, not redox features

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)

		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) 0
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10) 0	Geomorphic Position (D2) 0
Saturation (A3) 0	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) 0
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2) 0	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) 0
Drift Deposits (B3) 0	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): ~1"	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 10.5"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 50 Tall shrub (2-6m) 5 Short shrub (0.5-2m) 275 Dwarf shrub (<0.5m) Ø Tall herb (≥1m) Ø Short herb (<1m) 110 Moss-Lichen 5 Floating Ø Submerged Ø

Number of Wetland Types (M): 4 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine X Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet X

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_____ Sediment Observed on Wetland Substrate X Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs X Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) X Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH002 Field Target: 002 Date: 6/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date** 6.7.14

X Kim Degitis — **Field Crew Chief (print)**

X — **Signature / Date** 6/7/14

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 003	Map #: 1/130 Map Date: 5/27/14
Date: 6/7/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH006~~ W61LH003
Investigators: K Degutis J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 403.5	
Latitude: 1650625.60733852		Longitude: 4184750.45399651 W61LH006	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 4	Picture No.: P_~~W61LH006~~_SP; P; SW; SE	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: UPLAND	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: ~~PSS 4/1B~~ OK OJZ ~~[illegible]~~ OJZ
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II B2, II C2 ~~[illegible]~~ IAZ

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 4 for sketch & notes

Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10	Y	FACW
2.			
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	25		FACW
2. Vaccinium vitis-idaea	45	Y	FAC
3. Rhododendron groenlandicum	45	Y	FAC
4. Salix pulchra	T		FACW
5. Rosa acicularis	T		FACU
6. Picea mariana	50	Y	FACW
7.			
8.			
9.			

Total Cover: 165

50% of total cover: 83 20% of total cover: 33

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 5 (A)

Total Number of Dominant Species Across All Strata: 4 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	85	X 2 =	255
FAC species	95	X 3 =	285
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	180	(A)	540 (B)

PI = B/A = 3.0

VEGETATION (use scientific names of plants)

Herb Stratum (5')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	T		FAC
2. Calamagrostis canadensis	5	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Hydrophytic Vegetation Indicators:

- Dominance Test is > 50%
- Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

- 0 % Bare Ground
- ____ % Cover of Wetland Bryophytes
- 95 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/7/14 Feature ID W01LH~~006~~ 003 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-6							organics	Dry
6-6.5							organics	Moist
6.5-7							Fibric Peat	Moist to saturated
7"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Soil Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes: 1/2" of fibric peat, w/light squeeze produces water
Soil Pit needs to be dug into frozen layer to identify seasonal frost v permafrost. inadequate soil info

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in):		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6.5"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved 0 Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 10 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 50 Short shrub (0.5-2m) 70 Dwarf shrub (<0.5m) 45 Tall herb (≥1m) 0 Short herb (<1m) 5 Moss-Lichen 99-95 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even 0

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) 0

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A 0

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) 0 High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A 0

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches 0 Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) 0 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) 0

HGM Class (P): Slope_____ Flat 0 Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric 0 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 0 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 0 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed 0 Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding 0 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 0

Water pH (P): No surface water 0 Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable 0

Basin Topographic Gradient (M): Low Gradient (<2%) 0 High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs 0 Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below 0 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) 0

Watershed Land Use: 0-5% Rural 0 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) 0 Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] 6/11 GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~WG1LH006~~ WG1LH003 KF Field Target: 003 Date: 6/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

- ☑ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. **Maps**

- ☐ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6-7-14 — **Signature / Date**

X Kim DeGuise — **Field Crew Chief (print)**

X [signature] 6/7/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 004	Map #: 21130 Map Date: 5/27/14
Date: 6/7/2014	Project Name & No.: Alaska LNG 26221306		Feature Id: WG1 LH ~~007~~ 004	
Investigators: KD, JA				Team No.: WG1
State: Alaska	Region: Alaska	Milepost: 484.5		
Latitude: 1851712.86039113		Longitude: 4179723.859745		Datum: WGS84
Logbook No.: WG1-1	Logbook Page No.: 4	Picture No.: WG1LH ~~007~~ 004 SP, F, N, S,		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PF04/SS4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** ~~PSS 1/4B~~ PSS4B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~II C 1, II B2~~ II B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See WG1-1 logbook page 4

GPS handheld collected data, satellite receiver not working

* note FID change

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	5	Y	FacW
2.			
3.			
4.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	60	Y	Fac
2. Rhododendrum + Tomentosum	10		FacW
3. Empetrum nigrum	10		Fac
4. Picea mariana	50	Y	FacW
5. Rhododendrum groenlandicum	40		Fac
6. Spirea stevenii	T		FacU
7. Vaccinium Vitis-idaea	45	Y	Fac
8. Rosa acicularis	T		FacU
9. Salix glauca	T		Fac

Total Cover: 215

50% of total cover: ~~108~~ 107.5 20% of total cover: ~~42~~ 43

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	65 X 2 =	130
FAC species	165 X 3 =	495
FACU species	30 X 4 =	120
UPL species	— X 5 =	—
Column Totals:	260 (A)	745 (B)

PI = B/A = 2.86

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum Scirpoides	30	Y	FacU
2. Calamagrostis canadensis	10	Y	Fac
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

95 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

004

SOIL Date 6/7/14 Feature ID W6L4004 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Organics	Dry
2-6							Organics	Moist
6-7	10YR 3/1						Peat: Fibric	Sat
7"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes: Peat fibric is sat. - light squeeze produces water

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__X__ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__5__ Sapling (<5 dbh, <6m tall)__50__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__110__ Dwarf shrub (<0.5m) __55__ Tall herb (≥1m) __0__ Short herb (<1m) __40__ Moss-Lichen__95__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ | **Evenness of Wetland Type Distribution (M)**: Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)__X__ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A__X__

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches__X__ Continuous Cover_____

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_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ 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__X__ 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__X__ Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__X__ 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)__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: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W6LLH007~~ W6LLH004 Field Target: 004 Date: 6/7/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. Photos

☐ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jenfer Anderson

Wetland Scientist (print) — Signature / Date

X Kimberly Dot — X 6/7/14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 005	Map #: 3/130 Map Date: 5/27/2014
Date: 6/8/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH~~008~~ 005
Investigators: K DeGutis J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 405.25	
Latitude: 852362.37901621		Longitude: 4175769.88001093	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 5	Picture No.: P_W61LH~~008~~ 005; SP; P; N; S	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Hillslope
Slope (%): 2	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: U	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: ~~PSS 1/4B~~ 4
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~II C1, II B2~~ I A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

* Change from previous mapping U → PSS 1/4 B



Note new FID

* GPS data handheld only

See logbook W61-1 page 5

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10	Y	FACW
2.			
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	70	Y	FAC
2. Rhododendron groenlandicum	45	Y	FAC
3. Vaccinium uliginosum	35		FAC
4. Rhodendron tomentosum	5		FACW
5. Picea mariana	40		FACW
6. Salix pulchra	10		FACW
7. Alnus tenuifolia	2		FAC
8. ~~Geocaulon~~			
9.			

Total Cover: 207

50% of total cover: 104 (103.5) 20% of total cover: 41.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	67	X 2 =	134
FAC species	157	X 3 =	471
FACU species	5	X 4 =	20
UPL species	—	X 5 =	—
Column Totals:	229 (A)		625 (B)

PI = B/A = 2.72

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	T		FACU
2. Calamagrostis canadensis	5	Y	FAC
3. Geocaulum lividum	5	Y	FACU
4. Rubus chamaemorus	2		FACW
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 12

50% of total cover: 6 20% of total cover: 3

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/8/14 Feature ID WA14 005 ~~009~~ **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Dry Organics	
2-5							Organics	moist
5-6	10YR 2/1						Organics	WET - Fibric
6"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes: Note: Sample fibric peat gives water when lightly squeezed
Soil pit needs to be about 20" deep - but 6" Frozen layer may be seasonal frost

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in):	
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 6"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved X Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 10 Sapling (<5 dbh, <6m tall) 40 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 97 Dwarf shrub (<0.5m) 70 Tall herb (≥1m) Ø Short herb (<1m) 12 Moss-Lichen 95 Floating Ø Submerged Ø

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) X Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61 LH005 Field Target: 005 Date: 6/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6-8-14 — **Signature / Date**

X Kim Dennis — **Field Crew Chief (print)**

X [signature] 6/8/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 006	Map #: 41 1:30 Map Date: 5/27/14
Date: 6/6/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH~~010~~ 006	
Investigators: K DEGUTIS J ANDERSON				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 406.3		
Latitude: 1851163.49132423		Longitude: 4170271.20330159		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 7	Picture No.: PW61LH~~010~~ 006 SP; P; E; W;		

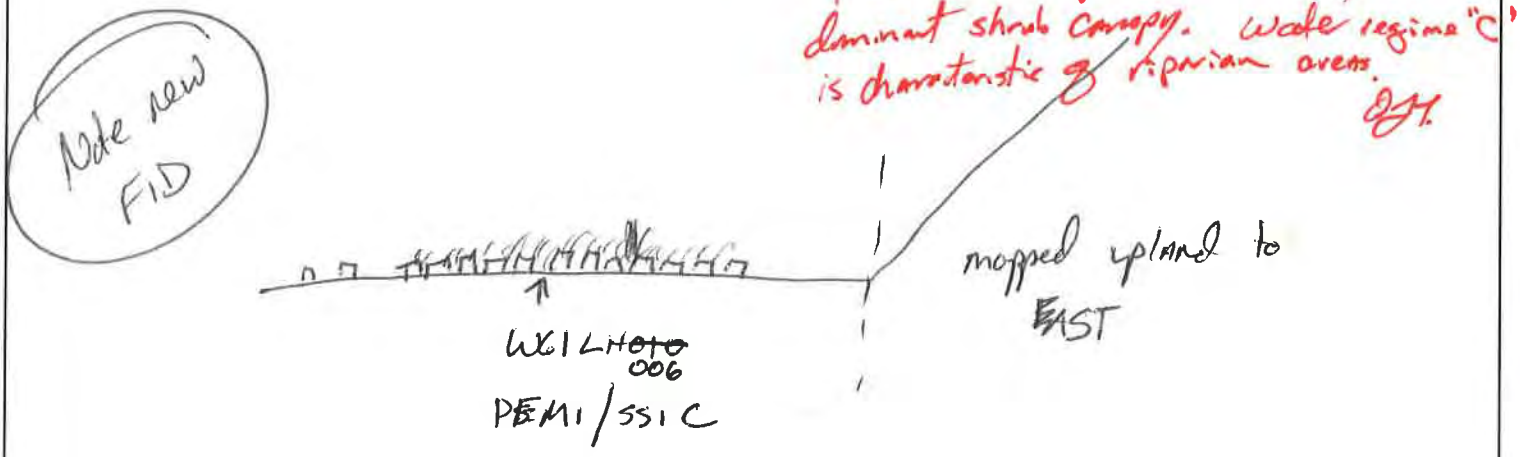
SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 0	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** ~~PEM1/SS1C~~ PSS1B JJT
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~III A2~~ II B2, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, pg 7

Photos and veg data identify a dominant shrub canopy. Water regime "C" is characteristic of riparian areas. JJT



*GPS collected by handheld unit, no external antennae

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	55	Y	FAC
2. Vaccinium uliginosum	15		FAC
3. Rhododendron tomentosum	25	Y	FACW
4. Alnus tenuifolia	15		FAC
5. Picea mariana	2		FACW
6. Salix pulchra	10		FACW
7. Vaccinium vitis-idaea	5		FAC
8.			
9.			
Total Cover: 127			
50% of total cover: 63.5	20% of total cover: 25.4		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	10	X 1 =	10
FACW species:	127	X 2 =	254
FAC species	45	X 3 =	135
FACU species	–	X 4 =	–
UPL species	–	X 5 =	–
Column Totals:	182 (A)		399 (B)

PI = B/A = 2.19

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	85	Y	FACW
2. Eriophorum ~~schuechzeri~~ Scheuchzeri	10		OBL
3. Calamagrostis canadensis	10		FAC
4. Rubus chamaemorus	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 110			
50% of total cover: 55	20% of total cover: 22		

Hydrophytic Vegetation Indicators:

A Dominance Test is > 50%

A Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

10 % Bare Ground

____ % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

~~0~~ 10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Well Microrelief well developed – Areas in between hummocks no open water/ Bare ground

WETLAND DETERMINATION DATA FORM

SOIL Date 6/18/14 Feature ID WGLH 006 (~~010~~) **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	Dry
1-2							Organics	Moist
2-3							Peat - Fibric	
3	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2) X	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4) X		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 3"

Hydric Soil Present (Y/N): Y

Notes: Soils produce water when slightly squeezed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1) X	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 1/4"	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 1 1/2"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_X_ Aquatic Bed_____

Percent Cover (P): Tree (≥5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_0_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_12_ Dwarf shrub (<0.5m)_5_ Tall herb (≥1m)_0_ Short herb (<1m)_10_ Moss-Lichen_10_ Floating_0_ Submerged_0_

Number of Wetland Types (M): ~~2~~ 4 | **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_X_

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_~~X~~ W_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_X_ N/A_~~X~~ SW_

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

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_____ Flat_X_ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_ 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_X_ 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_X_

Frequency of Overbank Flooding (P): No Overbank Flooding_X_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_X_

Water pH (P): No surface water_X_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_X_ 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)_X_

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_X_ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jenn for Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WX61 LH006 006 Field Target: 006 Date: 6/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson — 6/8/14

Wetland Scientist (print) — **Signature / Date**

X Kim DEGUIS — X [signature] — 6/8/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 007 other	Map #: 5 of 13 Map Date: 5/27/2014
Date: 6/8/14	Project Name & No.: Alaska LNG 26221163	Feature Id: W61LH044 007	
Investigators: K Degutis J Andersen			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 407.1	
Latitude: 64.9632.77765053	Longitude: 416685.96935748		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 9	Picture No.: W61LH044 007 SP; P; N; S;	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flats
Slope (%): 1	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: UPLAND	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 4/B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~II B1~~ IIA2, II C1?

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 9 for sketch & notes

* GPS handheld unit only

Note New FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Larix laricina	2		FACW
2. Picea Mariana	T		FACW
3.			
4.			

Total Cover: —

50% of total cover: — 20% of total cover: —

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	20		FACU
2. Rhododendron groenlandicum	50	Y	FAC
3. Picea mariana	65	Y	FACW
4. Picea glauca	10		FACU
5. Vaccinium Uliginosum	25		FAC
6. Vaccinium vitis-idaea	30		FAC
7.			
8.			
9.			

Total Cover: 202

50% of total cover: 101 20% of total cover: 40.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	67	X 2 =	134
FAC species	115	X 3 =	345
FACU species	10	X 4 =	40
UPL species	—	X 5 =	—
Column Totals:	192 (A)		519 (B)

PI = B/A = 2.70

Tree stratum has <5% cover - added to shrub stratum.

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Pyrola grandiflora	T		FAC
2. Calamagrostis canadensis	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

_____ % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 10/8/14 Feature ID WL11007 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2.5							Organics	Dry
2.5-5							Organics	Moist
5-6	10YR 3/1						Peat Fibric	Saturated
6"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3) ~~X~~ n/a	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes:
@ 5" water is produced upon light squeezing

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): —	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved 10 Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 2 Sapling (<5 dbh, <6m tall) 65 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 105 Dwarf shrub (<0.5m) 30 Tall herb (≥1m) Ø Short herb (<1m) 10 Moss-Lichen 90 Floating Ø Submerged Ø

Number of Wetland Types (M): 4 **Evenness of Wetland Type Distribution (M)**: Even X Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61 LH014 007 Field Target: 007 Date: 6/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X Jennifer Anderson

Wetland Scientist (print) Signature / Date

X Kim DEGUTIS X 6/8/14

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 008	Map #: 61130 Map Date: 5/27/14
Date: 6/8/14	Project Name & No.: Alaska LNG 26221306			Feature Id: W61 LH~~01~~ 008
Investigators: KDEGUIS J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 412.36		
Latitude: 64.5090.78059012		Longitude: 413907.2, 8258332		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 8	Picture No.: P_W61 LH~~012~~ _ SP, P, W, & N		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flats
Slope (%): 2	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS 1/4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 1/3B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C1, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Simple plot w/in burn - approx 5 yrs ago?

See logbook W61-1, page 8

for sketch & notes

Note FID change

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	T		FACW
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	70	Y	FAC
2. Rhododendron groenlandicum	45	Y	FAC
3. Vaccinium vitis-idaea	40	Y	FAC
4. Picea mariana	10		FACW
5. Salix glauca	5		FAC
6. Rosa acicularis	T		FACU
7. Empetrum nigrum	5		FAC
8. Alnus tenuifolia	T		FAC
9.			
Total Cover: 175			
50% of total cover: 88	20% of total cover: 35		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	15 X 2 =	30
FAC species	165 X 3 =	495
FACU species	15 X 4 =	60
UPL species	— X 5 =	—
Column Totals:	195 (A)	585 (B)

PI = B/A = 3.0

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum scirpoides	15	Y	FACU
2. Equisetum pratense	5		FACW
3. Calamagrostis canadensis	10	Y	FAC
4. Stellaria longipes	T		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 30			
50% of total cover: 15	20% of total cover: 6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

____ % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/8/14 Feature ID WELL 008 ~~012~~ **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	Dry
1-3							organics	Moist
3-6	10YR 2/1						Peat - Fibric	
6-8	10YR 3/1.5	100%					Si	
46"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 8"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** X	
Water Table Present (Y/N): Y	Depth (in): 5"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 46"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 35 Dwarf shrub (<0.5m) 40 Tall herb (≥1m) 0 Short herb (<1m) 30 Moss-Lichen 20 Floating 0 Submerged 0

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_X_ 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 X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) X 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_____ 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 X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH012~~ W61LH008 Field Target: 008 Date: 6/4/14

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**

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/8/14 — **Signature / Date**

X Kim DeCosta — **Field Crew Chief (print)**

X [signature] 6/9/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 009	Map #: 71130 Map Date: 5/27/14
Date: 6/9/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH015~~ W61LH009
Investigators: K DEGUTIS J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 413.2	
Latitude: 1644548.45629735		Longitude: 4134618.3645107 W61LH009	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 10	Picture No.: P ~~W61LH015~~ SP; P; SW; SE	

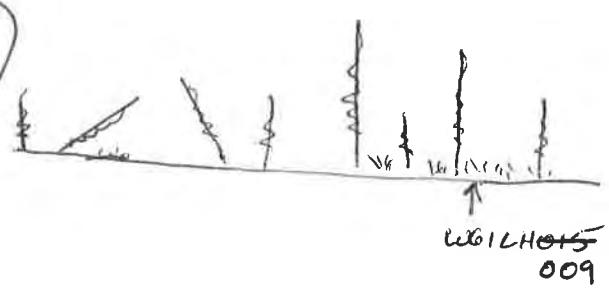
SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 3	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes____ No X
Hydric Soil Present? Yes____ No X	Wetland Type: Upland
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C1, ~~II B2~~ I A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 10

Note FID change



* Soils do not satisfy depth necessary for histic epipedon

* Collected by GPS handheld

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	8	Y	FACW
2.			
3.			
4.			

Total Cover: 8

50% of total cover: 4 20% of total cover: 1.6

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium oliginosum	45	Y	FAC
2. Vaccinium vitis-idaea	50	Y	FAC
3. Rhododendron groenlandicum	35	Y	FAC
4. Picea mariana	30		FACW
5. Arctous rubra	20		FAC
6. Alnus tenuifolia	15		FAC
7. Shepherdia canadensis	10		FACU
8. Rosa acicularis	2		FACU
9. Empetrum nigrum	5		FAC

Total Cover: 229

50% of total cover: 115 20% of total cover: 46

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	42	X 2 =	84
FAC species	162	X 3 =	486
FACU species	32	X 4 =	128
UPL species	—	X 5 =	—
Column Totals:	236	(A)	698 (B)

PI = B/A = 2.95

Picea glauca 10 FACU

~~Picea mariana 30~~ ~~FACW~~

Salix glauca 7 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	T		FAC
2. Petasites frigidus	2		FACW
3. Equisetum pratense	2		FACW
4. Equisetum scirpoides	10	Y	FACU
5. Equisetum sylvaticum	T		FAC
6.			
7.			
8.			
9.			
10.			

Total Cover: 14

50% of total cover: 7 20% of total cover: 3

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/9/17 Feature ID W61LH009 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							organics	Dry
1-2.5							Organics	Moist
3-5							Peat/ Fibric	
5-10	10YR 3/1	85	7.5YR 3/2	15	C	PL	SL	
10"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 10"

Hydric Soil Present (Y/N): N

Notes: Profile does not satisfy (A3) indicators by depth

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): -	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 9"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): ~~7~~ 3"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m)_____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (<5 plant species) _____ Medium (5-25 species) _____ High (>25)_____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed/ Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH015~~ W61LH009 Field Target: 009 Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland? – Non wetland

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson

Wetland Scientist (print) — **Signature / Date**

X Kim Deyhs — X 6/9/14

Field Crew Chief (print) — **Signature / Date**

Vegetation Classification Data Form

Site Description		
Date: 6/9/14	Project Name & #: Alaska LNG 26221306	Field Target: 009
Investigators: K DEGUTIS J Anderson		Feature ID: ~~W61LH015~~ W61LH009
Latitude:	Longitude:	Datum: WGS84
Logbook #: W61-1	Logbook Page #: 10	Picture #: W61LH015_SW, SE
Location Description:		
on edge of burn area, co-located w/survey stake LH-017		
Common Species Observed (Scientific Name)		
VACCINIUM vitis-idaea	Arctous rubra	
VACCINIUM uliginosum		
Rhododendron groenlandicum		
Picea mariana		
Percent Cover of Dominant Structure Level: 134		
Habitat Description:		
Edge of burn area, Picea mariana starting to re-establish. No indications of burn PI-DEGS, drier wetland veg.		
Alaska Vegetation Classification: Level I, Level II, Level III		
IIC1	~~IIB2~~ IA2 W	
Notes:		
Soils do not satisfy histic epipedon (lack 8" SAT organics)		

Field Crew Chief: Kimberly DEGUTIS Fi

W61LH009
- only wetland point collected
no veg point
veg data is same as on wetland form

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters (10 ft) tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15
II. Scrub		
8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water	III.D Aquatic herbaceous 21
16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Enophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: WELLHOUSE 07 (MP) Field Target: 009 Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - [x] Location data recorded?
   - [x] Photo taken and photo number recorded?
2. **Location Description**
   - [x] Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - [x] Scientific name of common species recorded?
   - [x] Percent cover of dominant structure level noted?
4. **Habitat Description**
   - [x] Habitat described?
5. **Classification**
   - [x] All three levels of classification recorded?
6. **Field Log Book**
   - [x] Field form entries consistent with log book?
   - [x] Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson — **Field Technician (print)**

X Jen for Anderson — **Signature**

X Kim DeGuzis — **Field Crew Chief (print)**

X — **Signature**

WETLAND DETERMINATION DATA FORM

W61LH013 007

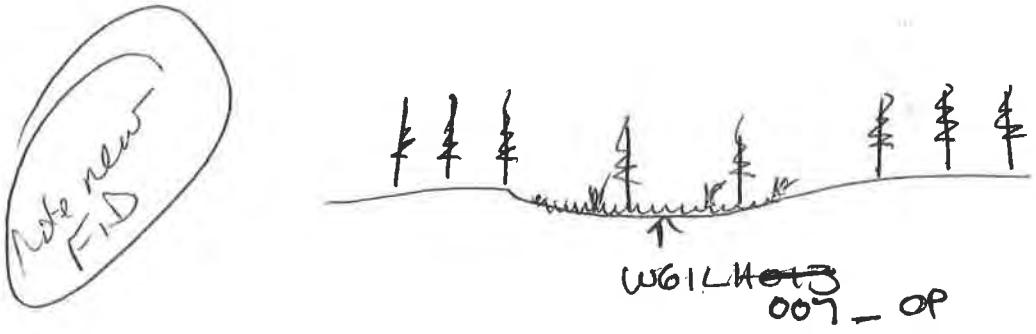
SITE DESCRIPTION			
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____		Field Target: 007	Map #: 5/130 Map Date: 5/27/14
Date: 6/8/14	Project Name & No.: Alaska LNG 26221163		Feature Id: ~~W61LH013 007_OP~~
Investigators: K DEGUTIS J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 407.1	
Latitude: 1849580, 05184267	Longitude: 4166699. 13771452 007		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 8	Picture No.: P_W61LH013_SP, P, NW, NE	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS 4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes ✓ No____
Hydric Soil Present? Yes ✓ No____	**Wetland Type:** ~~PSS1B~~ PSS1/EM1B
Wetland Hydrology Present? Yes ✓ No____	Alaska Vegetation Classification (Viereck): II C 1, III A 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Surve corridor.

See logbook page W61-1, page 8 for notes



GPS Collected w/handheld unit

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	255	Y	FACW
2.			
3.			
4.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron groenlandicum	60	Y	FAC
2. Vaccinium uliginosum	50	Y	FAC
3. Salix pulchra	40		FACW
4. Vaccinium vitis-idaea	35		FAC
5. Betula nana	35 45	Y	FAC
6. Rosa acicularis	5		FACU
7. Chamaedaphne calyculata	10		FACW
8. Picea mariana	25		FACW
9.			

Total Cover: 270

50% of total cover: 135 20% of total cover: 54

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	60 X 2 =	160
FAC species	255 X 3 =	765
FACU species	5 X 4 =	20
UPL species	— X 5 =	—
Column Totals:	340 (A)	945 (B)

PI = B/A = 2.78

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	T		FACW
2. Calamagrostis canadensis	65	Y	FAC
3. Equisetum pratense	T		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 65

50% of total cover: 33 20% of total cover: 13

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

____ % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

010

SOIL	Date 6/8/14	Feature ID W61 ~~L4019~~ 007-OP	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	Dry
1-3							Organics	moist
3-6	10YR 2/1						Peat Fibric	
6	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 6"

Hydric Soil Present (Y/N): X

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved ~~X~~ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 25 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 20 Dwarf shrub (<0.5m) 35 Tall herb (≥1m) Ø Short herb (<1m) 65 Moss-Lichen 10 Floating Ø Submerged Ø

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) X Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH~~013~~ 007-OP 010 Field Target: 007 Date: 6/8/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson

Wetland Scientist (print) — Signature / Date

X Kim DeGuts — X 6/8/14

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 011	Map #: 8/130 Map Date: 5/27/14
Date: 6/9/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH017~~ W61LH011	
Investigators: K Deguths J Alaska				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 416.35		
Latitude: 1642375.79650311		Longitude: 4118341.17820867		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 11	Picture No.: P_~~W61LH017~~ W61LH011 - SP; P; SW; SE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSSi/4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation X, Soil_____, or Hydrology_____ Significantly Disturbed?	No_____(If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** PLAND #C1
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): ~~#B1, #B2~~

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site is recovering from severe burn 5-10 yrs prior to sample date

see logbook W61-1 page 11 for notes

* Soils highly plastic in nature



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix glauca	60	Y	FAC
2. Betula neoalaskana	50	Y	FACU
3. Picea glauca	10		FACU
4. Picea mariana	40	Y	FACW
5. Salix sooleriana	20		FAC
6.			
7.			
8.			
9.			
Total Cover: 180			
50% of total cover: 90	20% of total cover: 36		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	—
FACW species: 75	X 2 =	150
FAC species 85	X 3 =	255
FACU species 60	X 4 =	240
UPL species —	X 5 =	—
Column Totals: 220 (A)		640 (B)

PI = B/A = 2.93

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	35	Y	FACW
2. Calamagrostis canadensis	5		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 40			
50% of total cover: 20	20% of total cover: 8		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

15 % Bare Ground

____ % Cover of Wetland Bryophytes

15 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

W61LH011

SOIL	Date 6/9/14	Feature ID ~~W61LH017~~	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
0-1.5							Fibric	Wet organics
1.5-4	10YR 2/1	100						Loam
4-18	10YR 3/2	65	10YR 2/1	35	C	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 20"

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes: sat. to surface, soils plasticky in texture

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Dried/Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH017~~ W61LH011 Field Target: 011 Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date**

X Kim Dejuris — **Field Crew Chief (print)**

X [signature] 6/9/14 — **Signature / Date**

Vegetation Classification Data Form

Site Description		
Date: 6/9/14	Project Name & #: Alaska LNG 26221306	Field Target: 011
Investigators: K DEGUTIS J Anderson		Feature ID: ~~W61LH017~~ W61LH011
Latitude:	Longitude:	Datum: WGS84
Logbook #: W61-1	Logbook Page #: 11	Picture #: P-W61LH017_SW, SE

Location Description:

Within severe burn area

Common Species Observed (Scientific Name)

Salix glauca	Equisetum pratense
Betula neoalaskana	
Picea mariana (All <12")	
Salix scouleriana	

Percent Cover of Dominant Structure Level: 180

W61LH011 Both wetland and veg forms filled out for this site

Habitat Description:

Former Spruce PSS4 B? wetland, severe bu[illegible] destroyed most of the organic layer – site now in recovery

Alaska Vegetation Classification: Level I, Level II, Level III

II C1		

Notes:

See logbook

Field Crew Chief: Kim Degutis

Field Scientist/Technician Jennifer Anderson

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	(1) Closed needleleaf (conifer) forest (2) Open needleleaf (conifer) forest (3) Needleleaf (conifer) woodland
	B. Broadleaf forest	(1) Closed broadleaf forest (2) Open broadleaf forest (3) Broadleaf woodland
	C. Mixed forest	(1) Closed mixed forest (2) Open mixed forest (3) Mixed woodland
II. Scrub	A. Dwarf tree scrub	(1) Closed dwarf tree scrub (2) Open dwarf tree scrub (3) Dwarf tree scrub woodland
	B. Tall scrub	(1) Closed tall scrub (2) Open tall scrub
	C. Low scrub	(1) Closed low scrub (2) Open low scrub
	D. Dwarf scrub	(1) Dryas dwarf scrub (2) Ericaceous dwarf scrub (3) Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	(1) Dry graminoid herbaceous (2) Mesic graminoid herbaceous (3) Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	(1) Dry forb herbaceous (2) Mesic forb herbaceous (3) Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	(1) Mosses (2) Lichens
	D. Aquatic (nonemergent) herbaceous	(1) Freshwater aquatic herbaceous (2) Brackish water aquatic herbaceous (3) Marine aquatic herbaceous

Descriptions of levels I, II, III, and IV follow the classification table.

1a.	Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more	I. Forest 2
1b.	Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant	7
I. Forest		
2a.	Over 75 percent of tree cover contributed by needleleaf (conifer) species	I.A Needleleaf forest 3
2b.	Less than 75 percent of tree cover contributed by needleleaf (conifer) species	4
3a.	Tree canopy of 60-100 percent cover	I.A.1 Closed needleleaf forest
3b.	Tree canopy of 25-59 percent cover	I.A.2 Open needleleaf forest
3c.	Tree canopy of 10-24 percent cover	I.A.3 Needleleaf woodland
4a.	Over 75 percent of tree cover contributed by broadleaf species	I.B Broadleaf forest 5
4b.	Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover	6
5a.	Tree canopy of 60-100 percent cover	I.B.1 Closed broadleaf forest
5b.	Tree canopy of 25-59 percent cover	I.B.2 Open broadleaf forest
5c.	Tree canopy of 10-24 percent cover	I.B.3 Broadleaf woodland
6a.	Tree canopy of 60-100 percent cover.	I.C.1 Closed mixed forest
6b.	Tree canopy of 25-59 percent cover.	I.C.2 Open mixed forest
6c.	Tree canopy of 10-24 percent cover	I.C.3 Mixed woodland
7a.	Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall)	8
7b.	Vegetation herbaceous (may have up to 25 percent shrub cover)	15

II. Scrub

8a.	Vegetation with at least 10 percent cover of dwarf trees	II.A Dwarf tree scrub 9
8b.	Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees	10
9a.	Dwarf tree canopy of 60-100 percent cover	II.A.1 Closed dwarf tree scrub
9b.	Dwarf tree canopy of 25-59 percent cover	II.A.2 Open dwarf tree scrub
9c.	Dwarf tree canopy of 10-24 percent cover	II.A.3 Dwarf tree scrub woodland
10a.	Shrubs more than 1.5 meters (5 ft) tall	II.B Tall scrub 11
10b.	Shrubs less than 1.5 meters (5 ft) tall	12
11a.	Shrub canopy cover greater than 75 percent	II.B.1 Closed tall scrub
11b.	Shrub canopy cover of 25-74 percent	II.B.2 Open tall scrub
12a.	Shrubs 20 centimeters to 1.5 meters tall	II.C Low scrub 13
12b.	Shrubs under 20 centimeters in height	II.D Dwarf scrub 14
13a.	Shrub canopy cover greater than 75 percent	II.C.1 Closed low scrub
13b.	Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present	II.C.2 Open low scrub
14a.	Dryas species dominant in the dwarf shrub layer	II.D.1 Dryas dwarf scrub
14b.	Ericaceous species dominant in the dwarf shrub layer	II.D.2 Ericaceous dwarf scrub
14c.	Willow species dominant in the dwarf scrub layer	II.D.2 Willow dwarf scrub
III. Herbaceous		
15a.	Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation	16
15b.	Dominant vegetation growing submerged in water or floating on the water surface but not emerging above the water	III.D Aquatic herbaceous 21

16a.	Grasses, sedges, or rushes (graminoid) plants dominant	III.A Graminoid herbaceous 17
16b.	Forbs or bryophytes dominant	18
17a.	Grasslands of well-drained dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp.	III.A.1 Dry graminoid herbaceous
17b.	On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present	III.A.2 Mesic graminoid herbaceous
17c.	On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens	III.A.3 Wet graminoid herbaceous
18a.	Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails)	III.B Forb herbaceous 19
18b.	Vegetation dominated by mosses or lichens	III.C Bryoid herbaceous 20
19a.	On dry sites, usually rocky and well drained; mostly tundra sites	III.B.1 Dry forb herbaceous
19b.	On moist sites but without standing water, mostly within forested areas	III.B.2 Mesic forb herbaceous
19c.	On wet sites, usually with standing water for part of the year	III.B.3 Wet forb herbaceous
20a.	Vegetation cover dominated by mosses	III.C.1 Bryoid moss
20b.	Vegetation cover dominated by lichens	III.C.2 Bryoid lichen
21a.	Vegetation submerged or floating in fresh water	III.D.1 Freshwater aquatic herbaceous
21b.	Vegetation submerged or floating in brackish water	III.D.2 Brackish water aquatic herbaceous
21c.	Vegetation submerged or floating in salt water	III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

This form is to be completed before leaving the field site.

Feature ID: ~~W61 LH017~~ W61LH011 Field Target: 011 Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **General Information**
   - ☑ Location data recorded?
   - ☑ Photo taken and photo number recorded?
2. **Location Description**
   - ☑ Location of site recorded with enough detail to help relocate?
3. **Common Species**
   - ☑ Scientific name of common species recorded?
   - ☑ Percent cover of dominant structure level noted?
4. **Habitat Description**
   - ☑ Habitat described?
5. **Classification**
   - ☑ All three levels of classification recorded?
6. **Field Log Book**
   - ☑ Field form entries consistent with log book?
   - ☑ Logbook clearly identifies the Field Target ID and Feature ID?

X Jennifer Anderson
Field Technician (print)

X Jennifer Anderson
Signature

X Kim DEGUTIS
Field Crew Chief (print)

X [signature]
Signature

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 12	Map #: 9/130 Map Date: 5/27/14
Date: 6.9.14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH020~~ W61LH012
Investigators: K Degutis, J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 419.75	
Latitude: 1841452.30156304		Longitude: 4100468.71729923	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 13	Picture No.: W61LH020_SP, P, NW, NE	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flats
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification:	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No Y (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes Y No____	Wetland Type: PSS1 ~~EM1~~ B ajz
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): II C1, ~~III A2~~ ajz

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

* Site has undergone overstory burn w/in last 5-10 years

* GPS handheld collected info

See logbook W61-1, page 13 for notes.



Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	T		FacW
2. Rhododendrum groenlandicum	75	Y	Fac
3. Rhododendrum tomentosum	5		FacW
4. Vaccinium vitis-idaea	55	Y	Fac
5. Betula Neoalaskana	T		FacU
6. Betula Nana	15		Fac
7. Vaccinium Oxycoccus	5		Obl
8.			
9.			

Total Cover: 155

50% of total cover: 77.5 20% of total cover: 31

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	5	X 1 =	5
FACW species:	470	X 2 =	940
FAC species	145	X 3 =	435
FACU species	0	X 4 =	0
UPL species	—	X 5 =	—
Column Totals:	620 (A)		1380 (B)
PI = B/A =	2.4	2.64	

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	25	Y	FacW
2. rubus chamaemorus	40%	Y	FacW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 65

50% of total cover: 32.5 20% of total cover: 13

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

_____ % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Burn last 5 - 10 years only overstory effected

WETLAND DETERMINATION DATA FORM

SOIL Date 6/4/14 Feature ID ~~W61LH012~~ **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							organic	moist
2-10							organic	saturated
10-10.5	10YR 2/1						Rz Fibric	Peat

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 10.5"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): ~	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): ~	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2 in No H2O table No surface H2O	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 95 Dwarf shrub (<0.5m) 60 Tall herb (≥1m) 0 Short herb (<1m) 65 Moss-Lichen 60 Floating 0 Submerged 0

Number of Wetland Types (M): 4 **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%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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) _____ Moderately Abundant (25-50% of surface) X 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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X 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_____ Fluvaquent 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%) X

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) 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: [signature] GPS Technician QA/QC check: Jennifer Andersen

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~WG1 LH020~~ WG1 LH012 Field Target: 012 Date: 6/9/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6-9-14 — **Signature / Date**

X Kim Degitis — **Field Crew Chief (print)**

X [signature] 6/9/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 013	Map #: 10/130 Map Date: 5/27/14
Date: 6/10/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH023~~ W61LH013	
Investigators: K DEGUTIS J ANDERSON				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 421.1		
Latitude: 4639549.9263028		Longitude: 4093698.3533341		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 15	Picture No.: P_W61LH023_SP; P; NE; SE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flats
Slope (%): 2	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PFO4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS4/1B GC
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IA2, IIB2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

GPS by handheld unit only

See logbook W61-1, page 15

Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	15	Y	FACW
2.			
3.			
4.			

Total Cover: 15

50% of total cover: 8 20% of total cover: 3

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	~~30~~ 30	Y	FAC
2. Rhododendron groenlandicum	25	Y	FAC
3. Picea mariana	55	Y	FACW
4. Rosa acicularis	T		FACU
5. Vaccinium uliginosum	10		FAC
6. Spiraea stevenii	2		FACU
7. Alnus frutiCOSA	T		FAC
8.			
9.			

Total Cover: 122

50% of total cover: 61 20% of total cover: 24.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	78 X 2 =	156
FAC species	80 X 3 =	240
FACU species	4 X 4 =	16
UPL species	— X 5 =	—
Column Totals:	162 (A)	412 (B)

PI = B/A = 2.54

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	8	Y	FACW
2. Mertensia paniculata	2		FACU
3. Stellaria longipes	T		FAC
4. Calamagrostis canadensis	15	Y	FAC
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 25

50% of total cover: 13 20% of total cover: 5

12.5

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

___ % Cover of Wetland Bryophytes

65 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/14 Feature ID tw20141013 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Organics	Dry
4-7							Organics	Moist
7-8	10YR 2/1						Peat	Fibric

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2) X	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 8"

Hydric Soil Present (Y/N): Y

Notes: 7-8" layer produces water when slightly squeezed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) Y
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 7"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_X_ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 15 Sapling (<5 dbh, <6m tall) 55 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 37 Dwarf shrub (<0.5m) 30 Tall herb (≥1m) Ø Short herb (<1m) 25 Moss-Lichen 65 Floating Ø Submerged Ø

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_X_ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_X_ Continuous Cover_____

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%) X

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) 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: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~WO1LH023~~ WO1LH013 Field Target: 013 Date: 6/10/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date** 6-10/14

X Kim Dennis — **Field Crew Chief (print)**

X [signature] 6/10/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Y Access Road (explain)____ Other (explain)____			Field Target: 014	Map #: 10|130 Map Date: 5|27|14
Date: 6|10|14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH022~~ W61LH014	
Investigators: K DeGuis J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 421.2		
Latitude: 639318.38637723		Longitude: 4093196.00839781		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 14	Picture No.: P_W61LH022-SP, P, W, E		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1 | EM1B ~~PSS1/4B~~ PSS 4/1B upl. upl.
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): ~~IIC2, IIIB2~~ IIA2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 14

*GPS collected w/handheld only

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10	Y	FACW
2.			
3.			
4.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	FACW
2. Rhododendron groenlandicum	40	Y	FAC
3. Vaccinium vitis-idaea	50	Y	FAC
4. Arctous rubra	20		FAC
5. Empetrum nigrum	5		FAC
6. ~~Rubus chamaemorous~~			
7. Salix glauca	15		FAC
8. Alnus tenuifolia	T		FAC
9.			
Total Cover: 170			
50% of total cover: 85	20% of total cover: 34		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	–	X 1 =	–
FACW species:	52	X 2 =	104
FAC species	162	X 3 =	456
FACU species	60	X 4 =	240
UPL species	–	X 5 =	–
Column Totals:	264 (A)		800 (B)

PI = B/A = 3.03

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorous	2		FACW
2. Calamagrostis canadensis	20	Y	FAC
3. Equisetum scirpoides	60	Y	FACW
4. Pyrola grandifolia	2		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 84			
50% of total cover: 42	20% of total cover: 17		
	16.8		

Hydrophytic Vegetation Indicators:

2 Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

____ % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 8/10/14 Feature ID ~~WG1LH028~~ WG1LH014 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Organics	Dry
2-4							Organics	Moist
4-8							Peat/Fibric	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2) ~~X~~	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes: Fibric peat produces moisture w/light squeeze

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in):	
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 4"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 10 Sapling (<5 dbh, <6m tall) 40 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 75 Dwarf shrub (<0.5m) 50 Tall herb (≥1m) 0 Short herb (<1m) 04 Moss-Lichen 85 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even 2

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) 2 Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A 0 pw

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) 0 High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A 0

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches 0 Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) 0 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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%) X

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) P

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: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH022~~ W61LH014 Field Target: 014 Date: 6/10/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/10/14 — **Signature / Date**

X Kim Deyts — **Field Crew Chief (print)**

X [signature] 6/10/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Y Access Road (explain)____ Other (explain)____			Field Target: 015	Map #: 111130 Map Date: 5/27/14
Date: 6/10/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH024~~ W61LH015	
Investigators: KDeCurtis J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 426.46		
Latitude: 1433906.69237275	Longitude: 4067863.28888413		Datum: WGS84	
Logbook No.: W61-1	Logbook Page No.: 15	Picture No.: P_W61LH024_SP, P, SE, SW		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Stream Terrace
Slope (%): 1	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PSS 4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS 1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11B1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

* GPS handheld collected

See logbook W61-1, page 15 for sketch

Note New FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus tenuifolia	70	Y	FAC
2. Salix arbuscubicles	15		FACW
3. Salix bebbiana	15		FAC
4. Salix richardsonii	10		FACW
5. Rosa acicularis	2		FACU
6. Rubus idaeus	2		FACU
7. Vaccinium uliginosum	5		FAC
8.			
9.			
Total Cover: 119			
50% of total cover: 60	20% of total cover: 23		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	45 X 2 =	90
FAC species	155 X 3 =	465
FACU species	4 X 4 =	16
UPL species	— X 5 =	—
Column Totals:	204 (A)	571 (B)

PI = B/A = 2.79

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	10		FAC
2. Calamagrostis canadensis	55	Y	FAC
3. Equisetum pratense	20	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 85			
50% of total cover: 43	20% of total cover: 17		

Hydrophytic Vegetation Indicators:

Q Dominance Test is > 50%

Q Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

10 % Bare Ground

____ % Cover of Wetland Bryophytes

Ø Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/14 Feature ID ~~WGLH015~~ 24 WGLH015 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							organic	Dry
2-5							organic	Peat Fibric
5-9	7.5YR 2/1						SL	
9-15	10YR 4/2		2.5YR 3/1					
			5YR 4/4					

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12) _____		Other (Explain in Notes) X

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: Satisfies (A11) indicator for Depleted below dark surface

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): —	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 65 Short shrub (0.5-2m) 34 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 45 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X 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 X

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) X Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W6LH024~~ W6LH015 Field Target: 015 Date: 6/10/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/10/14 — **Signature / Date**

X Kim Dennis — **Field Crew Chief (print)**

X [signature] 6/10/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 016	Map #: 12/130 Map Date: 5/27/14
Date: 6/11/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH031~~ W61LH016
Investigators: K Degatis J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 427.35	
Latitude: 65° 06' 52.6972"		Longitude: 148° 43' 43.1182"	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 19	Picture No.: P_W61LH031_SP;P;E;W;	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Slope
Slope (%): 2	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	Is the Sampled Area within a Wetland? Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: PSS1/4 ~~EM1B~~ OJZ
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II C2, ~~II C2~~, ~~III A2~~ II A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 19

for notes

Emergent layer is under the shrub canopy. OJZ.

Note New FID

X GPS handheld unit only

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula glandulosa	25	Y	FAC
2. Vaccinium uliginosum	30	Y	FAC
3. Rhododendron groenlandicum	20		FAC
4. Picea mariana	15		FACW
5. Arctous rubra	40	Y	FAC
6. Salix pulchra	5		FAC
7. Salix glauca	15		FAC
8. Potentilla fruticosa	10		FAC
9. Dasiphora			

Total Cover: 160

50% of total cover: 80 20% of total cover: 32

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:	490 X 2 =	~~8~~ 180
FAC species	~~94~~ 157 X 3 =	~~27~~ 471
FACU species	+2 X 4 =	~~4~~ 8
UPL species	— X 5 =	—
Column Totals:	~~+4~~ 249 (A)	~~39~~ (B) 659

PI = B/A = ~~2.79~~ 2.65

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	35	Y	FACW
2. Rubus chamaemorus	35	Y	FACW
3. Equisetum arvense	2		FAC
4. Equisetum scirpoides	2		FACW
5. ~~Comarum palustre~~	~~10~~		~~OBL~~
6. Carex sp (no inflorescence)	T		—
7. Calamagrostis canadensis	5		FAC
8. Deschampsia caespitosa	5		FAC
9.			
10.			

Total Cover: 84

50% of total cover: 42 20% of total cover: 16.8

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

___ % Cover of Wetland Bryophytes

50 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/11/14 Feature ID ~~W6114037~~ W6114016 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Organics	Dry
2-6	10YR 3/2						Organics	Saturated
6-9	10YR 2/1						~~Organics~~	Saturated Peat/Fibric
9-11	2.5Y 2.5/1						SL	
11	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 11

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): ~~2~~ —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_5_ Sapling (<5 dbh, <6m tall)_15_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_VAR_ Dwarf shrub (<0.5m)_40_ Tall herb (≥1m)_0_ Short herb (<1m)_ELI_ Moss-Lichen_50_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _2_ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_0_ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_X_ NW

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

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) _0_ 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_____ 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_X_ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_X_ 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_X_ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_X_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_X_

Water pH (P): No surface water_X_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_X_ 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)_X_

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_X_ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH037~~ W61LH016 Field Target: 016 Date: 6/11/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X Jennifer Anderson 6/11/14
Signature / Date

X Kim DEGUTIS
Field Crew Chief (print)

X [illegible] 6/11/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 017	Map #: 131 1130 Map Date: 5/27/14
Date: 6/10/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH026~~ W61LH017	
Investigators: K DEOJTIS J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 427.9		
Latitude: 1637614.36469596	Longitude: 4061334.95941237		Datum: WGS84	
Logbook No.: W61-1	Logbook Page No.: 16	Picture No.: P_W61LH026_SP; P; NE; NW		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSSiB	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSSi | EMi ~~B~~
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C1, III A 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site w/in burn complex, approx 5-10 yrs prior to survey

Note change in hydday modifier

See sketch logbook W61-1, page 16

Note New FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendrum groenlandicum	20		FAC
2. Vaccinium uliginosum	40	Y	FAC
3. Betula glandulosa	45	Y	FAC
4. Vaccinium vitis-idaea	25		FAC
5. Salix pulchra	20		FACW
6. Picea mariana	2		FACW
7. Salix alaxsuloides	15		FACW
8.			
9.			
Total Cover: 167			
50% of total cover: 84 (83.5)	20% of total cover: 32 (33.4)		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species: 114	X 2 =	228
FAC species 140	X 3 =	420
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 254 (A)		648 (B)

PI = B/A = 2.55

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	75	Y	FACW
2. Calamagrostis canadensis	10		FAC
3. Rubus chamaemorus	2		FACW
4. Pyrola grandiflora	T		FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 87			
50% of total cover: 44	20% of total cover: 17		

Hydrophytic Vegetation Indicators:

- 9 Dominance Test is > 50%
- 9 Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

- 15 % Bare Ground
- ____ % Cover of Wetland Bryophytes
- 10 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/10/14	Feature ID ~~W61LH026~~ W61LH017	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	Dry
1-6	10YR 2/1						Peat	Fibric; saturated
6	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) ~~X~~	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) X		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes: Notes H_2S odor @ 4" depth

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) —	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) ____
High Water Table (A2) 6	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) ____
Saturation (A3) 6	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) X
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) X
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) X	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 5"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 1"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 142 Dwarf shrub (<0.5m) 25 Tall herb (≥1m) 0 Short herb (<1m) 81 Moss-Lichen 10 Floating 0 Submerged 0

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) X 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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X 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 X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH026~~ W61LH017 Field Target: 017 Date: 6/10/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson
Wetland Scientist (print)

X Jennifer Anderson 6-10-14
Signature / Date

X Kim DEGUTIS
Field Crew Chief (print)

X [signature] 6/10/14
Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 61B	Map #: 13/130 Map Date: 5/27/14
Date: 6/10/14	Project Name & No.: Alaska LNG 26221306			Feature Id: ~~W61LH025~~ W61LH018
Investigators: K Degitis	J Anderson			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 427.9		
Latitude: 146.7651.99096498		Longitude: 406/277.91222585		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 16	Picture No.: P_W61LH025_SP; P; NW; NE		

SITE PARAMETERS		
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1		Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: UPLAND		Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)	
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)	

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes X No____		**Is the Sampled Area within a Wetland?** Yes X No____	
Hydric Soil Present? Yes X No____		**Wetland Type:** PSS1/EM1B	
Wetland Hydrology Present? Yes X No____		Alaska Vegetation Classification (Viereck): II C 2 III A 2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Burn site

Approx 5-10 yrs ago from date of survey

See site sketch in logbook W61-1, Page 16



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			

Total Cover:_____

50% of total cover:_____ 20% of total cover:_____

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula ~~Acuna~~ glandulosa	15		FAC
2. Rhododendron groenlandicum	35	Y	FAC
3. Vaccinium vitis-idaea	40	Y	FAC
4. Vaccinium Uliginosum	20		FAC
5. Rosa acicularis	T		FACU
6. Picea mariana	5		FACW
7. Salix glauca	5		FAC
8. Salix pulchra	10		FacW
9.			

Total Cover: 130

50% of total cover: 65 20% of total cover: 26

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species:	~~2~~ 7	X 1 = ~~2~~ 7
FACW species:	~~4~~ 19	X 2 = ~~8~~ 38
FAC species	~~7~~ 190	X 3 = ~~21~~ 570
FACU species	2	X 4 = 8
UPL species	—	X 5 = —
Column Totals:	~~15~~ 218 (A)	~~39~~ 623 (B)

PI = B/A = ~~2.6~~ 2.86 vw

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. ~~Calamagrostis~~ Calamagrostis canadensis	75	Y	FAC
2. Mertensia paniculata	2		FACU
3. Eriophorum vaginatum	2		FACW
4. Comarum Palustre	7		obl
5. carex vaginata	T		obl
6. Stellaria longipes	T		Fac
7. Rubus chamaemorus	2		FacW
8.			
9.			
10.			

Total Cover: 88

50% of total cover: 44 20% of total cover: 17.6

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

____ % Bare Ground

____ % Cover of Wetland Bryophytes

? 10 Total Cover of Bryophytes vw

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/14 Feature ID W61LH018 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Organics	Dry
2-4							Organics	Moist
4-8							Peat	Fibric; Saturated
8-12	10YR 4/1	60	10YR 3/3	40	C	M	SL	
12"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 12"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 90 Dwarf shrub (<0.5m) 40 Tall herb (≥1m) 0 Short herb (<1m) 88 Moss-Lichen 10 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A X VW

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 X (JA)

Cover Distribution of Dominant Layer (P): No Veg_____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) X 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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty X Mineral: Clayey_____

VW

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet X 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow X

Water pH (P): No surface water X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown X

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)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jon Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

W61LH018
~~W61LH025~~

Feature ID: ~~LH0~~ Field Target: 018 Date: 6.10.14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☐ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X [signature] 6.10.14 — Signature / Date

X Kim Dennis — Field Crew Chief (print)

X [signature] 6.10.14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target ~~021~~ 019	Map #: 14130 Map Date: 5/27/14
Date: 6/11/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH030~~ W61LH019	
Investigators: K Dennis J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 429.4		
Latitude: 65° 05' 10.3950"	Longitude: -148° 43' 18.6685"			Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 18	Picture No.: P_W61LH030_SP, P, N, E, W		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): hummocks
Slope (%): 0	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A 2, II C 1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Cowardin / Viereck correct.

See boundary notes on map

*logbook has site sketch

GPS by handheld unit

Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. NA			
2.			
3.			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	5		FAC
2. Betula glandulosum	6050	Y	FAC
3. Rhododendron groenlandicum	10		FAC
4. Alnus tenuifolia	15		FAC
5. Vaccinium vitis-idaea	10		FAC
6.			
7.			
8.			
9.			

Total Cover: ~~100~~ 90

50% of total cover: 45 20% of total cover: 18

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	90	X 2 =	180
FAC species	165	X 3 =	495
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	255	(A)	675 (B)

PI = B/A = 2.64

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	90	Y	FACW
2. Calamagrostis canadensis	60	Y	FAC
3. Deschampsia cespitosa	10		FAC
4. Festuca altaica	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 165

50% of total cover: 83 20% of total cover: 33

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

~~Y~~ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

10 % Bare Ground

____ % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

hummocks throughout sample plot

WETLAND DETERMINATION DATA FORM

SOIL Date 6/11/14 Feature ID ~~W61LH030~~ W61LH019 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Organics	Saturated
1"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) ____	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) ____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 1"

Hydric Soil Present (Y/N): Y

Notes: Assumed organics layer extends.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) ____
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) ____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) X
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) X
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) ____	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N):	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 1/2"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__40__ Dwarf shrub (<0.5m)__10__ Tall herb (≥1m)__0__ Short herb (<1m)__165__ Moss-Lichen__10__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A__X__

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking__X__ Histosol:Fibric__X__ 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__X__ 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_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water__X__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH019 ~~W61LH030~~ Field Target: 019 Date: 6/11/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson 6/11/14

Wetland Scientist (print) — **Signature / Date**

X Kim DeGutis — X [signature] 6/11/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Ø Access Road (explain)____ Other (explain)____			Field Target: 020	Map #: 14/130 Map Date: 5/27/14
Date: 6/11/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH028~~ W61LH020	
Investigators: K DEGUTIS J ANDERSON				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 429.5		
Latitude: 65° 05' 06.4755"		Longitude: 148° 43' 8711'		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 17	Picture No.: W61LH028_SP; P; NW; NE		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): hummocks	
Slope (%): 1		Local relief (concave, convex, none): none	
Pre-mapped Alaska LNG/NWI classification: Upland		Soil Map Unit Name:	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Ø No____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes Ø No____ (If no, explain in Notes.)	
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No Ø (If yes, explain in Notes)		
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No Ø (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes Ø No____		Is the Sampled Area within a Wetland? Yes Ø No____	
Hydric Soil Present? Yes Ø No____		Wetland Type: PSS1/EM1B	
Wetland Hydrology Present? Yes Ø No____		Alaska Vegetation Classification (Viereck): II C1, III A2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

FT 020 by GPS, Survey not staked

No indications of burn

Ø Change in mapping — Cowardin type

See logbook W61-1, pg 17

Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula glandulosa	70	Y	FAC
2. Vaccinium vitis-idaea	50	Y	FAC
3. Alnus tenuifolia	8		FAC
4. Betula nana	5		FAC
5. Rhododendron groenlandicum	30		FAC
6. Salix pulchra	35		FACW
7. Vaccinium oxycoccus	1		OBL
8. Salix myrtillifolia	5		FACW
9.			
Total Cover: 204			
50% of total cover: 102	20% of total cover: 41		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 1	X 1 =	1
FACW species: 85	X 2 =	170
FAC species 205	X 3 =	615
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 291 (A)		786 (B)

PI = B/A = 2.70

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	40	Y	FAC
2. Equisetum pratense	2		FAC
3. Eriophorum vaginatum	45	Y	FACW
4. Rubus chamaemorus	T		FACW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 87			
50% of total cover: 44	20% of total cover: 17		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

— % Bare Ground

____ % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

— % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/11/14 Feature ID ~~WG1LH028~~ WG1LH020 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-7							Organics	Saturated
7-8	10YR2/1						Organics	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Roots Depth (inches): 8"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 5"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 15 3 Dwarf shrub (<0.5m) 50 Tall herb (≥1m) 0 Short herb (<1m) 0 Moss-Lichen 10 Floating 0 Submerged 0

Number of Wetland Types (M): 2

Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even 0

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) 0 Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) 0 High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A 0

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches 0 Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) 0 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) 0

HGM Class (P): Slope_____ Flat 0 Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric 0 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 0 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 0 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed 0 Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) 0 Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding 0 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 0

Water pH (P): No surface water 0 Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable 0

Basin Topographic Gradient (M): Low Gradient (<2%) 0 High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs 0 Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below 0 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) 0

Watershed Land Use: 0-5% Rural 0 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) 0 Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~W61LH028~~ W61LH020 Field Target: FF020 Date: 6/11/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson — 6/11/14

Wetland Scientist (print) — **Signature / Date**

X Kim Degutis — X [signature] — 6/11/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 021	Map #: 14/130 Map Date: 5/27/14
Date: 6/11/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~WG1LH029~~ WG1LH021	
Investigators: C DeCoutis J Anderson				Team No.: WG1
State: Alaska	Region: Alaska	Milepost: 429.55		
Latitude: 65° 05' 03.4021"		Longitude: 148° 43' 12.0458		Datum: WGS84
Logbook No.: WG1-1	Logbook Page No.: 14	Picture No.: P_WG1 LH029_SP; P; N; E;		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: UPLAND	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes X No ~~X~~	**Wetland Type:** ~~PSS~~ UPLAND
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): I B2, III B1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

** See boundary adjustment on aerial

notes in logbook WG1-1, page 14



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus tremuloides	40	Y	FACU
2. Salix glauca	15		FAC
3. Picea glauca	30	Y	FACU
4.			

Total Cover: 85

50% of total cover: 43 20% of total cover: 17

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	2		FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: ↓

50% of total cover: ↓ 20% of total cover: ↓

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	—	X 2 =	—
FAC species	25	X 3 =	75
FACU species	140	X 4 =	560
UPL species	—	X 5 =	—
Column Totals:	165	(A)	635 (B)

PI = B/A = 3.84

Shrub stratum added to herb stratum due to <5% cover.

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Mertensia paniculata	20	Y	FACU
2. Cornus canadensis	35	Y	FACU
3. Equisetum arvense	10		FAC
4. Geocaulum lividum	15		FACU
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 80

50% of total cover: 40 20% of total cover: 16.4

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

90 % Bare Ground

____ % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/11/14	Feature ID ~~W61LH029~~ W61LH021	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Organics	Dry
4-18"+	6 Lay 4/10Y	55	10YR 3/6	45	C	M	SCL	
	10Y 4/1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer X
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

W61LH021

Feature ID: ~~W61LH029~~ Field Target: 021 Date: 6/11/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson 6/11/14

Wetland Scientist (print) — **Signature / Date**

X Kim DeGuisis — X [signature] 6/11/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) corridor			Field Target: 022	Map #: 15 Map Date: 5/27/14
Date: 6/12/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH025~~ W61LH022	
Investigators: Kim Reynolds, Jennifer Anderson, Abbygayle Fisher, Valerie Whitking				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 430.4		
Latitude: 65° 04' 23.37		Longitude: 148° 42' 19.18		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 23	Picture No.: P_W61LH025_NF_W_pit_Plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: upland	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No ~~+~~ AF	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** upland
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): I C2, II A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See Logbook W61-1 page 23 for site sketch and notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana			FacW
2. Picea Glauca	30	Y	FacU
3. Betula neoalaskana	5		FacU
4.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	25%	Y	FacW
2. Betula glandulosa	1%		Fac
3. Rhododendron groenlandicum	30		Fac
4. Salix alaxensis	10		Fac
5. Vaccinium vitis-idaea	65%	Y	Fac
6. Arctous rubra	6		Fac
7. Rosa acicularis	15		FacU
8. Alnus sp.	3		Fac
9. Salix pulchra	2		FacW

Total Cover: 147%

50% of total cover: 73.5 20% of total cover: 29.4

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: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 27	X 2 =	54
FAC species 108	X 3 =	324
FACU species 57	X 4 =	228
UPL species	X 5 =	
Column Totals: 192	(A)	606 (B)

PI = B/A = 3.16

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus Canadensis	3	Y	FacU
2. Calamagrostis canadensis	3	Y	Fac
3. Geocaulon lividum	2		FacU
4. Stellaria longipes	T		Fac
5. Equisetum scirpoides	1		FacU
6. Pyrola grandiflora	T		Fac
7. Mertensia paniculata	1		FacU
8. Chamerion angustifolium	T		FacU
9. Equisetum arvense	T		Fac
10. unidentified herb	1		

Total Cover: 11

50% of total cover: 5.5 20% of total cover: 2.2

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is > 50%
- ____ Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

5 % Bare Ground

— % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below)

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/12/14	Feature ID ~~WBILH005~~ WBILH022	Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-6							Fibric	dry organics
6-8	10YR 2/1	100					Fibric	
8	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): ~~8~~ 8"

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)_____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) ✓
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (≤0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none)_____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: ~~WGILH025~~ WGILH022 Field Target: 022 Date: 6/12/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — X [signature] 6/12/14

Wetland Scientist (print) — **Signature / Date**

X Kim Deguis — X [signature] 6/12/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) corridor			Field Target: 23	Map #: 16 Map Date: 5/27/14
Date: 6/12/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH023	
Investigators: Kim Deguitis, Jennifer Anderson, Abigayle Fisher, Valerie Watkins				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 433.3		
Latitude: 65° 02' 07.430"		Longitude: 148° 40' 33.52"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 21	Picture No.: P_W61LH023_ NE; NW; P.T.; Plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: PF04/SS4B	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PF04/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IA2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See W61-1, page 21 for note, site sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	45	Y	FACW
2.			
3.			
4.			

Total Cover: 45

50% of total cover: 22.5 20% of total cover: 9

Sapling/Shrub Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	20		FACW
2. Rhododendrum groenlandicum	55	Y	FAC
3. Vaccinium vitis-idaea	50	Y	FAC
4. Vaccinium uliginosum	35	Y	FAC
5. Betula glandulosa	10		FAC
6. Salix glauca	5		FAC
7.			
8.			
9.			

Total Cover: 175

50% of total cover: 87.5 20% of total cover: 35

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	70	X 2 =	140
FAC species	190	X 3 =	570
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	260 (A)		710 (B)

PI = B/A = 2.73

VEGETATION (use scientific names of plants)

Herb Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	15	Y	FAC
2. Equisetum sylvaticum	10	Y	FAC
3. Calamagrostis canadensis	10	Y	FAC
4. Eriophorum vaginatum	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

Hydrophytic Vegetation Indicators:

- ✗ Dominance Test is > 50%
- ✗ Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

- Ø % Bare Ground
- — % Cover of Wetland Bryophytes
- 95 Total Cover of Bryophytes
- 1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/12/14 Feature ID W6LH003 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-7"							Organic Fibric	Saturated
7"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes: * Does not meet 8" depth requirement for (A2) however secondary soil pits in slightly elevated areas Adjacent to original pit Confirm Frozen soils throughout

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes: * Both small pockets of GW throughout SP & polygon	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved_____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 45 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 125 Dwarf shrub (<0.5m) 50 Tall herb (≥1m) 0 Short herb (<1m) 40 Moss-Lichen 95 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even b

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 4.89

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6LH023 Field Target: Ø23 Date: 6/12/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- [x] 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)?

Abigayle Fisher

X ~~[signature]~~ AF X [signature]

Wetland Scientist (print) **Signature / Date**

X Kim DeGutis X [signature]

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____		Field Target: 024	Map #: 16/130 Map Date: 5/27/14
Date: 6/12/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH024
Investigators: KDeguitis J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 433.25	
Latitude: 65°02'01.89		Longitude: 148° 40' 31.13	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 22	Picture No.: P_W61LH024 ~~001-4~~ AF	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-2%	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No ✓	Is the Sampled Area within a Wetland? Yes____ No ✓
Hydric Soil Present? Yes____ No ✓	Wetland Type: Upland
Wetland Hydrology Present? Yes____ No ✓	Alaska Vegetation Classification (Viereck): IC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 22 for notes & site sketch

* Survey lath knocked over in field but spike is in place

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea ~~Mariana~~ Glauca	45	Y	FacW
2. Betula Neoalaskana	15	Y	FacU
3. Salix bebbiana	10		Fac
4.			

Total Cover: 70

50% of total cover: 35 20% of total cover: 14

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea ~~Mariana~~ Glauca AF	10		FacU
2. Rosa acicularis	20	Y	FacU
3. Vaccinium vitis-idaea	1		Fac
4. Salix bebbiana	25	Y	Fac
5. Rubus Arcticus	3		Fac
6. Ribes Triste	2		Fac
7. Linnaea borealis	20	Y	FacU
8. Rhododendrum groenlandicum T			Fac
9.			

Total Cover: 81

50% of total cover: 40.5 20% of total cover: 16.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 28.5 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: —	X 2 = —
FAC species ~~860~~	X 3 = ~~174~~ 180
FACU species 150	X 4 = 600
UPL species —	X 5 = —
Column Totals: 208 (A)	~~780~~ (B)

PI = B/A = 3.75

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	30	Y	FacU
2. Calamagrostis canadensis	20	Y	Fac
3. Mertensia paniculata	7		FacU
4. Geocaulon lividum	3		FacU
5. Chamerion angustifolium	T		FacU
6. Pyrola grandiflora	T		Fac
7. Unidentified herb	1		
8.			
9.			
10.			

Total Cover: 61

50% of total cover: 30.5 20% of total cover: 13 12.2

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

15 % Bare Ground

— % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/12/14 **Feature ID** W61CH024 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-7							Fibric	organics
7-10	10YR 4/1	70	7.5YR 5/6	30	C	M	Fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10in

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) ✓
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m)_____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none)_____ One or Few_____ Several to Many_____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WGILH024 Field Target: 024 Date: 6/17/14

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

- 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)? NA
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher X _____

Wetland Scientist (print) **Signature / Date**

X Kim Dennis X _____ 6/12/14

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline ~~X~~ Access Road (explain)____ Other (explain) Corridor X		Field Target: 025	Map #: 17/130 Map Date: 5/27/14
Date: 6/14/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH025
Investigators: K DEGOUTIS J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 436	
Latitude: 64° 59' 41.61"	Longitude: 148° 40' 31.35"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 25	Picture No.: P_W61LH025_Pt, Plng, NE, SE	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS 4/2B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** UPLAND
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C2, III A2!

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site w/in severe burn -

See logbook W61-1, page 25 for notes

Appears to be within same burn complex as FT026

more standing deadwood here than at FT026

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Rosa Acicularis	5		FACU
2. Rhododendron groenlandicum	20	Y	FAC
3. Populus tremuloides	5		FAC
4. Salix pulchra	15	Y	FAC
5. Vaccinium uliginosum	5		FAC
6. Vaccinium vitis-idaea	10	Y	FAC
7. Alnus tenuifolia	10	Y	FAC
8. Picea glauca	T		FACU
9. Salix alexensis	5		FAC
Total Cover:	75		
50% of total cover: 37.5	20% of total cover: 15		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 115	X 3 =	345
FACU species 8	X 4 =	32
UPL species	X 5 =	
Column Totals: 123 (A)		377 (B)

PI = B/A = 3.07

Salix arbusculoides T FACW

VEGETATION (use scientific names of plants)

Herb Stratum (20)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Mertensia paniculata	T		FACU
2. Calamagrostis canadensis	40	Y	FAC
3. Chamaerion angustifolium	3		FACU
4. Equisetum arvense	5		FAC
5. Stellaria longipes	T		FAC
6.			
7.			
8.			
9.			
10.			
Total Cover:	48		
50% of total cover: 24	20% of total cover: 9.6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

– % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/14/14	Feature ID W61LH025	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2"							Charcoal	
2+	10YR 4/1	60	10YR 3/6	40	C	M	Silt	No grit detected

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N/A Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: * Redox not prominent or distinct w/ing profile
— thixotropic soils (see logbook) unable to dig to 20" due to soil pit caving in.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25)_____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W01LH025 Field Target: 025 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☐ NA 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 Jennifer Anderson X Jennifer Anderson 6/14/14

Wetland Scientist (print) **Signature / Date**

X Kim DeGuzis X 6/14/14

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 026	Map #: 17/130 Map Date: 3/27/14
Date: 6/12/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH026
Investigators: K DeGoutis J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 436.1	
Latitude: 64° 59' 40.26"		Longitude: 148° 40' 27.65"	Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 23	Picture No.: P_W61LH026_Pit; Plug; NE; SW	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): Ø	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: Upland	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation X, Soil____, or Hydrology____ Significantly Disturbed?	No____(If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	Is the Sampled Area within a Wetland? Yes____ No X
Hydric Soil Present? Yes____ No X	Wetland Type: Upland
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

* Area w/in severe burn

MED - High percentage of burned, down trees throughout

*No frozen w/in 14" of surface by shovel test (press into soil pit)

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	50	Y	FACU
2. Salix glauca	15		FAC
3. Salix pulchra	10		FACW
4. Salix bebbiana	5		FAC
5. Picea mariana	1		FACW
6. Salix scouleriana	2		FAC
7. Populus tremuloides	5		FACU
8. Rosa acicularis	2		FACU
9. Rhododendron groenlandicum	~~23~~		FAC
Total Cover:	93		
50% of total cover: 46.5	20% of total cover: 18.6		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: ~~0~~ 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

% Dominant Species that are OBL, FACW, or FAC: ~~0~~ 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	11	X 2 =	22
FAC species	~~33~~ 34	X 3 =	~~99~~ 102
FACU species	58	X 4 =	232
UPL species	—	X 5 =	—
Column Totals:	~~102~~ 103 (A)		~~353~~ 356 (B)

PI = B/A = 3.46

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	8	Y	FAC
2. Chamerion angustifolium	1		FACU
3. Equisetum arvense	1		FAC
4. Unidentified grass	T		—
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover:	10		
50% of total cover: 5	20% of total cover: 2		

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

____ % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/12/14 Feature ID WOILH086 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-1							Fibric organic	Dry
1-2							Charcoal	Dry
2+	10YR 4/2	60	10YR 4/6	40	C	M	Fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): N

Notes:
- thixotropic soils (see logbook) - unable to dig to 20" due to soil caving into pit

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) ~~N~~ Y	Depth (in): 2" ±5		

Notes:
2" Saturation, throughout

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately Even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface)_____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH026 Field Target: 026 Date: 6/12/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [ ] Appropriate hydric soil indicators are marked? NA

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] 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 Abigayle Fisher X _____

Wetland Scientist (print) **Signature / Date**

X Kim DeGuis X _____ 6/12/14

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) 2000 Corridor			Field Target: 027	Map #: 17/130 Map Date: 5/27/2014
Date: 6/14/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61027 W61LH027	
Investigators: K DeGuttis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 436.09		
Latitude: 64° 54' 39.33"		Longitude: 148° 40' 20.89"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 26	Picture No.: P_W61LH027_Pit; Plug; SW; SE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PF04/SS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** UPLAND TI A2 KD
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): I A2, ~~II C2~~

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 26

Area has slight indications of burn but not severe

- Overstory ~40' throughout (Picea & Betula)

Viereck autopopulating

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 7x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoAlaskana	8		FACU
2. Picea glauca	40	Y	FacU
3.			
4.			

Total Cover: 46
50% of total cover: 24 20% of total cover: 9.6

Sapling/Shrub Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	20	Y	FACU
2. Rhododendron groenlandicum	15	Y	FAC
3. Rosa acicularis	10		FACU
4. Vaccinium vitis-idaea	10		FAC
5. Alnus tenuifolia	5		FAC
6. Salix glauca	T		FAC
7.			
8.			
9.			

Total Cover: 60
50% of total cover: 30 20% of total cover: 12

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:	—	X 2 =	
FAC species	30	X 3 =	240
FACU species	118	X 4 =	472
UPL species	—	X 5 =	
Column Totals:	148	(A)	712 (B)

PI = B/A = 3.596

VEGETATION (use scientific names of plants)

Herb Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	15		FAC
2. Equisetum arvense	30	Y	FAC
3. Geocaulon lividum	20	Y	FACU
4. Calamagrostis canadensis	5		FAC
5. Chamerion angustifolium	10		FACU
6. Cornus canadensis	10		FACU
7. Mertensia paniculata	T		FACU
8.			
9.			
10.			

Total Cover: 90
50% of total cover: 45 20% of total cover: 18

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

— % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/19/14 Feature ID W61LH027 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							organics	dry
2-6	10YR 2/1	100					organics	wet
6-14	10YR 4/3	50	7.5YR 3/2	50			silt	saturated
14	FROZEN	5						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 14"

Hydric Soil Present (Y/N): N

Notes: * Matrix colors blended, no redox observed w/in profile

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2"	

Notes: Soil was thixatropic in nature, No distinct mottling.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none)_____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH027 Field Target: 027 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/14/14 — **Signature / Date**

X Kim Deems — **Field Crew Chief (print)**

X [signature] 6/14/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X			Field Target: ~~200~~ 300 corridor ~~400~~ 035	Map #: 23/130 Map Date: 5/27/14
Date: 6/14/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH028	
Investigators: K Deems J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 452.6		
Latitude: 67° 46' 55.26"		Longitude: 148° 49' 15.52"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 27	Picture No.: P_W61LH028_P.L; Plug; W; SE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 3	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PF04/2B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes ~~X~~ No X	**Wetland Type:** ~~PF04/1/SS1B~~ c upland (R)
Wetland Hydrology Present? Yes ~~X~~ No X	Alaska Vegetation Classification (Viereck): IA2, IC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 27 for notes & sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 7.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	15	Y	FACU
2. Picea glauca	20	Y	FACU
3.			
4.			
Total Cover: 35			
50% of total cover: 17.5	20% of total cover: 7		

Sapling/Shrub Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron groenlandicum	70	Y	FAC
2. Betula neoalaskana	20		FACU
3. Rosa acicularis	5		FACU
4. Vaccinium vitis-idaea	45	Y	FAC
5. Salix pulchra	1		FACW
6.			
7.			
8.			
9.			
Total Cover: 141			
50% of total cover: 70.5	20% of total cover: 28.2		

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:	1	X 2 =	2
FAC species	119	X 3 =	357
FACU species	61	X 4 =	244
UPL species	—	X 5 =	—
Column Totals:	181 (A)		603 (B)

PI = B/A = 3.3

VEGETATION (use scientific names of plants)

Herb Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	3	Y	FAC
2. Calamagrostis canadensis	1		FAC
3. Cornus canadensis	1		FACU
4. Unknown herb	T		—
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 5			
50% of total cover: 2.5	20% of total cover: —		

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/19/14 Feature ID WB1LH020 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Fibric Peat	Saturated
4-7	7.5YR 2.5/1	58	5YR 5/8	2	C	M	SL	
	10YR 3/2	40						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) ~~X~~ *	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 7"

Hydric Soil Present (Y/N): ~~Y~~ N

Notes: * Charcoal (15%) observed w/in profile * Does not meet histic epipedon indicator requirements.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) ~~X~~	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** ~~Y~~ N	
Water Table Present (Y/N): —	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4		

Notes: Saturation indicator requires a water table underneath. Only one secondary indicator was selected.

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_X_ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_35_ Sapling (<5 dbh, <6m tall)_20_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_70_ Dwarf shrub (<0.5m)_45_ Tall herb (≥1m)_0_ Short herb (<1m)_5_ Moss-Lichen_15_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _3_ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_X_

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_X_ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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_____ 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_X_ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent 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_X_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_X_ 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)_X_

Watershed Land Use: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_X_ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH028 Field Target: 035 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/14/14 — **Signature / Date**

X Kim DeGuzis — **Field Crew Chief (print)**

X [signature] 6/14/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X within 2500 ft corridor			Field Target: 036	Map #: 23/30 Map Date: 5/27/14
Date: 6/14/14	Project Name & No.: Alaska LNG 26221306		Feature Id: WGILH029	
Investigators: K Degutis J Anderson A Fisher				Team No.: WG1
State: Alaska	Region: Alaska	Milepost: 452.6		
Latitude: 64° 41' 56.43"		Longitude: 148° 49' 22.30"		Datum: WGS84
Logbook No.: WG1-1	Logbook Page No.: 28	Picture No. PJWGILH029_NW_F_pit_plug		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 0-3	Local relief (concave, convex, none): none AF concave
Pre-mapped Alaska LNG/NWI classification: PEMIB	Soil Map Unit Name: —
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEMIB
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook WG1-1, page 28



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover:			
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 2	X 1 =	2
FACW species: —	X 2 =	—
FAC species 95	X 3 =	285
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 97 (A)		287 (B)

PI = B/A = 2.95

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis Canadensis	95	Y	FAC
2. Equisetum fluviatile	2		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 97			
50% of total cover: 48.5	20% of total cover: 19.4		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

2 % Bare Ground

___ % Cover of Wetland Bryophytes

Ø Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/14/14 Feature ID W61LH029 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
0-2		100					organics	dry
2-3.5		100					Fibric	Peat
3.5-4	~~2.5Y 3/2~~ NA	100					charcoal	
4-9	2.5Y 3/2	90	5YR 5/4	10	C	PL	Silt Loam	concentration in pores

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) ~~X 2.5Y hue~~ NA	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue X
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 9"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) X
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) X
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (≥5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: _____ GPS Technician QA/QC check: _____

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH029 Field Target: 036 Date: 6/14/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/14/14 — **Signature / Date**

X Kim DeGuis — **Field Crew Chief (print)**

X — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X 2000' corridor		Field Target: 034	Map #: 221130 Map Date: 5/2/14
Date: 6/15/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH030
Investigators: K DEGUTIS J ANDERSON A FISHER			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 452.07	
Latitude: 64° 47' 19.31"	Longitude: 148 48' 36.64"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 30	Picture No.: P_W61LH030_Pit; Aug; NW; E	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): ~~II A2~~, I A2, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 30 for sketch & notes

* Viereck code may still be autopopulating

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	10		FAC
2. Vaccinium vitis-idae	10		FAC
3. Dasiphora fruticosa	T		FAC
4. Rhododendron groenlandicum	25	Y	FAC
5. Betula glandulosa	1		FAC
6. Salix pulchra	2		FACW
7. Rosa acicularis	T		FACU
8. Empetrum nigrum	T		FAC
9. Picea mariana	50	Y	FACW

Total Cover: 101

50% of total cover: 50.5 20% of total cover: 20.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	59	X 2 =	118
FAC species	51	X 3 =	153
FACU species	1	X 4 =	4
UPL species	—	X 5 =	—
Column Totals:	111 (A)		275 (B)

PI = B/A = 2.48

Salix glauca 2 FAC
Salix bebbiana T FAC
Arctous rubra 1 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum scirpoides	1		FACW
2. Calamagrostis canadensis	2	Y	FAC
3. Petasites frigidus	2	Y	FACW
4. Stellaria longipes	T		FAC
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

— % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/14 Feature ID WOLLH030 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3							Peat Fibric	Dry
3-7							Peat Fibric	Saturated
7"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2) ~~X~~ Org	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): —	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved ~~X~~ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 50 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 40 Dwarf shrub (<0.5m) 10 Tall herb (≥1m) 0 Short herb (<1m) 5 Moss-Lichen 80 Floating 0 Submerged 0

Number of Wetland Types (M): 2 | **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%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown X

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)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH030 Field Target: 034 Date: 6/15/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/15/14 — **Signature / Date**

X Kim DeGuis — **Field Crew Chief (print)**

X 6/15/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____			Field Target: 037	Map #: 24/130 Map Date: 5/27/14
Date: 6/15/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH031	
Investigators: K Degutis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 453.95		
Latitude: 64° 45° 51.25"		Longitude: 148. 49' 39.47"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 32	Picture No.: P_W61LH031_Pit; Plug; W; S		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 2	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes ✓ No____
Hydric Soil Present? Yes ✓ No____	**Wetland Type:** PF04/SS1B
Wetland Hydrology Present? Yes ✓ No____	Alaska Vegetation Classification (Viereck): I A2, II C1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 32 for sketch & notes

• Viereck codes may be extrapolated again

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	30	Y	FACU
2. Betula neoalaskana	5		FACU
3.			
4.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	20		FACU
2. Rhododendron groenlandicum	50	Y	FAC
3. Alnus tenuifolia	7		FAC
4. Vaccinium vitis-idaea	25	Y	FAC
5. Linnaea borealis	5		FACU
6. Picea glauca	15		FACU
7.			
8.			
9.			

Total Cover: 122

50% of total cover: 61 20% of total cover: 24.4

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	92	X 3 =	276
FACU species	86	X 4 =	344
UPL species	—	X 5 =	—
Column Totals:	178	(A)	620 (B)

PI = B/A = 3.48

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	3		FAC
2. Geocaulon lividum	10	Y	FACU
3. Mertensia paniculata	1		FACU
4. Equisetum arvense	2		FAC
5. Calamagrostis canadensis	5	Y	FAC
6. Chamaerion angustifolium	T		FACU
7.			
8.			
9.			
10.			

Total Cover: 21

50% of total cover: 10.5 20% of total cover: 4.2

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

90% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/14 Feature ID WC1CH031 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5							Peat Fibric	Dry
5-6							Peat Fibric	SATURATED
6"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 6"

Hydric Soil Present (Y/N): Y

Notes: 5-6" Peat layer is very Saturated

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): —	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved__X__ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__~~X~~__ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 35 Sapling (<5 dbh, <6m tall) 15 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 97 Dwarf shrub (<0.5m) 25 Tall herb (≥1m) 0 Short herb (<1m) 21 Moss-Lichen 90 Floating 0 Submerged 0

Number of Wetland Types (M): 2

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%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH031 Field Target: 037 Date: 6/15/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date**

X Kim DeGutis — **Field Crew Chief (print)**

X [signature] 6/15/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 038	Map #: 94/130 Map Date: 5/27/14
Date: 6/15/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH032	
Investigators: K Degutis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 454		
Latitude: 64° 45' 48.963"	Longitude: 148° 49' 37.81"		Datum: WGS84	
Logbook No.: W61-1	Logbook Page No.: 33	Picture No.: P_W61LH032_Pit; Plot; NW; SE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS4/1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** UPLAND
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): I C2, II B2, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, pag 33

No evidence of recent burn

Viereck code may be Autopopulating

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	50	Y	FACW
2. Picea glauca	10		FACW
3.			
4.			

Total Cover: 60

50% of total cover: 30 20% of total cover: 12

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus tenuifolia	35	Y	FAC
2. Betula neoalaskana	15	Y	FACW
3. Rosa acicularis	10		FACU
4. Vaccinium vitis-idaea	10		FAC
5. Picea mariana	T		FACW
6. Salix ~~sitchensis~~	2		~~NI~~ FAC
7. Rhododendron groenlandicum	8		FAC
8. Linnaea borealis	2		FACU
9. Picea glauca	15	Y	FACU

Total Cover: 119

50% of total cover: 59.5 20% of total cover: 23.8

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	124	X 3 =	372
FACU species	112	X 4 =	448
UPL species		X 5 =	
Column Totals:	236	(A)	820 (B)

PI = B/A = 3.47

Salix pulchra 2 FAC
Fragaria vesca 15 Y FAC
Ribes hudsonianum T FAC
Vaccinium uliginosum 5 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	47		FAC
2. Calamagrostis canadensis	40	Y	FAC
3. Cornus canadensis	10		FACU
4. Chamaerion angustifolium	T		FACU
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 57

50% of total cover: 28.5 20% of total cover: 11.4

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

0 % Bare Ground

____ % Cover of Wetland Bryophytes

10% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/14 Feature ID WB12TP32 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4"							Fibric	Dry
4-10"							woody organic layer	
10-12"	7.5YR 3/4						Silt	5% charcoal
12"+	10YR 3/1	95	10YR 4/4	5%	C	M	Silt	not distinct, prominent

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N/A Depth (inches): _____

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) _____
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WoILH032 Field Target: 038 Date: 6/15/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X [signature] 6/15/14

Wetland Scientist (print) **Signature / Date**

X Kim DEGUTIS X [signature] 6/15/14

Field Crew Chief (print) **Signature / Date**

WETLAND DETERMINATION DATA FORM

300-ft corridor

SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)___ Other (explain) X			Field Target: 039	Map #: 25/130 Map Date: 5/27/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306			Feature Id: W61LH033
Investigators: K DeCovs J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 455.75		
Latitude: 64° 44 20.72"		Longitude: 148 150' 01.90"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 35	Picture No.: P_W61LH033_Pit; Plug; NE, SW		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PF04/2/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	Is the Sampled Area within a Wetland? Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: PF04/SS1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IA2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1 page 35

for sketch & notes

* Viereck not captured in GPS data

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	15	Y	FACW
2. Betula neoalaskana	5	Y	FACW
3.			
4.			

Total Cover: 20

50% of total cover: 10 20% of total cover: 4

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	T		FACU
2. Betula glandulosa	35	Y	FAC
3. Rhododendron groenlandicum	40	Y	FAC
4. Vaccinium vitis-idaea	40	Y	FAC
5. Ribes hudsonianum	2		FAC
6. Salix pulchra	7		FAC
7. Picea mariana	20		FACW
8. Vaccinium uliginosum	5		FAC
9. Betula neoalaskana	T		

Total Cover: 149

50% of total cover: 74.5 20% of total cover: 29.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 85 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	38	X 2 =	76
FAC species	134	X 3 =	402
FACU species	5	X 4 =	20
UPL species	—	X 5 =	—
Column Totals:	177 (A)		498 (B)

PI = B/A = 2.8

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	5	Y	FAC
2. Petasites frigidus	3	Y	FACW
3. Pyrola grandiflora	T		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 8

50% of total cover: 4 20% of total cover: 1.6

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % 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):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/14 Feature ID W61CH033 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3							Fibric	Dry
3-9							Fibric	Saturated
9"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 9"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1) X
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_X_ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_X_ 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) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 80 Dwarf shrub (<0.5m) 40 Tall herb (≥1m) 0 Short herb (<1m) 8 Moss-Lichen 85 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even 0

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_0_ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_0_ <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) _0_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_0_

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_X_ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _0_ 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)_0_

HGM Class (P): Slope_____ Flat_0_ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_X_ Histosol:Hemic_X_ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_0_ 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_0_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_0_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_0_ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_0_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_0_ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_0_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_0_

Basin Topographic Gradient (M): Low Gradient (<2%)_0_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_0_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_0_ 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)_0_

Watershed Land Use: 0-5% Rural_0_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_0_ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH033 (W) Field Target: 039 Date: 6/15/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/16/14 — **Signature / Date**

X Kim DeGuss — **Field Crew Chief (print)**

X [signature] 6/16/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline____ Access Road (explain)____ Other (explain) 2000' corridor		Field Target: 040	Map #: 25/130 Map Date: 5/27/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH034
Investigators: K Decouts J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 456	
Latitude: 64° 44' 10.95"	Longitude: 148° 50' 28.25"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 36	Picture No.: P_W61LH034_P.t.Plug.S.E	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 0	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): ~~I~~ IIA2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 36 for sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	5	Y	FACW
2.			
3.			
4.			

Total Cover: 5

50% of total cover: 2.5 20% of total cover: —

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	FACW
2. Vaccinium vitis-idaea	45	Y	FAC
3. Rhododendron groenlandicum	15		FAC
4. Vaccinium uliginosum	10		FAC
5. Rosa acicularis	3		FACU
6. Salix pulchra	5		FAC
7. Salix bebbiana	T		FAC
8. Alnus tenuifolia	1		FAC
9.			

Total Cover: 119

50% of total cover: 59.5 20% of total cover: 23.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 45	X 2 =	90
FAC species 109	X 3 =	327
FACU species 4	X 4 =	16
UPL species	X 5 =	
Column Totals: 158 (A)		433 (B)

PI = B/A = 2.74

VEGETATION (use scientific names of plants)

Herb Stratum (20)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	30	Y	FAC
2. Equisetum pratense	2		FAC
3. Eleocharis palustris	T		FACW
4. Pyrola grandiflora	1		FAC
5. Equisetum scirpoides	1		FACW
6.			
7.			
8.			
9.			
10.			

Total Cover: 34

50% of total cover: 17 20% of total cover: 6.8

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

0 % Bare Ground

— % Cover of Wetland Bryophytes

90% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/16/14	Feature ID W61LH034	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
0-3							Fibric	Dry
3-7							Fibric	Saturated
7-8	10YR 3/2						Hemic	Saturated
8-9	10YR 5/1	100				S	Silt	
9	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) ____	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) X	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) X		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 9"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) X
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) ____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) X
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) ____
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) X	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 6 1/2"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved X Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 40 Tall shrub (2-6m) 0 Short-shrub (0.5-2m) 34 Dwarf shrub (<0.5m) 45 Tall herb (≥1m) 0 Short herb (<1m) 34 Moss-Lichen 90 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

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_____ 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 X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) X Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6LH034 Field Target: 040 Date: 6/16/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/16/14 — **Signature / Date**

X Kim DeCuir — **Field Crew Chief (print)**

X [signature] 6/16/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Y Access Road (explain)____ Other (explain)____			Field Target: 041	Map #: 261130 Map Date: 5/27/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH035	
Investigators: K Dennis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 457.15		
Latitude: 64° 43' 18.77"		Longitude: 148° 51' 26.89"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 37	Picture No.: P_W61LH035_DT; Plug; SE; NW		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): ~~FLAT~~ FLAT	
Slope (%): 1		Local relief (concave, convex, none): NONE	
Pre-mapped Alaska LNG/NWI classification: PSS4/EM1C		Soil Map Unit Name:	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)	
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)		
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes Y No____		Is the Sampled Area within a Wetland? Yes Y No____	
Hydric Soil Present? Yes Y No____		Wetland Type: PSS 1/4B	
Wetland Hydrology Present? Yes Y No____		Alaska Vegetation Classification (Viereck): IIC 2, IIA 2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 37 for site sketch & notes

* Viereck field autopopulated in GPS data

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 2m¹)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (2m¹)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Vaccinium uliginosum	35	Y	FAC
2. Vaccinium vitis-idaea	75	Y	FAC
3. Rhododendron groenlandicum	10		FAC
4. Betula glandulosa	20		FAC
5. Picea mariana	25	Y	FACW
6. Salix pulchra	2		FAC
7. Alnus tenuifolia	1		FAC
8. Salix glauca	5		FAC
9. Arctous rubra	2		FAC
Total Cover: 135			
50% of total cover: 67.5 20% of total cover: 25			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 25	X 2 =	50
FAC species 111	X 3 =	333
FACU species 1	X 4 =	4
UPL species —	X 5 =	
Column Totals: 137 (A)		387 (B)

PI = B/A = 2.82

VEGETATION (use scientific names of plants)

Herb Stratum (2m¹)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhoda gandiflora	1		FAC
2. Petasites frigidus	T		FACW
3. Equisetum scirpoides	1		FACW
4. Equisetum pratense	2		FAC
5. Stellaria longipes	T		FAC
6. Calamagrostis canadensis	8	Y	FAC
7. Mertensia paniculata	T		FACW
8.			
9.			
10.			
Total Cover: 12			
50% of total cover: 6 20% of total cover: 2.4			

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

— % Cover of Wetland Bryophytes

50% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/16/14	Feature ID W61LH035	Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
0-3							Fibric	Dry
3-6.5							Fibric	Saturated
6.5-10	10YR 2/2	60	10YR 4/6	5	C	M	Silt	
	10YR 3/1	35						
10"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) ____	Alaska Gleyed (A13) ____	Alaska Color Change (TA4)[4] ____
Histic Epipedon (A2) X	Alaska Redox (A14) ____	Alaska Alpine Swales (TA5) ____
Black Histic (A3) ____	Alaska Gleyed Pores (A15) ____	Alaska Redox with 2.5Y Hue ____
Hydrogen Sulfide (A4) ____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer ____
Thick Dark Surface (A12) ____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) ____	Surface Soil Cracks (B6) ____	Water-stained Leaves (B9) ____	Stunted or Stressed Plants (D1) X
High Water Table (A2) ____	Inundation Visible on Aerial Imagery (B7) ____	Drainage Patterns (B10) ____	Geomorphic Position (D2) ____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) ____	Oxidized Rhizospheres along Living Roots (C3) ____	Shallow Aquitard (D3) X
Water Marks (B1) ____	Marl Deposits (B15) ____	Presence of Reduced Iron (C4) ____	Microtopographic Relief (D4) ____
Sediment Deposits (B2) ____	Hydrogen Sulfide Odor (C1) ____	Salt Deposits (C5) ____	FAC-Neutral Test (D5) X
Drift Deposits (B3) ____	Dry-Season Water Table (C2) ____	Notes:	
Algal Mat or Crust (B4) ____	Other (Explain in Notes):		
Iron Deposits (B5) ____			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in):	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): ?	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 25 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 70 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 75 Moss-Lichen 50 Floating 0 Submerged 0

Number of Wetland Types (M): 2

Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water 0 <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) 0 High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A 0

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 0

Dead Woody Material (P): Low Abundance (0-25% of surface) 0 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) 0

HGM Class (P): Slope_____ Flat 0 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 0 Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet 0 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 0 Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded_____

Evidence of Sedimentation (P): No Evidence Observed 0 Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.) 0 Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding 0 Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow 0 Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water 0 Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable 0

Basin Topographic Gradient (M): Low Gradient (<2%) 0 High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs 0 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 0 Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) 0

Watershed Land Use: 0-5% Rural 0 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres) 0 Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature]

GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WetLH035 Field Target: 041 Date: 6/16/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson

Wetland Scientist (print) — **Signature / Date**

X Kim DeGutis — X 6/16/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

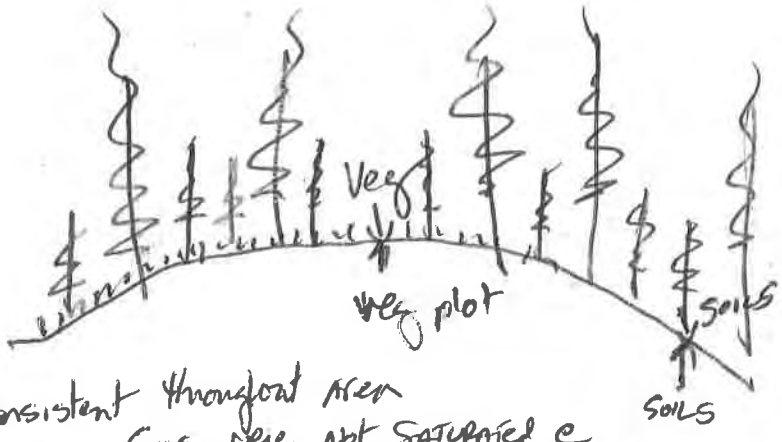
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 042	Map #: 26 130 Map Date: 5/27/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH036	
Investigators: K. DEGUTIS J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 457.15		
Latitude: 64° 43' 17.12"		Longitude: 148 51' 30.26"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 38	Picture No.: P-W61LH 036_Pit; Plug: NW, SW		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): ~~None~~ Flat
Slope (%): 2	Local relief (concave, convex, none): Convex
Pre-mapped Alaska LNG/NWI classification: PF04/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PF04/SS1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2, 11A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logpack W61-1 page 38 for site sketch & notes



Very consistent throughout area
Soils were not saturated @ center veg plot so soil pit relocated to edge of mound

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 20 ')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	30	Y	FACW
2.			
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	20	Y	FACW
2. Rhododendron groenlandicum	10	Y	FAC
3. Vaccinium vitis-idaea	3		FAC
4. Rosa acicularis	1		FACU
5. Vaccinium uliginosum	2		FAC
6. Arctous rubra	2		FAC
7. Salix pulchra	5		FAC
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: 5 (A)

Total Number of Dominant Species Across All Strata: 9 (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: 30	X 2 =	100
FAC species 30	X 3 =	90
FACU species 2	X 4 =	8
UPL species	X 5 =	
Column Totals: 82	(A)	198 (B)

PI = B/A = 2.4

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	5	Y	FAC
2. Cornus canadensis	2	Y	FAC
3. Geocaulon lividum	1		FACW
4. Pyrola grandiflora	1		FAC
5. Petasites frigidus	T		FACW
6. Stellaria longipes	T		FAC
7. ~~Petasites frigidus~~			
8.			
9.			
10.			

Total Cover: 9

50% of total cover: 4.5 20% of total cover: 1.8

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

15 % Bare Ground

____ % Cover of Wetland Bryophytes

85% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 8/16/14 Feature ID WALL+036 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Fibric	Dry
4-7							Fibric	Saturated
7-7.5	10YR 3/2	100					Silt	Sat.
7.5	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 7.5"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) X
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved_____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 30 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 5 Dwarf shrub (<0.5m) 5 Tall herb (≥1m) 6 Short herb (<1m) 9 Moss-Lichen 65 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

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_____ 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 X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below X 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) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: Ashley Wolf GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH036 Field Target: 042 Date: 6/16/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date**

X Kim DeGuzis — **Field Crew Chief (print)**

X [signature] 6/16/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)___ Other (explain) ROW x			Field Target: 043	Map #: 26/130 Map Date: 5/22/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH037	
Investigators: C Deems J Anderson				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 457.17		
Latitude: 64°43'15.23		Longitude: 148°51'22.13		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 39	Picture No.: P_W61LH037_Pit_Plug_E,W,		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): Flat	
Slope (%): 1		Local relief (concave, convex, none): None	
Pre-mapped Alaska LNG/NWI classification: Upland		Soil Map Unit Name:	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)	
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No X (If yes, explain in Notes)		
Are Vegetation___, Soil___, or Hydrology___ Naturally Problematic?	No X (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes ✓ No___		Is the Sampled Area within a Wetland? Yes X No___	
Hydric Soil Present? Yes ✓ No___		Wetland Type: PF04 SS1 ~~A~~ B	
Wetland Hydrology Present? Yes X No___		Alaska Vegetation Classification (Viereck): I A2, ~~II A2~~, II C1	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 39

* Change in Cowardin / Viereck

Viereck definition of dwarf tree scrub - 10% or more cover in tree species that will not achieve 3 meters at maturity. Site already has larger members of this species, DJF

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus tremuloides	10	Y	FACU
2. Picea mariana	20	Y	FACW
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	20		FACW
2. Picea glauca	5		FACU
3. Rhododendron groenlandicum	35	Y	FAC
4. Vaccinium vitis-idaea	50	Y	FAC
5. Rosa acicularis	2		FACU
6. Vaccinium uliginosum	10		FAC
7. Salix glauca	5		FAC
8. Alnus ○ tenuifolia	2		FAC
9. Salix bebbiana	3		FAC

Total Cover: 130

50% of total cover: 65 20% of total cover: 26.0

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 41	X 2 =	82
FAC species 126	X 3 =	378
FACU species 30	X 4 =	80
UPL species	X 5 =	
Column Totals: 187 (A)		540 (B)

PI = B/A = 2.88

Arctous rubra 2 FAC

Salix pulchra 2 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	1		FACW
2. Calamagrostis canadensis	15	Y	FAC
3. Equisetum scirpoides	1		FACW
4. Equisetum arvense	2		FAC
5. Geocaulon lividum	2		FACU
6.			
7.			
8.			
9.			
10.			

Total Cover: 21

50% of total cover: 10.5 20% of total cover: 4.2

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

65% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/16/14 Feature ID WetL4037 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3							Fibric	DM
3-7							Fibric	Saturated
7"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 7"

Hydric Soil Present (Y/N): Y

Notes: Lower Fibric layer very saturated

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): +	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved_____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 30 Sapling (<5 dbh, <6m tall) 25 Tall shrub (2-6m) 5 Short shrub (0.5-2m) 5 Dwarf shrub (<0.5m) 50 Tall herb (≥1m) 0 Short herb (<1m) 20 Moss-Lichen 65 Floating 0 Submerged 0

Number of Wetland Types (M): 3 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%) X Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg_____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open X Small Scattered Patches_____ Continuous Cover_____

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown X

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: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LW037 Field Target: 043 Date: 6/16/14

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

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/16/14 — **Signature / Date**

X Kimberly DeGroot

Field Crew Chief (print)

X 6/16/14

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) 2000 ft corridor			Field Target: OHY	Map #: 2 Map Date: 7/30 5/27/14
Date: 6/17	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH038	
Investigators: K DEGUTIS J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 458.15		
Latitude: 64° 40' 32.48"		Longitude: 148° 52' 33.12"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 41	Picture No.: P W61LH038 - Pit; Plug, E, W		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PFO4/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IA2, IIC1, ~~IIIA3~~

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

No indication of burn

Soils Frozen but no saturation

Ridgebreak is pretty dramatic

See logbook W61-1, page 41

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	35	Y	FACW
2.			
3.			
4.			
Total Cover: 35			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (20')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Vaccinium vitis-idaea	50	Y	FAC
2. Rosa acicularis	5		FACU
3. Salix pulchra	3		FAC
4. Betula glandulosa	5		FAC
5. Salix glauca	2		FAC
6. Vaccinium uliginosum	2		FAC
7. Rhododendron ~~subarcans~~	5		FAC
8. Rubus arcticus ~~groenlandicum~~	T		FAC
9. ~~Fragaria vesca~~			
Total Cover: 72			
50% of total cover: 36 20% of total cover: 14.4			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: —	X 2 = —
FAC species 85	X 3 = 255
FACU species 67	X 4 = 268
UPL species	X 5 =
Column Totals: 152 (A)	523 (B)

PI = B/A = 3.44

Picea glauca T FACW

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Pyrola grandiflora	3		FAC
2. Cornus canadensis	20	Y	FACU
3. Mertensia paniculata	5		FACU
4. Equisetum arvense	T		FAC
5. Calamagrostis canadensis	15	Y	FAC
6. Stellaria longipes	T		FAC
7. Petasites frigidus	T		FACW
8. Gymnocolea inflata	2		FACU
9.			
10.			
Total Cover: 45			
50% of total cover: 22.5 20% of total cover: 9			

Hydrophytic Vegetation Indicators:

____ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

8 % Bare Ground

____ % Cover of Wetland Bryophytes

60% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/14 Feature ID W61LH036 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Fibric	Dry
4-10	10YR 3/3						Fibric	Dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10"

Hydric Soil Present (Y/N): N

Notes: Organics not moist or saturated

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: Jennifer Anders

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH038 Field Target: 044 Date: 6/17/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/17/14 — **Signature / Date**

X Kim Deguts — **Field Crew Chief (print)**

X [signature] 6/17/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X			**Field Target:** 045	**Map #:** 27 **Map Date:** 5/27/14
Date: 6/17/14	**Project Name & No.:** Alaska LNG 26221163		**Feature Id:** W61LH039	
Investigators: K Degotis J Anderson A Fisher				**Team No.:** W61
State: Alaska	**Region:** Alaska	**Milepost:** 458.2		
Latitude: 64° 42' 29.23"		**Longitude:** 148° 52'		**Datum:** WGS84
Logbook No.: W61-1	**Logbook Page No.:** 47	**Picture No.:** P_W61LH039_Pit, Plug; W, N		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): FLAT	
Slope (%): 1		Local relief (concave, convex, none): NONE	
Pre-mapped Alaska LNG/NWI classification: UPLAND		Soil Map Unit Name:	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)	
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No N (If yes, explain in Notes)		
Are Vegetation___, Soil___, or Hydrology___ Naturally Problematic?	No N (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes Y No___		**Is the Sampled Area within a Wetland?** Yes Y No___	
Hydric Soil Present? Yes Y No___		**Wetland Type:** PSS1EB	
Wetland Hydrology Present? Yes Y No___		Alaska Vegetation Classification (Viereck): IIB1, ~~IIC1~~	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 47 for site sketch & notes

no indication of burn

very small pockets of GW on game trails in sample plt

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	2		FACU
2.			
3.			
4.			
Total Cover: 2			
50% of total cover: ____ 20% of total cover: ____			

Sapling/Shrub Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula glandulosa	55	Y	FAC
2. Salix pulchra	20	Y	FAC
3. Picea glauca	10		FACU
4.			
5. Vaccinium uliginosum	10		FAC
6. Vaccinium vitis-idaea	5		FAC
7. Rosa acicularis	T		FACU
8. Rhododendron groenlandicum	1		FAC
9. Salix glauca	5		FAC
Total Cover: 118			
50% of total cover: 59 20% of total cover: 23.6			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 122	X 3 =	366
FACU species 13	X 4 =	52
UPL species	X 5 =	
Column Totals: 135 (A)		418 (B)

PI = B/A = 3.09

Salix scouleriana 10 FAC

* Tree stratum added to shrub stratum since there was <5% cover,

VEGETATION (use scientific names of plants)

Herb Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	10	Y	FAC
2. Petasites frigidus	T		FACW
3. Equisetum pratense	T		FACW
4. Chamaenerion angustifolium	T		FACU
5. Cornus canadensis	1		FACU
6. Pyrola grandiflora	1		FAC
7. Rubus arcticus	5	Y	FAC
8.			
9.			
10.			
Total Cover: 17			
50% of total cover: 8.5 20% of total cover: 3.4			

Hydrophytic Vegetation Indicators:

- Yes Dominance Test is > 50%
- ____ Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

- 0 % Bare Ground
- — % Cover of Wetland Bryophytes
- 15 Total Cover of Bryophytes
- 5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/14 Feature ID W61LH039 **Soil Pit Required (Y/N)**_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10"							Fibric	Saturated
10"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) P	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) Y
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 5"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): <5" ?		

Notes: VWI

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 2 Sapling (<5 dbh, <6m tall) 10 Tall shrub (2-6m) 55 Short shrub (0.5-2m) 45 Dwarf shrub (<0.5m) 10 Tall herb (≥1m) 0 Short herb (<1m) 12 Moss-Lichen 15 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M):** Even ~~X~~ Highly Uneven X Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water ~~X~~ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover X N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A X

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded X

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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** 6.54

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown X

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)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WG1LH039 Field Target: 045 Date: 5/27/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/17/14 — **Signature / Date**

X Kim DEGOTIS — **Field Crew Chief (print)**

X [signature] 6/17/18 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Y Access Road (explain)____ Other (explain)_____			Field Target: 047	Map #: 28/130 Map Date: 5/27/14
Date: 6/17/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH1040	
Investigators: K Degutis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 4160.3		
Latitude: 64° 41' 12.19"		Longitude: 148° 55' 30.77"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 43	Picture No.: P_W61LH040_Pt; Plug; W; N		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PFO1/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No Y (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PFO1/SS1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): I B2, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

* See logbook W61-1, page 43

* No indication of burns w/in polygon

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	50	Y	FACW
2.			
3.			
4.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	1		FACW
2. Salix bebbiana	2	Y	FAC
3. Rhododendron groenlandicum	1		FAC
4. Salix glauca	3	Y	FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 7

50% of total cover: 3.5 20% of total cover: 1.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 = —	
FACW species: —	X 2 = —	
FAC species 22	X 3 = 66	
FACU species 52	X 4 = 208	
UPL species —	X 5 = —	
Column Totals: 74	(A)	274 (B)

PI = B/A = 3.7

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	15	Y	FAC
2. Chamaerion Angustifolium	T		FACU
3. Geocaulon lividum	1		FACU
4. Equisetum pratense	1		FAC
5. Stellaria longifolia	T		FAC
6.			
7.			
8.			
9.			
10.			

Total Cover: 17

50% of total cover: 8.5 20% of total cover: 3.4

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

40 % Bare Ground

— % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/14 Feature ID LX61H040 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3							Fibric	Dry
3-7							Hemic	Saturated
7-10	10YR 2/1	100					SL	
10"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved 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) 50 Sapling (<5 dbh, <6m tall) 1 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 6
Dwarf shrub (<0.5m) Ø Tall herb (≥1m) Ø Short herb (<1m) 17 Moss-Lichen Ø Floating Ø Submerged Ø

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%) X Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover X N/A_____

Plant Species Diversity (P): Low (< 5 plant species) X Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A X

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems X 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

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_____ 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 X Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X
Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent X Poorly Developed (6in.)_____ 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** 7.05

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____
Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____
Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WetLH040 Field Target: 047 Date: 6/17/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. Photos

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson 6/17/14 — Signature / Date

X Kimberly DEGUTIS — Field Crew Chief (print)

X [signature] 6/17/14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X (2000' corridor)			Field Target: 046	Map #: ~~28~~/30 Map Date: 5/27/14
Date: 6/17/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH041	
Investigators: K DeCoutis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 460.3		
Latitude: 64° 41' 10.65"		Longitude: 148 55' 21.68"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 44	Picture No.: P_W61LH041_Pit; Plug; S; E		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): ~~none~~ Convex
Pre-mapped Alaska LNG/NWI classification: PF04/1/SS1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** UPLAND
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): II B1, II C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, pages 44

Sample plot on localized convex surface, within mixed matrix wetland polygon (see aerial)

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	5	Y	FACU
2. Betula neoalaskana	8	Y	FACU
3.			
4.			
Total Cover: 13			
50% of total cover: 6.5	20% of total cover: 2.6		

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	8		FACU
2. Vaccinium vitis-idaea	20	Y	FAC
3. Rhododendron groenlandicum	15		FAC
4. Salix pulchra	15		FAC
5. Alnus tenuifolia	5		FAC
6. Salix glauca	~~30~~	Y	FAC
7. Rosa acicularis	1		FACU
8. Betula glandulosa	2		FAC
9. Chamaedaphne calyculata	1		FACW
Total Cover: 102			
50% of total cover: 51	20% of total cover: 20.4		

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:	2	X 2 =	4
FAC species	105	X 3 =	315
FACU species	24	X 4 =	96
UPL species	—	X 5 =	—
Column Totals:	131	(A)	415 (B)

PI = B/A = 3.17

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	1		FACW
2. Chamaerion angustifolium	1		FACU
3. Calamagrostis canadensis	12	Y	FAC
4. Pyrola grandiflora	1		FAC
5. Cornus canadensis	1		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: 16			
50% of total cover: 8	20% of total cover: 3.2		

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is > 50%
- ____ Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

- 0 % Bare Ground
- ____ % Cover of Wetland Bryophytes
- 15% Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/14 Feature ID W6L2H041 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3"							Fibric	Dry
3-7"	10YR 3/3						Fibric	Dry
7"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) _____	Alaska Redox (A14) _____	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 7"

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) _____	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) _____
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional_____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: _____ GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH041 Field Target: 046 Date: 6/17/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/17/14 — **Signature / Date**

X Kimberly DEGUTIS — **Field Crew Chief (print)**

X [signature] 6/17/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)_____ Other (explain)_____			Field Target: 048	Map #: 39 Map Date: 5/27/14
Date: 6/16/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH042	
Investigators: K DeCortis J Anderson A Fichet				Team No.: W01
State: Alaska	Region: Alaska	Milepost: 514.05		
Latitude: 64° 0' 15.29"		Longitude: 149° 07' 45.53"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 47	Picture No.: P_W61LH042_P.T; Plan; NW; NE		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS1 EM1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1 EM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIC1, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Counclin connect as mapped

See logbook W61-1, page 47.

~~Area partially w/in powerline corridor~~

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula glandulosa	40	Y	FAC
2. Dasiphora Fruticosa	10		FAC
3. Salix myrtilloides	5		FACW
4. Vaccinium uliginosum	5		FAC
5. Salix pulchra	30	Y	FAC
6. Picea glauca	12	AS	FACW
7. Salix alaxensis	7		FACW
8.			
9.			

Total Cover: 109

50% of total cover: 54.5 20% of total cover: 21.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	—	X 1 = —
FACW species:	18	X 2 = 36
FAC species	130	X 3 = 390
FACU species	15	X 4 = 60
UPL species	—	X 5 = —
Column Totals:	163 (A)	486 (B)

PI = B/A = 2.98

VEGETATION (use scientific names of plants)

Herb Stratum (2')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	5		FACW
2. Equisetum sciurioides	2		FACW
3. Pyrola ~~asarifolia~~ asarifolia	1		FACW
4. Carex sp.	T		—
5. ~~Carex vaginata~~			
6. Carex vaginata	1		FACW
7. Poa arctica	45	Y	FAC
8.			
9.			
10.			

Total Cover: 54

50% of total cover: 27 20% of total cover: 10.8

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

— % Cover of Wetland Bryophytes

10% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/18/14 Feature ID WetLH042 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5							Fibric	Dry
5-9							Fibric	Saturated
9-11	5Y 3/1	85	10YR 4/6	15	C	PL	Sandy loam	Distinct & prominent PL
11	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) _____	Alaska Gleyed (A13) _____	Alaska Color Change (TA4)[4] _____
Histic Epipedon (A2) X	Alaska Redox (A14) X	Alaska Alpine Swales (TA5) _____
Black Histic (A3) _____	Alaska Gleyed Pores (A15) _____	Alaska Redox with 2.5Y Hue _____
Hydrogen Sulfide (A4) _____		Alaska Gleyed without 5Y Hue or Redder Underlying Layer _____
Thick Dark Surface (A12) _____		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 11"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) _____	Surface Soil Cracks (B6) _____	Water-stained Leaves (B9) _____	Stunted or Stressed Plants (D1) _____
High Water Table (A2) _____	Inundation Visible on Aerial Imagery (B7) _____	Drainage Patterns (B10) _____	Geomorphic Position (D2) _____
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8) _____	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) X
Water Marks (B1) _____	Marl Deposits (B15) _____	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
Sediment Deposits (B2) _____	Hydrogen Sulfide Odor (C1) _____	Salt Deposits (C5) _____	FAC-Neutral Test (D5) X
Drift Deposits (B3) _____	Dry-Season Water Table (C2) _____	Notes:	
Algal Mat or Crust (B4) _____	Other (Explain in Notes):		
Iron Deposits (B5) _____			

Surface Water Present (Y/N): –	Depth (in): –	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): –	Depth (in): –		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (≥5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 12 Tall shrub (2-6m) 0 Short shrub (0.5-2m) ~~10~~ 97 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 54 Moss-Lichen 10 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%)_X_ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_X_ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_X_

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_X_ Small Scattered Patches_____ Continuous Cover_____

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_____ 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_X_ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_X_ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent 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_X_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_

Basin Topographic Gradient (M): Low Gradient (<2%)_X_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_X_ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_X_

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_X_ Low Intensity (i.e. open space) ~~X~~ 150

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: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH042 Field Target: 048 Date: 6/18/19

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/18/14 — **Signature / Date**

X Kim Decker — **Field Crew Chief (print)**

X [signature] 6/18/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline Y Access Road (explain)____ Other (explain)____			Field Target: 049	Map #: 30/130 Map Date: 5/27/14
Date: 6/19/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH043	
Investigators: K Deemis J Anderson A Fisher				Team No.: W61
State: Alaska	Region: Alaska	Milepost: 514.95		
Latitude: 63° 59' 33.31"	Longitude: 149° 07' 22.76"		Datum: WGS84	
Logbook No.: W61-1	Logbook Page No.: 48	Picture No.: P_W61LH043_Pit; Plug;		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS1/4B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** ~~PSS1/4B~~ PSS4/1B
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): ~~II B2, II C1~~ IA2, IIC1 1B

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 48 for notes & site sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	15	Y	FACW
2.			
3.			
4.			

Total Cover: 15

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	30	Y	FACW
2. Alnus tenuifolia	25	Y	FAC
3. Betula glandulosa	35	Y	FAC
4. Vaccinium uliginosum	10		FAC
5. Dasiphora fruticosa	2		FAC
6. Salix pulchra	6		FACW
7. Rhododendron groenlandicum	2		FAC
8. Salix glauca	5		FAC
9. Rosa acicularis	1		FACU

Total Cover: ~~NA~~ 127

50% of total cover: ~~29~~ 63.5 20% of total cover: 25.4

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:	15 X 2 =	30
FAC species	110 X 3 =	330
FACU species	46 X 4 =	184
UPL species	— X 5 =	—
Column Totals:	171 (A)	544 (B)

PI = B/A = 3.18

Vaccinium vitis-idaea 2 FAC
Salix scouleriana 3 FAC
Salix arbusculoides 4 FACW

VEGETATION (use scientific names of plants)

Herb Stratum (2x6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	1		FAC
2. Calamagrostis canadensis	25	Y	FAC
3. Petasites frigidus	3		FACW
4. Eriophorum ~~vaginatum~~ angustifolium	T		FACW
5. Carex vaginata	T		OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 29

50% of total cover: 14.5 20% of total cover: 5.8

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

_____ Morphological Adaptations[1] (Provide supporting data in Notes)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

7 % Bare Ground

_____ % Cover of Wetland Bryophytes

20% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/19/14 Feature ID WetLat043 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5"							Fibric	Saturated
5"	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 5"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5)
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_0_ 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)_15_ Sapling (<5 dbh, <6m tall)_30_ Tall shrub (2-6m)_25_ Short shrub (0.5-2m)_70_ Dwarf shrub (<0.5m) _2_ Tall herb (≥1m) _0_ Short herb (<1m) _24_ Moss-Lichen_20_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _2_ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _0_

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_0_ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_0_ <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) _0_ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_0_

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_0_

Dead Woody Material (P): Low Abundance (0-25% of surface) _0_ 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)_0_

HGM Class (P): Slope_____ Flat_0_ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_0_ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_0_ 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_0_ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_0_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_0_ Well Developed (6-18in.)_____ Pronounced (>18in)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_0_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_0_ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_0_ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_0_

Basin Topographic Gradient (M): Low Gradient (<2%)_0_ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_0_ 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_0_

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_0_

Watershed Land Use: 0-5% Rural_0_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_0_ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61L4043 Field Target: 049 Date: 6/19/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X Jennifer Anderson

Wetland Scientist (print) — **Signature / Date**

X Kim DeGutis — X [signature] 6/19/14

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 250	Map #: 31 Map Date: 5/27/14
Date: 6/19/14	Project Name & No.: Alaska LNG 26221306		Feature Id: WB1LH044
Investigators: K DeCurtis J Anderson A Fisher			Team No.: WB1
State: Alaska	Region: Alaska	Milepost: 518.15	
Latitude: 63° 56' 48.39"	Longitude: 149° 06' 35.25"		Datum: WGS84
Logbook No.: WB1-1	Logbook Page No.: 50	Picture No.: P_WB1LH044_D.F, Plug, S, E	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Flat
Slope (%): 1	Local relief (concave, convex, none): None
Pre-mapped Alaska LNG/NWI classification: PSS/1/EM1C	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PF04/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IA2, IIB2, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook WB1-1 page 50 for site sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	15	Y	FACW
2.			
3.			
4.			
Total Cover: 15			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10		FACW
2. Salix planifolia	8		FACW
3. Alnus Rubicosa	15	Y	FAC
4. Betula nana	35	Y	FAC
5. Dasiphora fruticosa	3		FAC
6. Rhodedendron groenlandicum	5		FAC
7. Vaccinium Uliginosum	20	Y	FAC
8. Empetrum nigrum	15	Y	FAC
9. ~~Betula nana~~			FAC
Total Cover: 127			
50% of total cover: 61 20% of total cover: 24.4			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

% Dominant Species that are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	14	X 2 =	28
FAC species	101	X 3 =	303
FACU species	28	X 4 =	112
UPL species	—	X 5 =	—
Column Totals:	143 (A)		443 (B)

PI = B/A = 3.098

Salix stolonifera 5 NI
Populus balsamifera 3 FACW
Chamaedaphne calyculata 3 FACW

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Pyrola grandiflora	1		FAC
2. Rubus arcticus	2	Y	FAC
3. Calamagrostis canadensis	5	Y	FAC
4. Equisetum arvense	2	Y	FACU
5. Chamaedaphne calyculata	T		FACW
6. Equisetum scirpoides	1		FACW
7.			
8.			
9.			
10.			
Total Cover: 11			
50% of total cover: 5.5 20% of total cover: 2.2			

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

____ Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic

0 % Bare Ground

____ % Cover of Wetland Bryophytes

50% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/19/14 Feature ID W61LH094 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5							Fibric	Saturated
5"+	Frozen							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 5"+

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5)
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** X	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5"+		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved__X__ 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)__15__ Sapling (<5 dbh, <6m tall)__10__ Tall shrub (2-6m)__8__ Short shrub (0.5-2m)__49__ Dwarf shrub (<0.5m)__55__ Tall herb (≥1m)__0__ Short herb (<1m)__11__ Moss-Lichen__50__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A__X__

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_____ Flat__X__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ 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__X__

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__X__ Poorly Developed (6in.)_____ 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_____ Restricted Outflow_____ Unrestricted Outflow__X__

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.50

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__

Basin Topographic Gradient (M): Low Gradient (<2%)__X__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__X__ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jenny Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W6LH044 Field Target: 050 Date: 6/19/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson — **Signature / Date**

X Kim DEGUTIS — **Field Crew Chief (print)**

X [signature] 6/19/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 051	Map #: 311 130 Map Date: 5/27/14
Date: 6/19/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH045	
Investigators: K DEBOTIS	J Anderson	A. Fisher		Team No.: W61
State: Alaska	Region: Alaska	Milepost: 512.35		
Latitude: 1784024.0227082	Longitude: 3634749.327082		Datum: WGS84	
Logbook No.: W61-1	Logbook Page No.: 57	Picture No.: P_W61LH045_P.T; Plug; N; W		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): FLAT
Slope (%): 3	Local relief (concave, convex, none): NONE
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1/4B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): ~~II A2~~, IIC1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 57 for notes & site sketch

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	2		FACW
2.			
3.			
4.			
Total Cover: 2			
50% of total cover: 1	20% of total cover:		

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	20		FACW
2. Rhododendron groenlandicum	8		FAC
3. Arctous rubra	10		FAC
4. Betula glandulosa	25	Y	FAC
5. Dasiphora fruticosa	2		FAC
6. Salix pulchra	10		FACW
7. Salix reticulata	15		FAC
8. Rhododendron tomentosum	30	Y	FACW
9. Vaccinium uliginosum	25	Y	FAC
Total Cover: 159			
50% of total cover: 79.5	20% of total cover: 31.8		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	47	X 2 =	94
FAC species	112	X 3 =	336
FACU species	22	X 4 =	88
UPL species	—	X 5 =	—
Column Totals:	181 (A)		518 (B)

PI = B/A = 2.86

Dryas	integrifolia	1	FAC
Salix	glauca	1	FAC
Salix	Scouleriana	5	FAC
Salix	myrtillifolia	5	FACW

* Tree stratum added to shrub stratum - 45% cover.

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	T		FAC
2. Rubus chamaemorus	2		FACW
3. Carex sp.	T		Assume FAC
4. Poa arctica	20	Y	FAC
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 22			
50% of total cover: 11	20% of total cover: 4.4		

Hydrophytic Vegetation Indicators:

- 0 Dominance Test is > 50%
- 0 Prevalence Index is ≤ 3.0
- ____ Morphological Adaptations[1] (Provide supporting data in Notes)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

- 0 % Bare Ground
- ____ % 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

SOIL Date 6/9/14 Feature ID W612H095 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5							Fibric	Saturated
5"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 5"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 1"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 2 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 13 Dwarf shrub (<0.5m) 16 Tall herb (≥1m) 0 Short herb (<1m) 22 Moss-Lichen 40 Floating 0 Submerged 0

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M):** Even 0 Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%) X High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches X Continuous Cover_____

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_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent 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 X Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural X 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres) X

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH045 Field Target: Ø51 Date: 6/19/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. Photos

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson — Signature / Date

X Kim DEGUTIS — Field Crew Chief (print)

X [signature] 6/19/14 — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 052	Map #: 32/130 Map Date: 5/27/14
Date: 6/27/14	Project Name & No.: Alaska LNG 26221306		Feature Id: W61LH046
Investigators: K Dennis J Anderson A Fisher			Team No.: W61
State: Alaska	Region: Alaska	Milepost: 519.35	
Latitude: 63° 55' 50.54"	Longitude: 149° 05' 35.99"		Datum: WGS84
Logbook No.: W61-2	Logbook Page No.: 2	Picture No.: P— W61LH046_Pit; Plug; S, N	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): ~~Flat~~ hummocks
Slope (%): 2	Local relief (concave, convex, none): none
Pre-mapped Alaska LNG/NWI classification: PSS1 | EM1B	Soil Map Unit Name:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1 | EM1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIC1, III A K2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-2, pg 2

for site sketch & notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover: /			
50% of total cover: /	20% of total cover: /		

Sapling/Shrub Stratum (30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	5		FACW
2. Salix pulchra	20		FACW
3. Betula glandulosa	65	Y	FAC
4. Alnus tenuifolia	15		FAC
5. Salix glauca	10		FAC
6. Rhododendron groenlandicum	T		FAC
7. Salix alexensis	5		FAC
8. Dasiphora fruticosa	T		FAC
9. Salix arbusculoides	5		FACW
Total Cover: ~~72~~ 127			
50% of total cover: 63.5	20% of total cover: 25.4		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 77	X 2 =	152
FAC species 97 ~~95~~	X 3 =	~~285~~ 291
FACU species 5	X 4 =	20
UPL species —	X 5 =	—
Column Totals: 179	(A)	463 (B)

PI = B/A = 2.58

Vaccinium oliginosum 2 FAC

VEGETATION (use scientific names of plants)

Herb Stratum (30')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	50	Y	FACW
2. Equisetum palustre	2		FACW
3. Rubus chamaemorus	T		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 52			
50% of total cover: 26	20% of total cover: 10.4		

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

___ Morphological Adaptations[1] (Provide supporting data in Notes)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

— % Cover of Wetland Bryophytes

5 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

SOIL Date 6/27/14 Feature ID W6LH046 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10"							Fibric	Saturated
10"	FROZEN							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4)		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: FROZEN Depth (inches): 10"

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) X	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): Y	Depth (in): 1/2"	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 0"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0"		

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved X Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) Ø Sapling (<5 dbh, <6m tall) 5 Tall shrub (2-6m) Ø Short shrub (0.5-2m) 12.2 Dwarf shrub (<0.5m) Ø Tall herb (≥1m) Ø Short herb (<1m) 52 Moss-Lichen 5 Floating Ø Submerged Ø

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover X N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

Dead Woody Material (P): Low Abundance (0-25% of surface) X Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed) X

HGM Class (P): Slope_____ Flat X Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric X Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet X No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) X Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow X Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.74

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X

Basin Topographic Gradient (M): Low Gradient (<2%) X High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream X Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space) X

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized X 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W61LH046 Field Target: 052 Date: 6/27/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 6/27/14 — **Signature / Date**

X Kimberly Degans — **Field Crew Chief (print)**

X [signature] 6/27/14 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

Not FT020

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain)_____			Field Target: ~~FT020~~ 020	Map #: 14/130 Map Date: 5/27/14
Date: 6/11/14	Project Name & No.: Alaska LNG 26221306		Feature Id: ~~W61LH020~~ W61LH020_op	
Investigators: KDEGUIS J Anderson				Team No.: W61 W61LH047
State: Alaska	Region: Alaska	Milepost: 429.5		
Latitude: 65° 05' 09.6904		Longitude: 148° 43' 12.1750"		Datum: WGS84
Logbook No.: W61-1	Logbook Page No.: 17	Picture No.: P_W61LH027_SP.P.SW, NE		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): hummocks	
Slope (%): 0		Local relief (concave, convex, none): none	
Pre-mapped Alaska LNG/NWI classification: Upland		Soil Map Unit Name:	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)	
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No 0 (If yes, explain in Notes)		
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No 0 (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes X No_____		Is the Sampled Area within a Wetland? Yes X No_____	
Hydric Soil Present? Yes X No_____		Wetland Type: PEM1/SS1C/B	
Wetland Hydrology Present? Yes X No_____		Alaska Vegetation Classification (Viereck): IIIA 3, IIC1 2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

See logbook W61-1, page 17 for sketch

No indications of burn

Not FT020

Note new FID

W61LH020_op

Note new FID

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. N/A			
2.			
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula glandulosa	20		FAC
2. Rhododendron groenlandicum	25	Y	FAC
3. Chamaedaphne calyculata	10		FACW
4. Betula nana	40	Y	FAC
5. Vaccinium vitis-idaea	15		FAC
6. Alnus tenuifolia	5		FAC
7.			
8.			
9.			
Total Cover: 115			
50% of total cover: 58 20% of total cover: 23			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 95	X 2 =	190
FAC species 140	X 3 =	420
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 235 (A)		610 (B)

PI = B/A = 2.59

VEGETATION (use scientific names of plants)

Herb Stratum (5)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	85	Y	FACW
2. Calamagrostis canadensis	20		FAC
3. Festuca altaica	15		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 120			
50% of total cover: 60 20% of total cover: 24			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

____ Morphological Adaptations[1] (Provide supporting data in Notes)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

____ % Cover of Wetland Bryophytes

15 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

WGILH047, WGILH020_OP

SOIL Date 6/4/14 **Feature ID** WGILH029 **Soil Pit Required (Y/N)** Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2							Organics	Saturated
2-5	10YR 2/1						Peat	Hemic, saturated
5-10	10YR 2/2						Peat	Hemic, H_2S odor

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		**INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]**
Histosol or Histel (A1) X	Alaska Gleyed (A13)	Alaska Color Change (TA4)[4]
Histic Epipedon (A2)	Alaska Redox (A14)	Alaska Alpine Swales (TA5)
Black Histic (A3)	Alaska Gleyed Pores (A15)	Alaska Redox with 2.5Y Hue
Hydrogen Sulfide (A4) X		Alaska Gleyed without 5Y Hue or Redder Underlying Layer
Thick Dark Surface (A12)		Other (Explain in Notes)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frozen Depth (inches): 10"

Hydric Soil Present (Y/N): Y

Notes: H_2S odor @ 5-11"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		**SECONDARY INDICATORS** (2 or more required)	
Surface Water (A1)	Surface Soil Cracks (B6)	Water-stained Leaves (B9)	Stunted or Stressed Plants (D1)
High Water Table (A2) X	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10)	Geomorphic Position (D2)
Saturation (A3) X	Sparsely Vegetated Concave Surface (B8)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) X
Water Marks (B1)	Marl Deposits (B15)	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) X
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1) X	Salt Deposits (C5)	FAC-Neutral Test (D5) X
Drift Deposits (B3)	Dry-Season Water Table (C2)	Notes:	
Algal Mat or Crust (B4)	Other (Explain in Notes):		
Iron Deposits (B5)			

Surface Water Present (Y/N): —	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 3"	
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 0"	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES

P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Needle-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__0__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 5 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 10 Dwarf shrub (<0.5m) 15 Tall herb (≥1m) 0 Short herb (<1m) 120 Moss-Lichen 15 Floating 0 Submerged 0

Number of Wetland Types (M): 2

Evenness of Wetland Type Distribution (M): Even _____ Highly Uneven _____ Moderately even 0

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__0__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A__0__ VW

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __0__ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A__0__

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__0__

Dead Woody Material (P): Low Abundance (0-25% of surface) __0__ 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)__0__

HGM Class (P): Slope_____ Flat__0__ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__0__ 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__0__ 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__ VW Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded__0__

Evidence of Sedimentation (P): No Evidence Observed__0__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__0__ 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__0__

Water pH (P): No surface water__0__ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Glacial Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__0__

Basin Topographic Gradient (M): Low Gradient (<2%)__0__ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs__0__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below__0__ 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)__0__

Watershed Land Use: 0-5% Rural__0__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)__0__ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

W61LH047 W61LH020 - OP

Feature ID: ~~W61LH027~~ Field Target: 020 Date: 6/11/14

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- [x] Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- [ ] Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

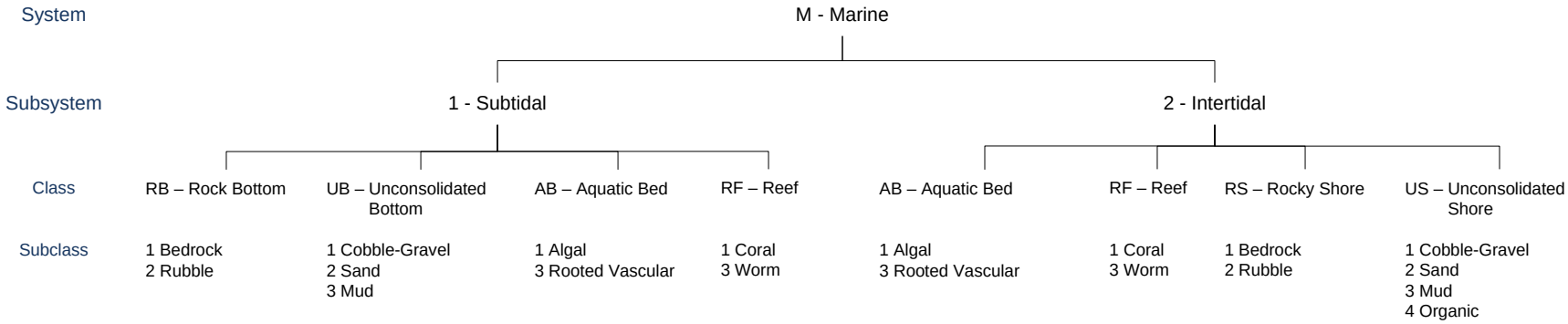
X Jennifer Anderson 6/11/14 — **Signature / Date**

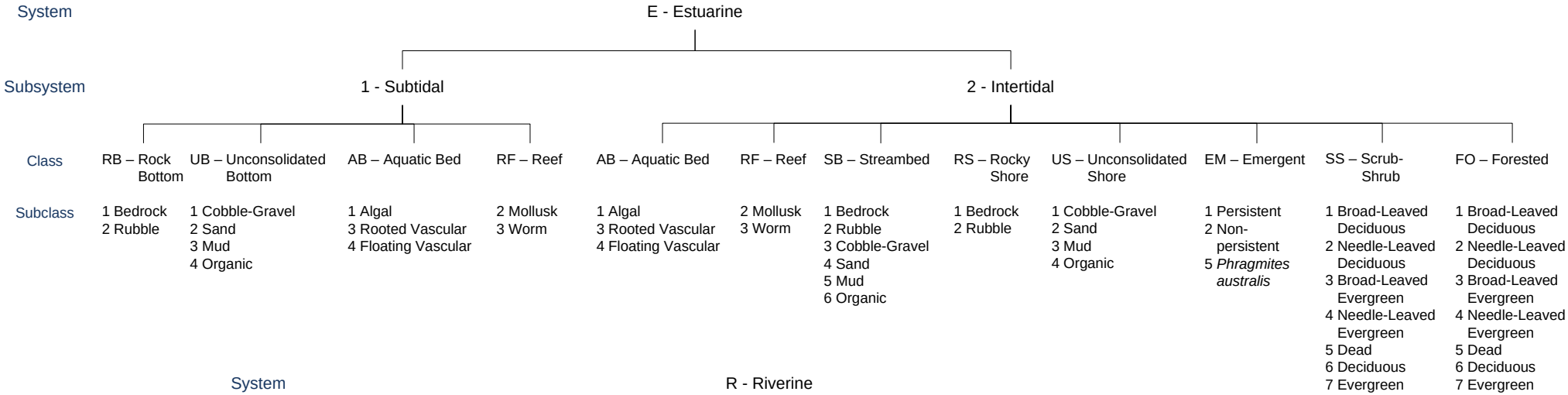
X Lm Deokes — **Field Crew Chief (print)**

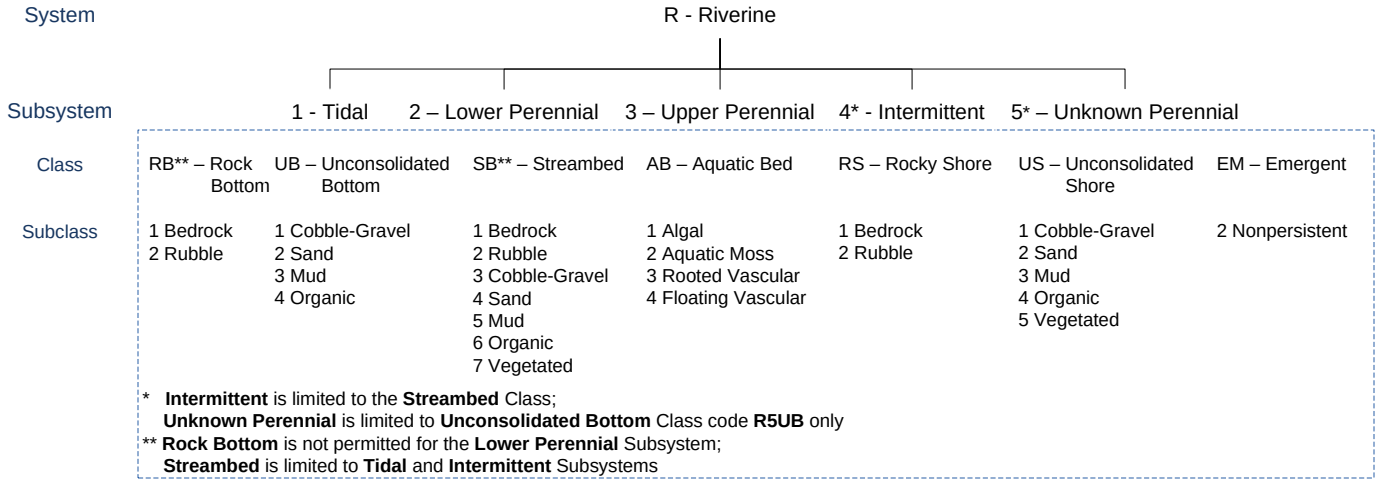
X [signature] 6/11/14 — **Signature / Date**

APPENDIX D – 2014 WETLAND DELINEATION MAPS

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION





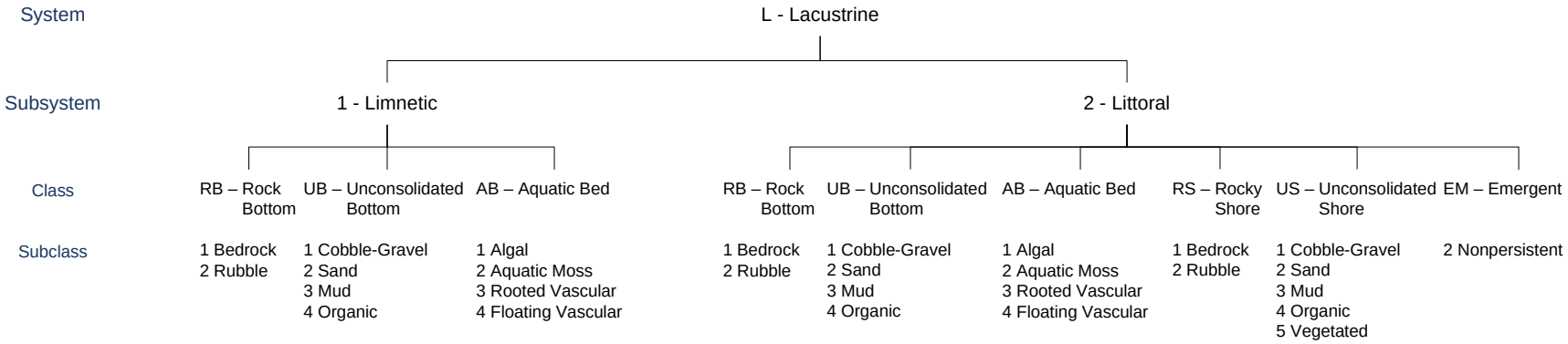


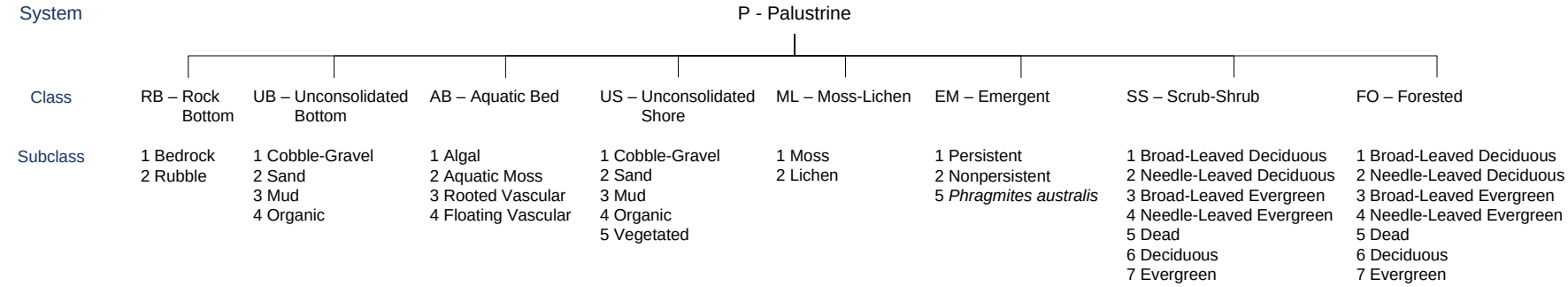
* **Intermittent** is limited to the **Streambed** Class;
Unknown Perennial is limited to **Unconsolidated Bottom** Class code **R5UB** only

** **Rock Bottom** is not permitted for the **Lower Perennial** Subsystem;
Streambed is limited to **Tidal** and **Intermittent** Subsystems

Classification of Wetlands and Deepwater Habitats of the United States, Cowardin *et al*. 1979

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION

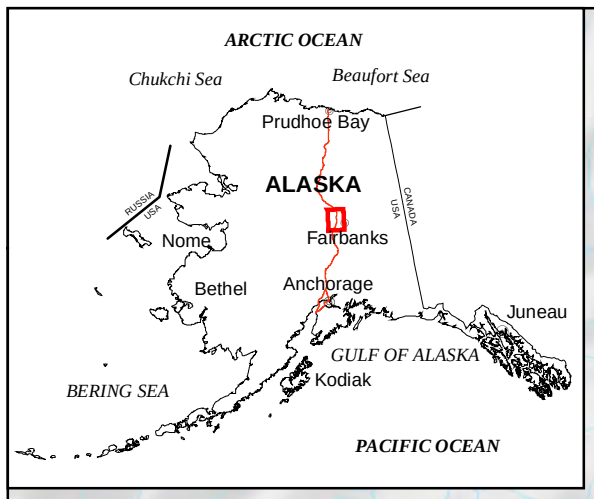




MODIFIERS

In order to more adequately describe the wetland and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

Water Regime			Special Modifiers	Water Chemistry			Soil
Nontidal	**Saltwater Tidal**	**Freshwater Tidal**		**Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**	
A Temporarily Flooded	L Subtidal	S Temporarily Flooded-Tidal	b Beaver	1 Hyperhaline	7 Hypersaline	a Acid	g Organic
B Saturated	M Irregularly Exposed	R Seasonally Flooded-Tidal	d Partly Drained/Ditched	2 Euhaline	8 Eusaline	t Circumneutral	n Mineral
C Seasonally Flooded	N Regularly Flooded	T Semipermanently Flooded-Tidal	f Farmed	3 Mixohaline (Brackish)	9 Mixosaline	i Alkaline	
E Seasonally Flooded/ Saturated	P Irregularly Flooded	V Permanently Flooded-Tidal	h Diked/Impounded	4 Polyhaline	0 Fresh		
F Semipermanently Flooded			r Artificial	5 Mesohaline			
G Intermittently Exposed			s Spoil	6 Oligohaline			
H Permanently Flooded			x Excavated	0 Fresh			
J Intermittently Flooded							
K Artificially Flooded							



MP 400
West Fork Tolovana River
ELLIOTT HIGHWAY
Brooks Creek
Slate Creek
Tolovana River
MP 425
Minto
Tatalina River
Washington Creek
Chatanika River
Tanana River
Goldstream Creek
MP 450
Ester
MP 350
PARKS HIGHWAY
MP 325
Little Goldstream Creek
Willow Creek
Nenana
N

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

Concept Information - Confidential

LEGEND

- Wetlands Page Number
- Pre-FEED Route Rev A (8/5/2014)
- Roads

Miles
0 1 2 3 4 5
0 2.5 5 7.5 10
Kilometers

ALASKA LNG

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DRAWN	ICS
CHECK	
DESIGN	TCS
APPR.	

ALASKA LNG
2014 WETLANDS OVERVIEW

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK 4	NAD83	URS ALASKA	Page 1 of 4	

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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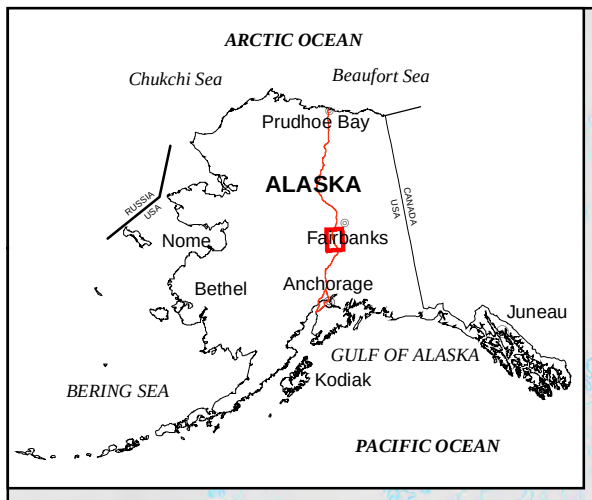

Nenana
MP 300
PARKS HIGHWAY
Nenana River
Anderson
Teklanika River
Tatlanika Creek
Windy Creek
MP 500
Healy
MP 250
MP 525
Healy Creek
Moody Creek
McKinley Park
MP 550

Concept Information - Confidential

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- Wetlands Page Number
- Pre-FEED Route Rev A (8/5/2014)
- Roads

Miles
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0 2.5 5 7.5 10
Kilometers

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2014 WETLANDS OVERVIEW

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK 4	NAD83	URS ALASKA	Page 2 of 4	

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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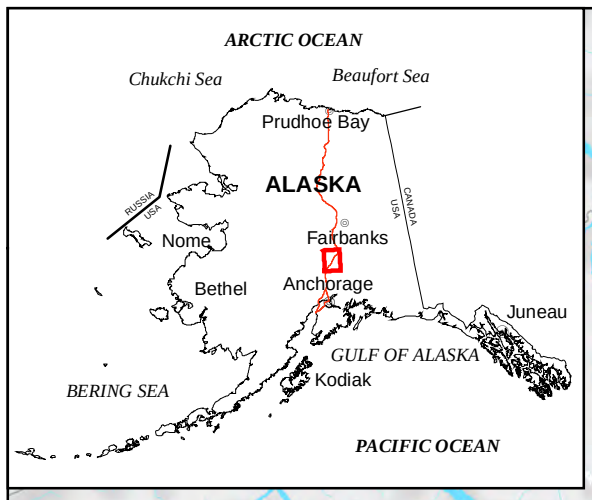

Riley Creek
Sanctuary River
Cantwell Creek
Cantwell
MP 225
MP 575
MP 200
MP 175
MP 625
MP 150
PARKS HIGHWAY
West Fork Chulitna River
Fountain River
Susitna River
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Concept Information - Confidential

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LEGEND

- Wetlands Page Number
- Pre-FEED Route Rev A (8/5/2014)
- Roads

Miles
0 1 2 3 4 5
0 2.5 5 7.5 10
Kilometers

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ALASKA LNG
2014 WETLANDS OVERVIEW

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK 4	NAD83	URS ALASKA	Page 3 of 4	

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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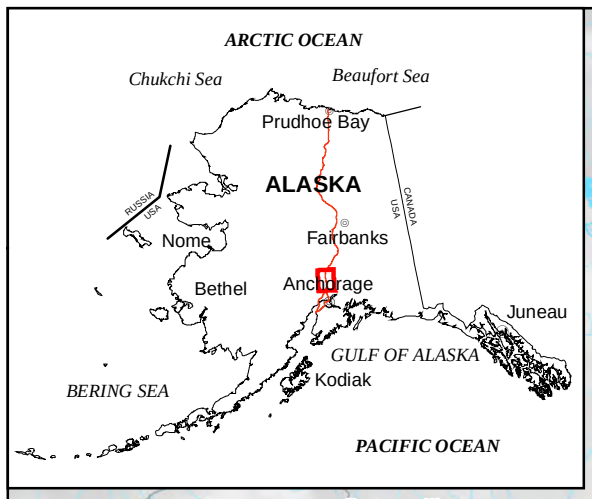

Petersville

Talkeetna

Willow

MP 650

MP 125

MP 100

MP 75

MP 700

MP 709.5

PARKS HIGHWAY

Susitna River

Tokositna River

Trapper Creek

Chulitna River

Talkeetna River

Middle Fork Montana Creek

South Fork Montana Creek

Sheep Creek

North Fork Kashwitna River

Kashwitna River

Little Willow Creek

Iron Creek

Willow Creek

Yentna River

Twentymile Slough

Fish Creek

Deshka River

Concept Information - Confidential

N

LEGEND

- Wetlands Page Number
- Pre-FEED Route Rev A (8/5/2014)
- Roads

Miles
0 1 2 3 4 5
0 2.5 5 7.5 10
Kilometers

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ALASKA LNG
2014 WETLANDS OVERVIEW

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK 4	NAD83	URS ALASKA	Page 4 of 4	

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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PSS4/1/FO4B
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MP 403
PSS4/1/FO4B
MP 403
PSS4/1/FO4B
U
PSS4/1B
U
PSS4/1/FO4B
PSS1/4C
U
PSS4/1/FO4B
PSS4/1/FO4B
W61LH001
PFO4B
W61LH002
PFO4B
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R4SB
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PSS4/1B
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R4SB
PFO4B
PFO4/SS4B
U
PFO4/SS4B
PFO4/SS4B
PFO4B
PFO4/SS4B
U
U

LEGEND

HGM Class
- Flat
- Depressional
- Slope
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

2014 Field Data
- Wetland
- Vegetation
- Observation
- Additional Wetlands Mapping
- Aerial Imagery Required
- Pre-Feed Rev A Mile Post (Current)
- Base Route (3/14/2014)

Feet
0 250 500 750 1,000
0 100 200 300
Meters

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DESIGN: TCS
APPR.:

ALASKA LNG
2014 WETLAND MAPPING

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
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SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
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