Part 8 of 19 of Appendix G of Resource Report No. 2

LH007

WETLAND DETERMINATION DATA FORM

7/20/15 W84LH007 Y

SOIL Date 7/20/15 Feature ID W84LH007 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								
2-4	2.5Y 5/3	100					SaL	
4-11	5Y 5/1	100					San2	parent material color
11-17	5Y 5/2	96	N4/0	2	D	PL	San2	lenses of SiL w/redox
11-24			7.5 4/6	2	C	PL		features associated
17-24	5Y 5/2	100					Sand	

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

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

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

LH007

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: LW84CH007 Field Target: 15143 Date: 7/20/15

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?~~ form

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 [signature] 7/20/15 — **Signature / Date**

X Brian Strong — **Field Crew Chief (print)**

X [signature] 7/20/15 — **Signature / Date**

LH008

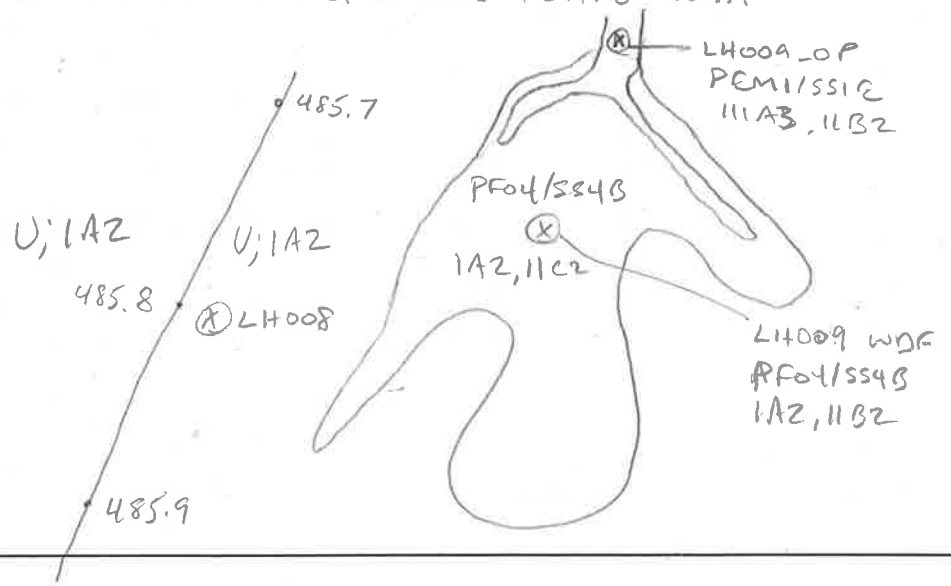
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 5142	**Map #:** 11 **Map Date** 6/18/15
Date: 7/20/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH008	
Investigators: Bryan Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 485.8		
Latitude: 64° 24' 15.43		**Longitude:** 149° 15' 33.87		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 01	**Picture No.:** D 001–004 N, S		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Flat, Hummocky - small
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No____ (if no explain in Notes) Dry summer	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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Very large white spruce in area. A couple rank among the largest I have observed in the interior. Partly cloudy 65°F. Rain over the past 2 days. Dry terrace. Open canopy of large, healthy PICGLA. Very sparse understory with a carpet of Hylocomium splendens feather moss.



LH008

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	45%	Y	FACU
2.			
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. Picea glauca	2%	Y	FACU
2. Rosa acicularis	3%	Y	FACU
3. Linnaea borealis	1%		FACU
4. Viburnum edule	T		FACU
5. ~~Calamagrostis canadensis~~ ESS			
6. Salix pseudomonticola	T		FAC
7.			
8.			
9.			

Total Cover: 6

50% of total cover: 3 20% of total cover: 1.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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 22	X 3 =	66
FACU species 61	X 4 =	244
UPL species	X 5 =	
Column Totals: 83	(A)	310 (B)

PI = B/A = 3.73

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	20%	Y	FAC
2. Cornus canadensis	7%	Y	FACU
3. Pyrola minor	1%		FAC
4. Geocaulon lividicum	3%		FACU
5. Chamerion angustifolia	T		FACU
6. Equisetum arvense	1%		FAC
7. Calamagrostis canadensis	T		FAC
8. Elymus innovatus	T		—
9.			
10. Orchid sp	T		—

Total Cover: 32

50% of total cover: 16 20% of total cover: 6.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N 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

87 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather moss 87
lichen 3
Litter 10

LH008

WETLAND DETERMINATION DATA FORM

7/20/15 W84LH008 Y

SOIL Date 7/20/15 Feature ID W84LH008 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
O 0-4								
E 4-5	5Y 7/1	100					vfSaL	
Bw 5-12	2.5Y 4/3	100					vfSaL	
C 12-22	5Y 6/1	100					Sand	Parent material color
								variegated 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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

LH008

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: BrS

GPS Technician QA/QC check: JeB

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH008 Field Target: 15142 Date: 7/20/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

- [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 Jennifer Anderson — Wetland Scientist (print)

X — Signature / Date 7/20/15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 7/20/15

LH009

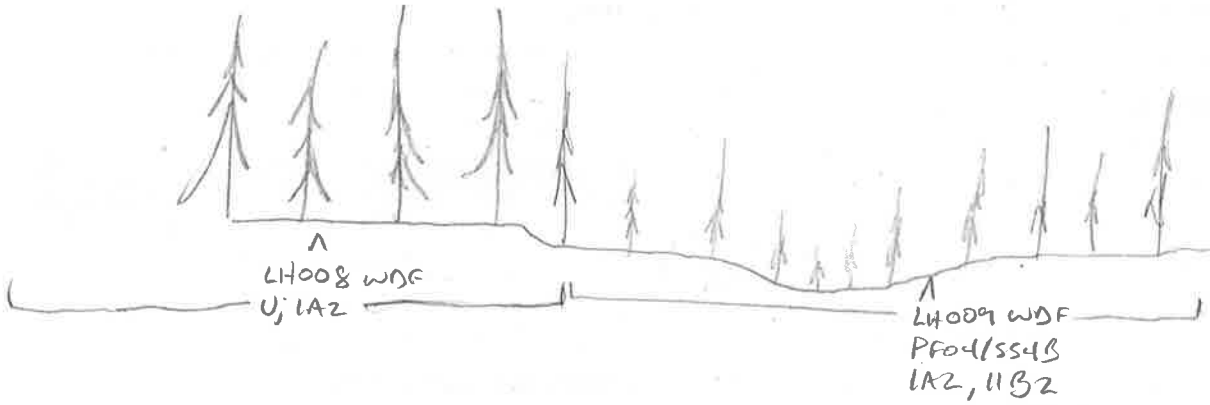
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline ✓ **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15141	**Map #:** W1 **Map Date:** 6/18/15
Date: 7/20/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84 LH009	
Investigators: Bryan Strong, Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 485.8		
Latitude: 64° 24' 14.16	**Longitude:** 149° 15' 26.93			**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 62	**Picture No.:** W84_VEG_VEG_PIT_PLOT N,S		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): ~1% with swale ~3% across	Local relief (concave, convex, none): Slightly concave, Hummocky. MO
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry summer	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 X No_____	**Is the Sampled Area within a Wetland?** Yes Y No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PFO4/SS4B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2, 1B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Rain for the past two days. Dry summer prior to rain. Partly cloudy 65°F Water table at 13"; Stratified alluvium. Sandy soils with stratified SiL, vfSaL and possibly S.CL. Slope HSM. PICGLA forest. No PICMAR observed. Moderately large spruce 20-45' tall. High diversity with a mix of very wet footed species and more mesic vegetation. Several species of Equisetum here.



LH009

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 20-40	45%	Y	FacU
2. Betula neoalaskana 4/5	1%		FacU
3.			
4.			

Total Cover: 46

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 10-19'	15	Y	FacU
2. Larix laricina 9'	1%		FacW
3. Betula neoalaskana	10%	Y	FacU
4. Salix bebbiana 5-7'	6	Y	Fac
5. Salix pseudomonticola 4'	2		Fac
6. Rhododendron groenlandicum	7%		Fac
7. Rosa acicularis	5%		FacU
8. Empetrum nigrum	5%		Fac
9. Arctous ruber	1%	Fac	Fac
Vaccinium vitis idaea 6	Total Cover: 60 (60)		Fac

50% of total cover: 30.5 20% of total cover: 12.2

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 0.42 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	3	X 1 =	3
FACW species:	10	X 2 =	20
FAC species	34	X 3 =	102
FACU species	82	X 4 =	328
UPL species		X 5 =	
Column Totals:	129 (A)		453 (B)

PI = B/A = 3.51

Vaccinium uliginosa T Fac
Betula glandulosa T Fac
Alnus incana 2 Fac
Salix myrtilifolia T
Salix glauca T Fac
Salix reticulata T Fac
Dasiphora fruticosa T Fac
Viburnum edule T FacU
Salix arbusculoidies 1 FacW

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Equisetum palustre	7	Y	FacW
1. Equisetum fluviatile	3	Y	OBL
2. Equisetum arvense	2		Fac
3. Rubus arcticus	1%		Fac
4. Cornus canadensis	2%		FacU
5. Valerian capitata	T		
6. Drosera rotundifolia	T		
7. Geocaulon lividicum	3%	Y	FacU
8. Arctostaphylos latifolia	1%		FacW
9. Calamagrostis canadensis	2%		Fac
10. Mertensia paniculata	T		

Total Cover: 22

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

Pyrola sp T
Equisetum scirpoidies 1 FacU
Orchid sp T
Chamerion angustifolia T
Carex bigelowii T
Spiraea annotinum T
Parnassia palustris T

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

3 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather moss 20
Sphagnum sp 5
Water T
Moss 40
Litter 5

LH 009

WETLAND DETERMINATION DATA FORM

WB4LH009 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O: 0-4.5								
Oa 4.5-5								
Cg 5-9	5-1 5/2	82	7.5-r 4/6	6	C	PL	Loamy Sand	a few Mn concentrations
	2.5-4 4/2	10	N5/0	2	D	PL		
Bg 9-10.5	N5/0	93	7.5-r 4/6	7	C	PL	SiL	
Ab 10.5-11	2.5-4 2.5/1	100					MK SiL	
Bg 11-16	N5/0		7.5-r 4/6	20	C	PL/RC	vfSaL	borderline SiL. Platy

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

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

Cg 16-21 5Y 5/2 / 7.5-r 4/6 7 C PL Sand

Hydric Soil Present (Y/N): Y

Notes: At ~30" a layer of finer material was identified with the shovel and may act as an aquitard

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

Surface Water Present (Y/N): Y	Depth (in): 3	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 13	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 12	EC: 1145 pH 5.64

Notes:

LH009

AQUATIC SITE ASSESSMENT 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)_40_ Sapling (<5 dbh, <6m tall)_20_ Tall shrub (2-6m)_8_ Short shrub (0.5-2m)_15_ Dwarf shrub (<0.5m) _10_ Tall herb (≥1m) _5_ Short herb (<1m) _17_ Moss-Lichen_30_ 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_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) _____ High (>25) _X_

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

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

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

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

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

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_X_ 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** 5.64

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

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

Evidence of Seeps and Springs (P): No Seeps or Springs_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: W84CH009 Field Target: 15141 Date: 7/20/15

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 — Signature / Date 7/20/15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 7/20/15

LH010

WETLAND DETERMINATION DATA FORM

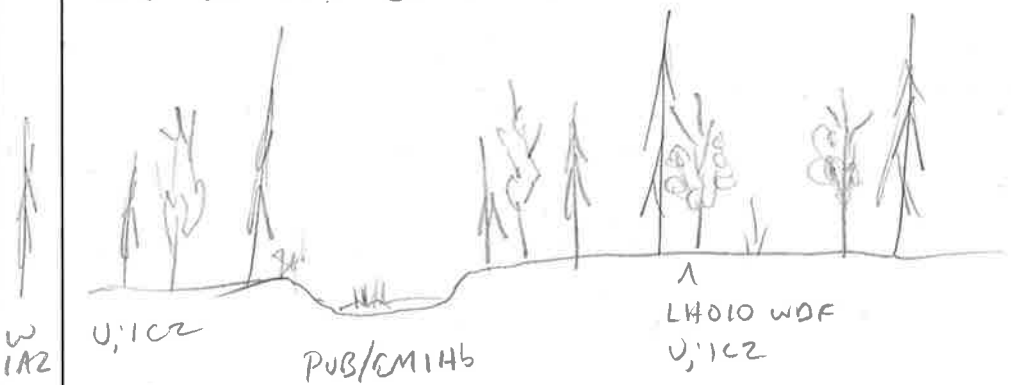
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15140	**Map #:** 112 **Map Date:** 6/18/15
Date: 7/20/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH010	
Investigators: Bryan Strong, Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 486		
Latitude: 64. 24. 04.50		**Longitude:** 149. 15 40.91		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 02	**Picture No.:** W84LH010_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2	Local relief (concave, convex, none): Flat Flat
Pre-mapped Alaska LNG/NWI classification: U; IC2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Dries summer	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 N	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No N	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): IC2 Polygon IC3 Plot

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

IC3 at point Most of area IC2. Very dry terrace. Rain past 2 days Dry summer up till 2 days ago. Soils formed in alluvial sand. Somewhat excessively drained. Old channels nearby exhibit extensive beaver influence with very old dams now well vegetated.



LH010

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	17	Y	FACU
2. Populus balsamifera	12	Y	FACU
3.			
4.			

Total Cover: 29

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10		FACU
2. Arctostaphylos uva-ursi	35	Y	UPL
3. Rosa acicularis	3		FACU
4. V. burnum edule	1		FAC
5. Sherperdia canadensis	T		FACU
6. Populus balsamifera	T		FACU
7. Empetrum nigrum	3		FAC
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: 1 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 0.16 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 6	X 3 =	18
FACU species 44	X 4 =	176
UPL species 35	X 5 =	175
Column Totals: 85	(A)	369 (B)

PI = B/A = 4.34

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	2	Y	FAC
2. Groccalon lividicum	1	Y	FACU
3. Equisetum pratense	T		FACW
4. Poa sp	T		
5. Elymus trachycaulis	1	Y	FACU
6. Chamarion angustifolium	T		FACU
7. Carex concinna	T		
8. Dryopteris sp	T		
9. Stellaria longipies	T		FAC
10. Hedysarum alpinum	T		FACU

Total Cover: 4

50% of total cover: 2 20% of total cover: 0.8

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

5 % Bare Ground

~~25~~ % Cover of Wetland Bryophytes

25 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Bare 5
Lichen 20
Moss 5
litter 40

WETLAND DETERMINATION DATA FORM

7/20/15 WSYLH010

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

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

	Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
A	0-1	2.5Y 2.5/1	100					SiL	
Bw	1-5	2.5Y 4/3	100					fSaL	
C	5-24	5Y 6/1	100					Sand	single grain 2% fine 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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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): NA

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: Bre Ong GPS Technician QA/QC check: Jeb

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84 4H010 Field Target: 15140 Date: 7/20/15

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~~ form?

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 — Signature / Date 7/20/15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 7/20/15

LH011

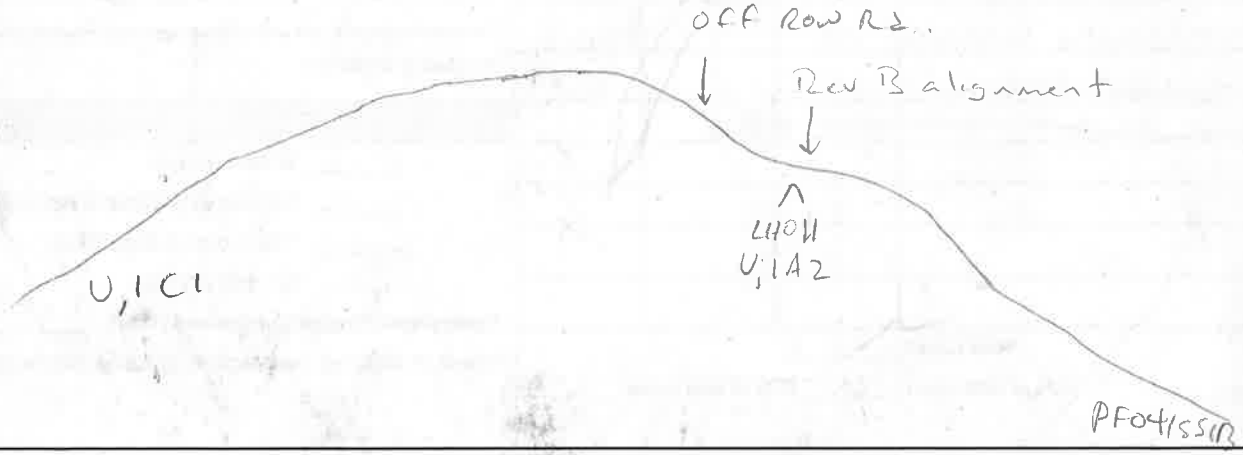
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 1520	**Map #:** 50 **Map Date:** 6/18/15
Date: 7/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH011	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 414.7		
Latitude: 65 17 58.09		**Longitude:** -148 35 57.48		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 03	**Picture No.:** W84LH01H_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior highlands	Landform (hillslope, terrace, hummocks, etc.): Shoulder slope
Slope (%): 24% measured NW aspect	Local relief (concave, convex, none): Convex, hummocky-small
Pre-mapped Alaska LNG/NWI classification: U, 1A2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No_____ (if no explain in Notes) Dry summer	Are "Normal Circumstances" present: Yes_____ 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:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. PICMAR forest on a dry ridge Point in a concave microsite on a shoulderslope. PICMAR 25-40' tall. A few scattered BETPAP. Carpet of feathermoss and lichen. 4 wheeler trail nearby



LHoil

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana 25-40'	45%	Y	FacW
2. Betula neoalaskana	1%		FacU
3.			
4.			
Total Cover: 46			
50% of total cover: 23 20% of total cover: 9.2			
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	3%		FacU
2. Vaccinium uliginosa	5%		Fac
3. Vaccinium vitis idaea	10%	Y	Fac
4. Rhododendron tomentosum	7%		FacW
5. Spirea stevensii	3%		FacU
6. Rhododendron groenlandicum	1%		Fac
7. Rosa acicularis	1%		FacU
8. Ribes triste	20%	Y	Fac
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: 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: 59	X 2 =	118
FAC species 26	X 3 =	78
FACU species 13	X 4 =	52
UPL species	X 5 =	
Column Totals: 98 (A)		248 (B)

PI = B/A = 2.53

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	2%		Fac
2. Rubus chamaemorus	7%	Y	FacW
3. Cornus canadensis	5%	Y	FacU
4. Calamagrostis lapponica	7%	Y	Fac
5. Aconogonon alaskana	1%		FacU
6. Ribes triste	30%	(A)	
7.			
8.			
9.			
10.			
Total Cover: 22			
50% of total cover: 11 20% of total cover: 4.4			

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

N 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

_____ Total Cover of Bryophytes

_____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather moss

Lichen

LH011

WETLAND DETERMINATION DATA FORM

7/21/15 W84 LH011 Y

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-5								
C 5-14	NA						Cobble/Flag	Cobble, Gravel, Stones < 2% mineral
Bw 14-17	10yr 4/6							
							VCB Loam	~65% Cobble and gravel
								Saturated, No redox
								features, No positive
								alpha alpha

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

[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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes: Pit dug in a concave microsite

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

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

Notes:

Uhon

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: [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: W84LH011 Field Target: ~~15205~~ 15205 Date: 7/21/15

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~~ form?

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 — **Signature / Date** 7/21/15

X Brian Strong — **Field Crew Chief (print)**

X — **Signature / Date** 7/21/15

LH012

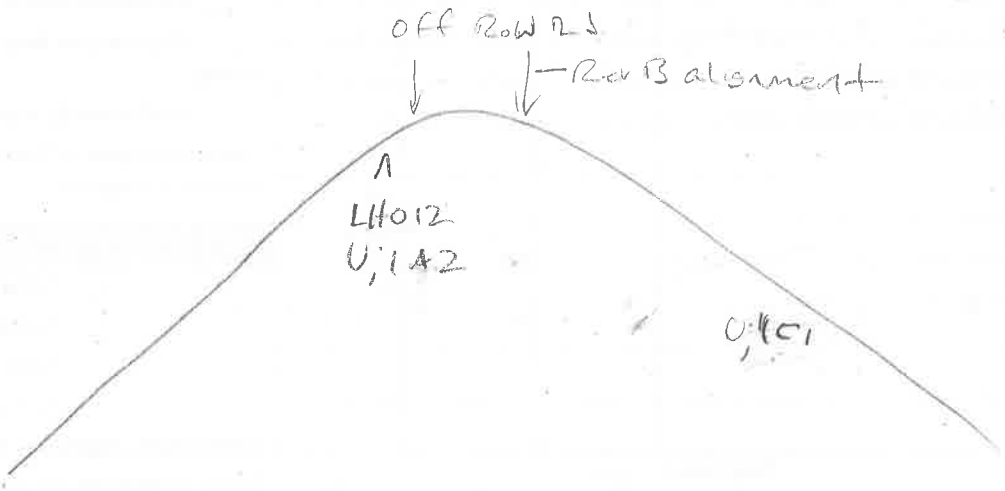
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 1521	**Map #:** 49 **Map Date:** 6/18/15
Date: 7/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH012	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** 84
State: Alaska	**Region:** Alaska	**Milepost:** 414.2		
Latitude: 65°18'24.99		**Longitude:** 148° 35' 56.77		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 02	**Picture No.:** W84LH012_VEG_VEG_PIT_PLOT		

SITE PARAMETERS			
Subregion: Interior Highlands		Landform (hillslope, terrace, hummocks, etc.): Ridge	
Slope (%): 5		Local relief (concave, convex, none): Flat to Slightly convex hummocky small	
Pre-mapped Alaska LNG/NWI classification: U; 1A2		Evidence of Wildlife Use: None observed	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Dry summer		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:** U	
Wetland Hydrology Present? Yes X No____		Alaska Vegetation Classification (Viereck): 1A2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor: Dry Black Spruce forest on a ridge. Black Spruce are 25-45' understory of PICMAR 4-20' tall. Sparse understory. CALLAP, VACVIT, CORCAN mostly.



LH012

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	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 (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	25%	Y	FacW
2. Vaccinium uliginosum	3%		Fac
3. Vaccinium vitis idaea	10%	Y	Fac
4. Rhododendron groenlandicum	1%		Fac
5. Alnus viridis	T		
6.			
7.			
8.			
9.			

Total Cover: 39

50% of total cover: 19.5 20% of total cover: 7.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 70	X 2 =	140
FAC species 44	X 3 =	132
FACU species 12	X 4 =	48
UPL species	X 5 =	
Column Totals: 126 (A)		320 (B)

PI = B/A = 2.5

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	30%	Y	Fac
2. Cornus canadensis	10%	Y	FacU
3. Geocaulon lividum	2%		FacU
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 42

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

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

95 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 90

Lichen 3

Moss 2

LH012

WETLAND DETERMINATION DATA FORM

7/21/15 W84LH012 Y

SOIL **Date** 7/21/15 **Feature ID** W84LH012 **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 %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Notes
O	0-4								
Bw	4-13	2.5Y 5/4	97	10YR 5/6	2	C	M		field capacity - near saturation
				2.5Y 5/1	1	D	PL		
Bwf	13-17	2.5Y 5/4							seasonal frost. low ice content
Bw	17-24	2.5Y 5/4	100						Talik material
BCf	24-25+	2.5Y 5/4	100						dry - non-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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Permafrost Depth (inches): 24

Hydric Soil Present (Y/N): N

Notes: Slightly plastic and slightly sticky. Peds glisseen on surface but are not saturated in ped interiors. Near field capacity. 2 days of rain occured 2 days ago. Showers occured overnight.

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

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

Notes:

LH012

AQUATIC SITE ASSESSMENT DATA FORM

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

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH012 Field Target: 15211 Date: 7/21/15

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~~ Form?

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 — Signature / Date 7/21/15

X Bryan Strong — Field Crew Chief (print)

X — Signature / Date 7/21/15

LH013

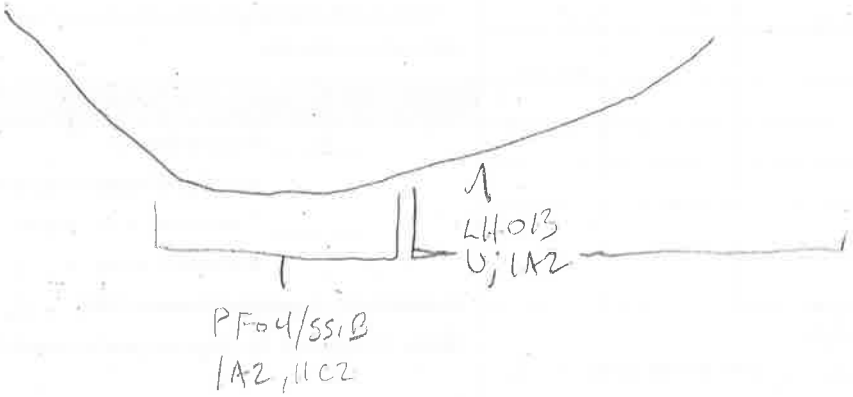
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 1520G	**Map #:** 1506 **Map Date:** 6/18/15
Date: 7/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH013	
Investigators: Brian Strong, Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 413.7		
Latitude: 65 18 45.27		**Longitude:** -148 35 25.00		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 03	**Picture No.:** W84LH013_VEG_VEG_PIT_PLOT		

SITE PARAMETERS		
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Saddle/Footslope	
Slope (%): 4% measured aspect: North	Local relief (concave, convex, none): Flat, Hummocky moderate	
Pre-mapped Alaska LNG/NWI classification: PF04/SSIB 1A2	Evidence of Wildlife Use: Bear scat, moose sign	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) Dry Summer till recent rain	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_____
Hydric Soil Present? Yes_____ No X	**Wetland Type:** non-wetland
Wetland Hydrology Present? Yes ~~X~~ No_____	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Transitional site. Massive, plastic, slightly thixotropic loam soil is slowly permiable with a frost table at 11.5. No positive reaction to alpha alpha. Soil has saturation and free water due to heavy rains over the past few days. Dry summer up until rains earlier in the week. Near a saddle with wet ground



LH013

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	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 (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	25%	Y	FacW
2. Vaccinium uliginosum	7%		Fac
3. Rhododendron groenlandicum	3%		Fac
4. Spirea stevensii	5%		FacU
5. Vaccinium vitis-idaea	3%		Fac
6. ~~Ledum groenlandicum~~			
7. Rhododendron tomentosum	1%		FacW
8.			
9.			

Total Cover: 44

50% of total cover: 22 20% of total cover: 8.8

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: 59	X 2 =	118
FAC species 31	X 3 =	93
FACU species 6	X 4 =	24
UPL species	X 5 =	
Column Totals: 96	(A)	235 (B)

PI = B/A = 2.44 JM

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	10%	Y	Fac
2. Rubus chamaemorus	3%		FacW
3. Calamagrostis lapponica	2%		Fac
4. Carex bigelowii	6%	Y	Fac
5. Cocealon frigidum	1%		FacU
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

____ Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather moss

Pleurozium sp.

Litter

WETLAND DETERMINATION DATA FORM

7/21/15 W84CH013 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-4								
A 4-5	2.5Y 2.5/1	100					MkSiL	
Bw 5-7	10YR 4/3	100					SiL	
Bwj 7-11.5	2.5Y 5/3	88	5Y 5/1	5	D	M	Loam	a few fine ice lenses
			10YR 5/6	7	C	M		sticky, plastic, thixotropic - slight
Bwjf 11.5-20	2.5Y 5/3	94	5Y 5/1	3	D	M	Loam	a few gravels. Soft frost
			10YR 5/6	3	C	M		

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Frost table Depth (inches): 11.5

Hydric Soil Present (Y/N): N transitional site,

Notes: Saturated with small amount of free water between 4-11.5 inches. Persistent rain fall over the last few days, May contribute to saturation. No positive reaction to alpha alpha Free water over the Massive Loam material at 11" due to recent rains

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5)
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Free water over Massive Loam in the A and Bw, around 5-6 inches. Rain persistant day before yesterday for 2 days	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4-11.5	**EC:** NA

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

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

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84CH013 Field Target: 15206 Date: 7/21/15

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~~ form?

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 7/21/15

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

X Brian Strong X 7/21/15

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

LH014

WETLAND DETERMINATION DATA FORM

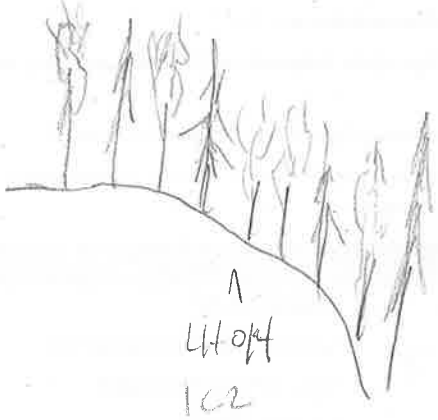
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15210	**Map #:** N/A **Map Date:** 6/18/15
Date: 7/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH014	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 413.5		
Latitude: 65 19 04.27		**Longitude:** -148 35 15.66		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 03	**Picture No.:** W84LH014_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Shoulder Slope
Slope (%): 15%	Local relief (concave, convex, none): Convex, Hummocky-Moderate
Pre-mapped Alaska LNG/NWI classification: U; 1C1	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No____ (if no explain in Notes) Dry summer	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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1C2

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

Mixed forest. PICMAR and BETNEO, BETNEO are ~25' tall. PICGLA 30-35' tall. BETNEO have very open/sparcely leaved canopies. Point moved from field target location due to access issues.



LH014

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	30%	Y	FACW
2. Betula neoalaskana	30%	Y	FACU
3. Picea glauca	5		FACW
4.			

Total Cover: 55

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	10%		FACW
2. Betula neoalaskana	2%		FACU
3. Vaccinium vitis idaea	80%	Y	FAC
4. Salix scouleriana	T		
5. Rhododendron groenlandicum	3%		FAC
6. Vaccinium uliginosum	T		
7. Picea glauca	3%		FACU
8. Spiraea stevenii	1%		FACU
9.			

Total Cover: 102

50% of total cover: 51 20% of total cover: 20.2

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 9 (B)

% Dominant Species that are OBL, FACW, or FAC: 0.78 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 30	X 2 =	60
FAC species 83	X 3 =	249
FACU species 41	X 4 =	164
UPL species	X 5 =	
Column Totals: 154 (A)		473 (B)

PI = B/A = 3.07

VEGETATION (use scientific names of plants)

Herb Stratum (26) incorporated into shrub strata <5%	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	3%	Y	FAC
2. Spiraea stevenii	T		
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:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N 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

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather moss 80

LH014

WETLAND DETERMINATION DATA FORM

7/21/15 W84LH014 Y

SOIL **Date** _____ **Feature ID** _____ **Soil Pit Required (Y/N)** _____

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

Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
O 0-4								
A 4-5	10YR 2/1	100					SiL	
C 5-6	2.5Y 5/1	100					SiL	
Bw1 6-10	10YR 5/6	100					SiL	
Bw2 10-17	2.5Y 5/4	100					SiL	gravels ~5%
C 17-20	2.5Y 4/4	100					VGSiL	fine gravels - shale 35%
Cr 20-24+	Shale						GRAVEL	Broken bedrock

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

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

CH01M

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH014 Field Target: 15210 Date: 7/21/15

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~~ form?

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 [signature] 7/21/15 — **Signature / Date**

X Brean Strong — **Field Crew Chief (print)**

X [signature] 7/21/15 — **Signature / Date**

LH015

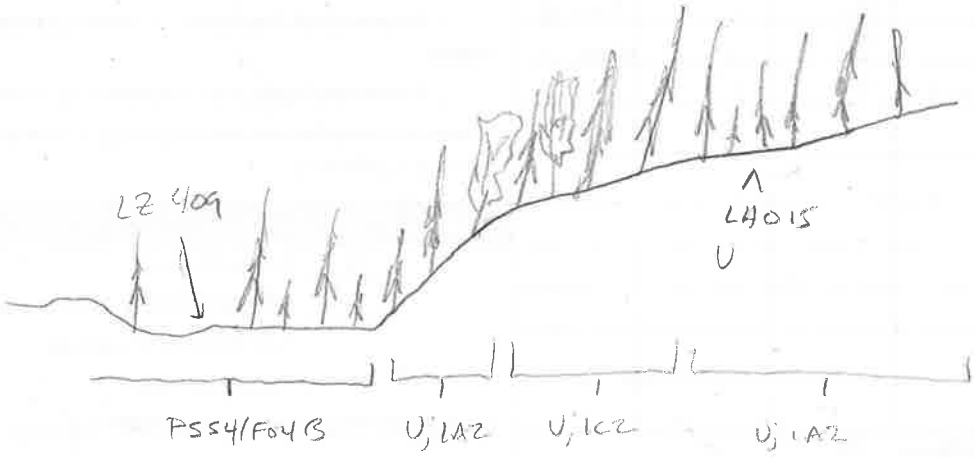
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 1520'	**Map #:** 4/6 **Map Date:** 6/18/15
Date: 7/22/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH015	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 409.55		
Latitude: 65 21 55.67		**Longitude:** -148 36 07.99		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 04	**Picture No.:** W84LH015_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 15 measured Aspect NW	Local relief (concave, convex, none): Slightly convex
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: None - Squirrel midden
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Dry summer	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 Y No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1 A 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. PICMAR Forest - fairly dense PICMAR with trees 20-40' tall and larger saplings co-dominant. Some layering creating dense stands of PICMAR with openings between colonies. Sparse understory and a feather moss carpet



LH015

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	55%	Y	FacW
2. Betula neoalaskana	3%		FacU
3.			
4.			

Total Cover: 58

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	20%	Y	FacW
2. Rhododendron groenlandicum	5%		Fac
3. Vaccinium vitis-idaea	5%		Fac
4. Ribes triste	2%		Fac
5. Vaccinium uliginosum	1%		Fac
6. Rosa acicularis	1%		FacU
7. Spiraea stevenii	2%		FacU
8. Linnaea borealis	T		
9.			

Total Cover: 36

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 75	X 2 =	150
FAC species 20	X 3 =	60
FACU species 13	X 4 =	52
UPL species	X 5 =	
Column Totals: 108	(A) 262	(B)

PI = B/A = 2.42

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	2%		FacU
2. Coeloglossum viride	5%	Y	FacU
3. Calamagrostis lapponica	7%	Y	Fac
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 14

50% of total cover: 7 20% of total cover: 2.8

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

____ Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feathermoss

CH015

WETLAND DETERMINATION DATA FORM

7/22/15 W84CH015 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O1 0-6								
A 6-8	10YR 3/2	100					S.L	
Bw1 8-11	2.5Y 4/1	100					S.L	
Bw2 11-19	5Y 6/3	100					Loam	SBK structure, Gravels ~5%
CB 19-27	5Y 5/3	100					Loam	Gravel ~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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes: No frost table in 30". No saturation. No redox features

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

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

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84CH015 Field Target: 15287 Date: 7/22/15

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?~~ form

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 — Signature / Date 7/22/15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 7/22/15

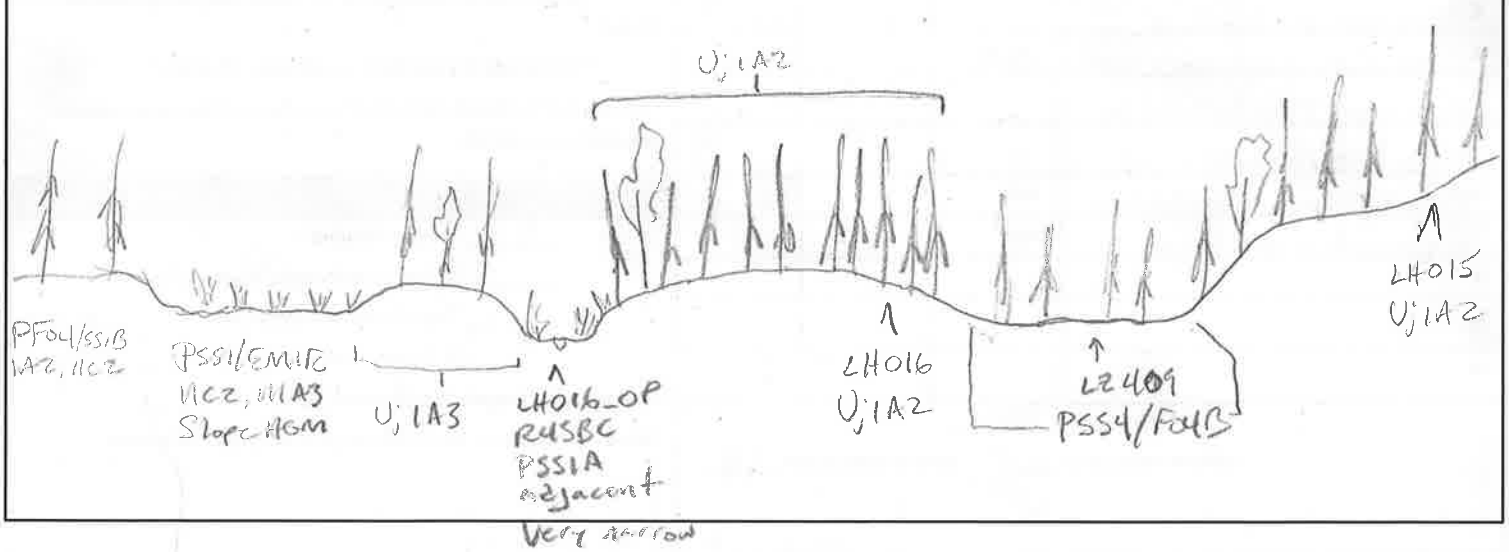
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)_____ Other (explain)________			Field Target: 15208	Map #: 45 Map Date: 6/18/15
Date: 7/22/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH016	
Investigators: BS, JA			Team No.: W84	
State: Alaska	Region: Alaska	Milepost: 409.3		
Latitude: 65° 22.06.43	Longitude: 148° 36' 32.78		Datum: WGS84	
Logbook No.: 02	Logbook Page No.: 04	Picture No.: P_Veg, Veg, Pit, Plug, N, S		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Interfluve
Slope (%): 5% West aspect	Local relief (concave, convex, none): Slightly convex, hummocky - Mod
Pre-mapped Alaska LNG/NWI classification: PFO4/SS1B 1A2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_______ No_______ (if no explain in Notes) Dry Summer	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: U
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Slightly convex interfluve (across slope). Dense stand of PICMAR mostly 15-25' tall 1.5-3" DBH. A bit of layering of PICMAR creating colonies with openings between dense clumps. Carpet of feather moss. Sparce understory of ROSACI, VACVIT, CALLAP, GEOLIV, CORCAN. Dry summer. 2.5 days of rain in the past week.



CH016

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	25%	Y	FacW
2.			
3.			
4.			

Total Cover: 25

50% of total cover: 12.5 20% of total cover: 5

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	7%		Fac
2. Rhododendron groenlandicum	5%		Fac
3. Rosa acicularis	5%		Fac U.
4. Linnaea borealis	T		Fac U.
5. Alnus viridis fruticosa	1%		Fac
6. Vaccinium uliginosum	T		Fac
7. Picea mariana	30%	Y	FacW
8. Spiraea stevenii	T		FAC
9.			

Total Cover: 48

50% of total cover: 24 20% of total cover: 9.6

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:	55	X 2 =	110
FAC species	20	X 3 =	60
FACU species	10	X 4 =	40
UPL species		X 5 =	
Column Totals:	85	(A)	210 (B)

PI = B/A = 2.47

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	2%		Fac U
2. Calamagrostis lapponica	7%	Y	Fac
3. Geocaulon lividum	3%	Y	Fac U
4. Arctagrostis latifolia	T		FacW
5. Equisetum arvense	T		Fac
6. Equisetum sylvaticum	T		Fac
7. Equisetum pratense	T		FAC
8.			
9.			
10.			

Total Cover: 12

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

JD

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

____ Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

7/22/15 W84+016 N

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc	Texture	Notes
Oi 0-9								
A 9-11	10yr 2/2	100						
Bw$_{ss}$ 11-16	2.5Y 4/2	94	7.5YR 4/6	6	C	M	Loam	Plastic-Slight, Moist, not saturated, Charcoal fragments
BC$_{ss}$f 16-21	2.5Y 4/2	97	7.5YR 4/6	3	C	M	Loam	fine platy, Seasonal frost
C$_{ss}$ 21-25	5Y 6/2	100					vfSaL	borderline SiL, Fine Platy

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

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

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

Restrictive Layer (if present): Type: Seasonal frost Depth (inches): 16-21 Talik from 21-25+ Permafrost assumed below

Hydric Soil Present (Y/N): N

Notes: Dry talik material below 21" with fine platy structure. No saturation. No positive alpha alpha reaction. 11-16" not far from field capacity.

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

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

Notes:

LH016

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH016 Field Target: 15208 Date: 7/22/15

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?
   - [ ] A detailed site sketch is included in ~~logbook~~ form?

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?
   - [ ] Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each 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 [signature] X [signature] 7/22/15

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

X Brean Strong X [signature] 7/22/15

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

LH017

WETLAND DETERMINATION DATA FORM

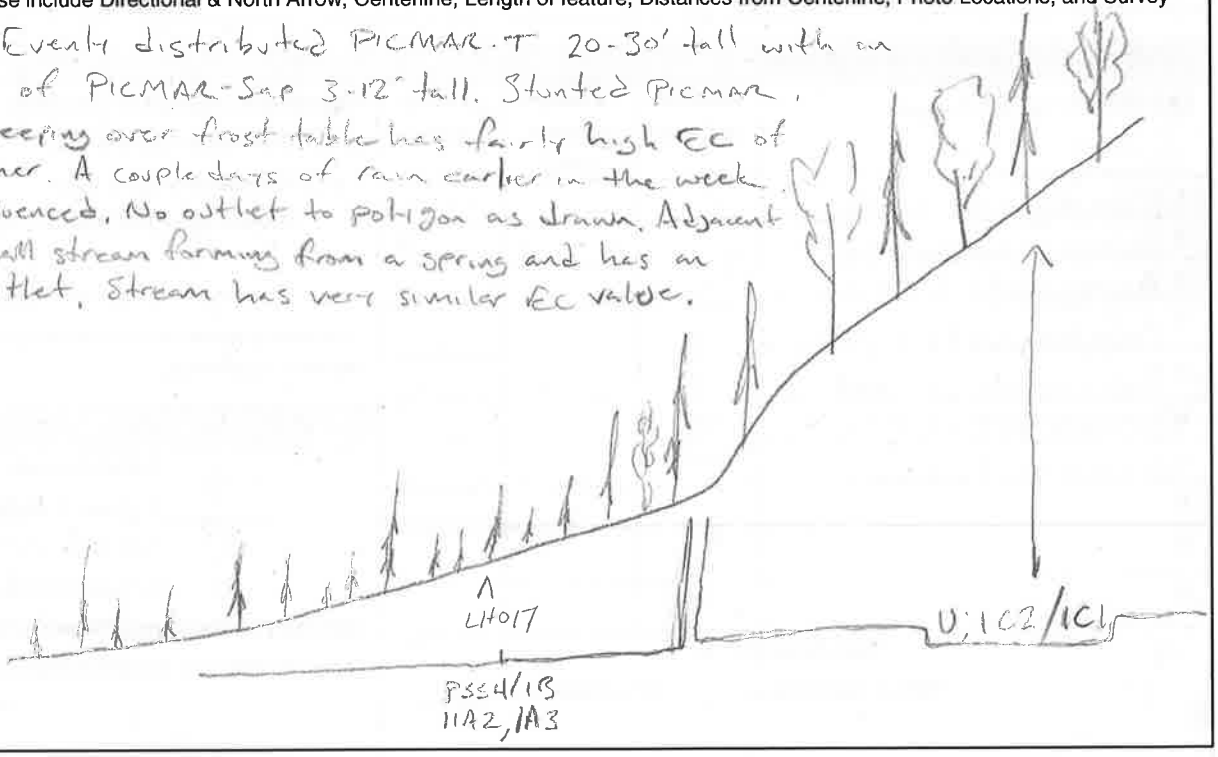
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)_____ Other (explain)_____			Field Target: 15209	Map #: 44 Map Date: 6/18/15
Date: 7/22/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH017	
Investigators: BS, JA				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 409.0		
Latitude: 68 22 21.11		Longitude: -148 36 31.72		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 05	Picture No.: W84LH017_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 8% measured aspect: West	Local relief (concave, convex, none): Slightly concave, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: PSS4/1B 11A2, 1A3	Evidence of Wildlife Use:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) Dry Summer	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 Y No_____	**Is the Sampled Area within a Wetland?** Yes Y No_____
Hydric Soil Present? Yes Y No_____	**Wetland Type:** PSS4/1B
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11A2, 1A3

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

Footslope. Evenly distributed PICMAR 20-30' tall with an open understory of PICMAR-Sap 3-12' tall. Stunted PICMAR. Gelisol. Water seeping over frost table has fairly high EC of 320mS. Dry summer. A couple days of rain earlier in the week. Groundwater influenced. No outlet to polygon as drawn. Adjacent Polygon as a small stream forming from a spring and has an intermittent outlet. Stream has very similar EC value.



CH017

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10%	Y	Fac W
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. Picea mariana	30%	Y	Fac W
2. Alnus viridis fruticosa	2%		Fac
3. Rhododendron groenlandicum	25%	Y	Fac
4. Vaccinium vitis-idaea	7%		Fac
5. Vaccinium uliginosa	7%		Fac
6. Empetrum nigrum	1%		Fac
7. Salix glauca	T		Fac
8. Ribes triste	T		Fac
9. Betula neoalaskana	T		Fac U

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: 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: 51	X 2 =	102
FAC species 157	X 3 =	171
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 108	(A)	273 (B)

PI = B/A = 2.52

Dasiphora fruticosa T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	15	Y	Fac
2. Rubus chamaemorus	10	Y	Fac W
3. Arctagrostis latifolia	1		Fac W
4. Calamagrostis lapponica	T		Fac
5. Equisetum scirpoides	T		Fac U
6. Drosera rotundifolia	T		Obl
7. Geocaulon lividum	T		Fac U
8.			
9.			
10.			

Total Cover: 26

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

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

7 % Cover of Wetland Bryophytes

98 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum 7
Feather Moss 85
Polytrichum sp T
Litter 2
lichen 5

WETLAND DETERMINATION DATA FORM

7/22/15 WSLH017 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-6								
Oe 6-9								free water at ~8.5"
Oaf 9-16+								frozen sapric material

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

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

[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: Permafrost 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) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) Y
High Water Table (A2)	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: free water over the frost table at ~8.5 Recent rains. Soil pit slowly filling	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): 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): 8	**EC:** 320 mS 4.5°C pH 5.7

Notes:

CH017

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 10 Sapling (<5 dbh, <6m tall) 30 Tall shrub (2-6m) 2 Short shrub (0.5-2m) 32 Dwarf shrub (<0.5m) 8 Tall herb (≥1m) 16 Short herb (<1m) 10 Moss-Lichen 98 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__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) _____ Abundant (>50% of surface) __X__

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

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

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric__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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

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: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WS4LH017 Field Target: 15209 Date: 7/22/15

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?~~ form

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 [signature] 7/22/15

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

X Brian Strang — X [signature] 7/22/15

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

LH018

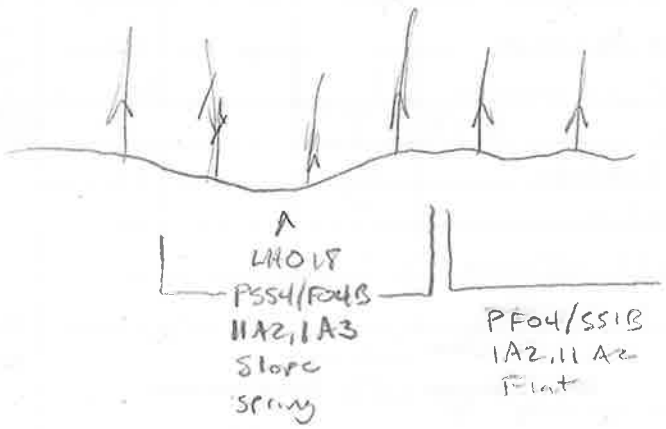
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____		**Field Target:** 15214	**Map #:** 43 **Map Date:** 6/18/15
Date: 7/22/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH018	
Investigators: BS JA			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 408.8	
Latitude: 65 22 32.84	**Longitude:** 148 36 44.26		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 05	**Picture No.:** W84LH018_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Swale on a footslope
Slope (%): 6 Aspect W	Local relief (concave, convex, none): Slightly concave, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) Dry summer	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 Y No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes Y No_____	**Wetland Type:** PSS4/FO4B
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11A2, 1A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Small spring in plot with standing water, discontinuous openings in Sphagnum Moss with standing water EC 333us. Probably a flat/slope complex throughout the footslope in area. Permafrost shallower over much of the area at 12-14". At the point describing a subtle swale, permafrost is at 17". No outlet appears to occur from poorly expressed spring. Water discharging appears to be absorbed in to Mixed shrub-sedge tussock wetland below.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	10	Y	Fac W
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. Picea mariana	25	Y	Fac W
2. Betula neoalaskana	1%		Fac U
3. Salix pulchra	10%	Y	Fac W
4. Rhododendron groenlandicum	7%		Fac
5. Vaccinium uliginosum	3%		Fac
6. Vaccinium vitis idaea	7%		Fac
7. Chamaedaphne calyculata	2%		Fac W
8. Vaccinium oxycoccus	1%		OBL
9. Rosa acicularis	3%		Fac U
Total Cover: 58			
50% of total cover: 29	20% of total cover: 11.6		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	1	X 1 =	1
FACW species:	48	X 2 =	96
FAC species	46	X 3 =	138
FACU species	8	X 4 =	32
UPL species		X 5 =	
Column Totals:	103	(A)	267 (B)

PI = B/A = 2.59

Betula nana T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	4%		Fac
2. Agrostis latifolia	1%		Fac W
3. Equisetum sylvaticum	25%	Y	Fac
4. Equisetum arvense	1%		Fac
5. Equisetum scirpoides	3		Fac U
6. Equisetum *	T		—
7. Drosera rotundifolia	1%		OBL
8. Rumex arctica	T		
9. Calamagrostis lapponica	T		
10. Cocacaulon triflorum	T		
Total Cover: 35			
50% of total cover: 17.5	20% of total cover: 7		

Eriophorum vaginatum T

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

____ Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp 27

Feather moss 55

Lichen 20

WETLAND DETERMINATION DATA FORM

7/22/15 W84LH018 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0	0-3							Not saturated.
Oe	3-8							Evidence of saturation
Oa	8-10							Saturated, Free water
Cg	10-17	N5/0	7.5YR 4/6	12	C	PL/OX	Clay Loam	Alpha alpha positive
2Cgf	17-20	~~N5/0~~ 10YR 5/2	7.5YR 4/6	10	C	PL	GR Loam	Alpha alpha positive Gravelly, ice lenses

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

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

[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: Permafrost Depth (inches): 17

Hydric Soil Present (Y/N): Y

Notes: Color of frozen material below 17 high in gravel. Not colored. Too gravelly and too much groundwater to extract a good sample.

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

Surface Water Present (Y/N): Y	Depth (in): 2	**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): 5	EC: 333 mS 5.2°C pH 6.25

Notes:

CH015

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__10__ Sapling (<5 dbh, <6m tall)__26__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__24__ Dwarf shrub (<0.5m) __8__ Tall herb (≥1m) __5__ Short herb (<1m) __30__ 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%)__100__ High Density (60-80%)_____ Very High Density (80-100%)__X__

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

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

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

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

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

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

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

SOIL VARIABLES

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

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.)_____ 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** 6.25

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

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

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

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: W84LH018 Field Target: 15214 Date: 7/22/16

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 — Signature / Date 7/22/15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 7/22/15

LH019

WETLAND DETERMINATION DATA FORM

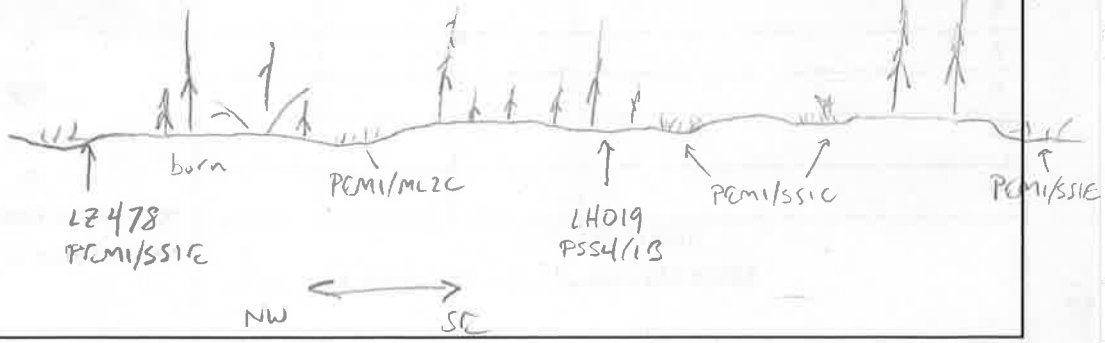
SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15155	**Map #:** JA **Map Date:** 6/18/15
Date: 7/23/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH019	
Investigators: TSS JA			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 478.3	
Latitude: 64 30 15.79	**Longitude:** -149 09 52.55		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 06	**Picture No.:** W84LH019_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): lowland - Terrace
Slope (%): 0.5-2%	Local relief (concave, convex, none): Flat, Hummocky Moderate
Pre-mapped Alaska LNG/NWI classification: ?	Evidence of Wildlife Use: Moose observed in area
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry summer	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:** PSS4/1B with PSS4/FO4B
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.

Patchy dispersion of vegetation communities in areas. Quite a few small PEMI/SSIC depressions in the area. Mostly PSS4 with a mix of Black Spruce saplings and Larch saplings. 7-10% Trees - a mix of Black Spruce, scattered paper birch, larch, and a few larger white spruce in decline. Open needleleaf canopy with fairly thick cover of LEDGRO, CAMCAL, CALCAN with a bit of SALPUL, ACNVIR at 2-4'. Some of area has burned but largely regenerated. Some downfall and standing dead snags. Point moved from original field target location due to access issues. Dry summer. Earlier in the week, a couple days of persistent rain fell. Dry summer before that.



Garmin Rhino 110 3D 20' accuracy
64.50437
149.16466

CN019

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	8	Y	FACW
2. Picea glauca	P/T		FACU
3. Betula neoalaskana	4	Y	FACU
4. Larix laricina ~27'	1		FACW

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 mariana	25	Y	FACW
2. Betula neoalaskana	7		FACU
3. Larix laricina	6		FACW
4. Salix pulchra 2-4'	10		FAC
5. Vaccinium vitis idaea	12	Y	FAC
6. Alnus viridis 3-4'	3		FAC
7. Rhododendron groenlandicum	27	Y	FAC
8. Vaccinium uliginosa	10		FAC
9. Chamaedaphne calyculata	15	Y	FACW

Total Cover: 115

50% of total cover: 57.5 20% of total cover: 23

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: 60	X 2 =	120
FAC species 84	X 3 =	252
FACU species 11	X 4 =	44
UPL species	X 5 =	
Column Totals: 155	(A)	416 (B)

PI = B/A = 2.68

Betula glandulosa 3-4' T
Vaccinium oxycoccos T
Rosa acicularis T
Picea glauca Sap T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	20	Y	FAC
2. Arctagrostis latifolia	5		FACW
3. Equisetum arvense	2		FAC
4. Anemone sp	T		
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 27

50% of total cover: 13.5 20% of total cover: 5.4

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

N 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

95 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum 80
Feather moss 15
Litter 5

LH019

WETLAND DETERMINATION DATA FORM

7/23/15 W84LH019 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

	Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi	6-4							Fibric	
Oe	4-7							Hemic	
Oa	7-9							Sapric	
Cgf1	9-13	N5/0		10YR 5/6	5	C	M	SiCL	Positive alpha alpha reaction
									wavy lower boundary
Cgf2	13-17	5Y 5/1	75	10YR 5/6	10	C	PL/M	SiCL	fine plate with fine
		2.5Y 4/3	15						ice lenses. No positive alpha

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

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

[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: Permafrost Depth (inches): 9

Hydric Soil Present (Y/N): Y

Notes: Evidence of a water table at ~7" and saturation at ~4 inches.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) Y	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Evidence of saturation at ~4" and evidence of a water table at ~7"	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

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

Notes:

4H019

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__13__ Sapling (<5 dbh, <6m tall)__38__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__5__ Dwarf shrub (<0.5m) __12__ Tall herb (≥1m) __23__ Short herb (<1m) __2__ Moss-Lichen__95__ Floating__0__ 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%)_____ 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_____

Plant Species Diversity (P): Low (< 5 plant species) _____ 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__✓__

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_____

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 _____

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.)__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_____

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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

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)_____

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: N84UH019 Field Target: 15155 Date: 7/23/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Jennifer Anderson — Wetland Scientist (print)

X 7/23/15 — Signature / Date

X Bryan Stronge — Field Crew Chief (print)

X [signature] 7/23/15 — Signature / Date

LH020

WETLAND DETERMINATION DATA FORM

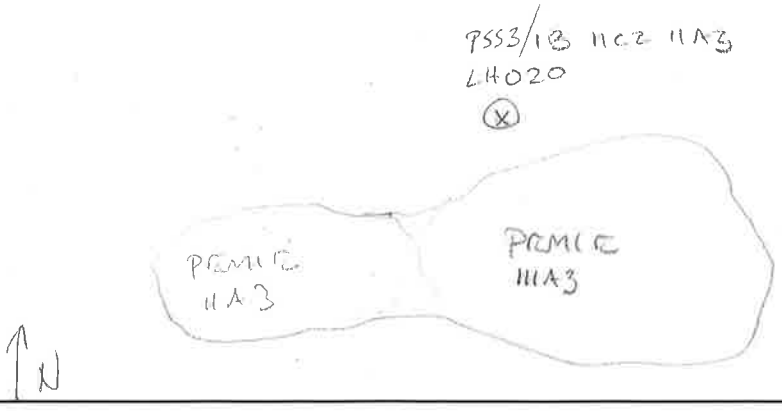
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15156	**Map #:** 101 **Map Date:** 6/18/15
Date: 7/23/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH020	
Investigators: BS, JA				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 178.1		
Latitude: 64 30 28.60	**Longitude:** -149 09 47.14		**Datum:** WGS84	
Logbook No.: 02	**Logbook Page No.:** 06	**Picture No.:** W84LH020_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Lowland - Terrace
Slope (%): .5 - 2%	Local relief (concave, convex, none): Flat 1-Hummocky - Moderate
Pre-mapped Alaska LNG/NWI classification: PFO4/SS4B 1A2, 11C1	Evidence of Wildlife Use: Moose observed in area
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Dry summer	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:** PSS3/4B Woodland Mixed forest
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II C2 IIA3

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

Fire came through some time ago. Some deadfall and a few PICGLA snags around. Mix of young BETNEO, PICGLA and Larch saplings. Few trees. Thick cover of CHACAL and CALCAN. Soil pit EC 115 uS @ 5.0°C pH 5.5. Flat/Depressional complex Point moved to due access issues. No map printed for new location., Dry summer 2 days of rain fell earlier in the week.



LH020

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	2%	Y	FacW
2. Betula neoalaskana	3%	Y	FacU
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. Larix laricina	5%		FacW
2. Betula neoalaskana	2%		FacU
3. Rhododendron groenlandicum	3%		Fac
4. Chamaedaphne calyculata	30%	Y	FacW
5. Salix pulchra	3%		FacW
6. Alnus viridis	2%		Fac
7. Vaccinium vitis idaea	5%		Fac
8. Vaccinium uliginosum	3%		Fac
9. Rosa acicularis	T		FacU
Picea glauca 1%	Total Cover: 55		FacU

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 1	X 1 =	1
FACW species: 44	X 2 =	88
FAC species 49	X 3 =	147
FACU species 8	X 4 =	32
UPL species	X 5 =	
Column Totals: 102 (A)		268 (B)

PI = B/A = 2.62

Salix bebbiana 1% Fac

Betula nana T Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	30%	Y	FAC
2. Arctagrostis latifolia	5%		FACW
3. Equisetum arvense	5%		FAC
4. Carex aquatilis	1%		OBL
5. Equisetum palustre	1%		FacW
6. Comarum palustre	T		OBL
7.			
8.			
9.			
10.			

Total Cover: 42

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

N 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

_____ Total Cover of Bryophytes

_____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

CH020

WETLAND DETERMINATION DATA FORM

7/23/15 WSHCH020 -Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-7								
De 7-9								
Cg 9-11	N5/0	85	10YR 4/6	15	C	PL/M	SiCL	Saturated with free water over frost. Alpha alpha positive
Cgf1 11-14	N5/0	80	10YR 4/6	20	C	PL/M	SiCL	Alpha alpha positive
Cgf2 14-17	5Y 5/1	85	10YR 5/6	15	C	M	SiCL	Not alpha alpha positive

[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) N	Alaska Gleyed (A13) Y	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) Y	Alaska Redox (A14) Y	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Reduced Matrix

[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: Permafrost Depth (inches): 11

Hydric Soil Present (Y/N): Y

Notes: Active layer extends down to 14, possibly deeper.

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

Surface Water Present (Y/N): N	Depth (in): NA	**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	**EC:** NA

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

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

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved __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) 2 Tall shrub (2-6m) 1 Short shrub (0.5-2m) 4/1 Dwarf shrub (<0.5m) 5 Tall herb (≥1m) 83 Short herb (<1m) 7 Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): 2 **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_____ >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)_____ 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.)_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable __X__ Permafrost

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: W84LH020 Field Target: 15156 Date: 7/23/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jennifer Anderson — X

Wetland Scientist (print) — Signature / Date

X Brian Strong — X

Field Crew Chief (print) — Signature / Date

LH021

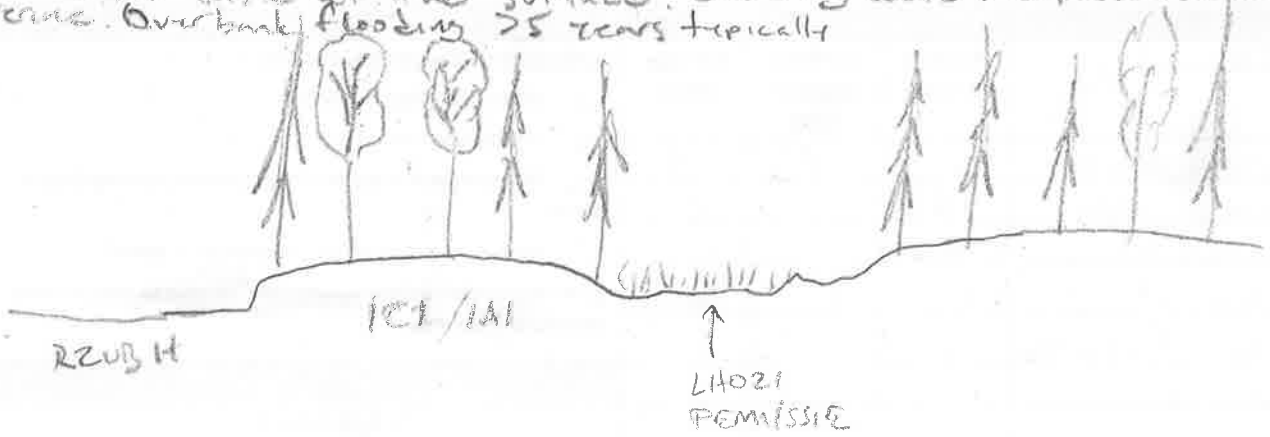
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____		**Field Target:** 15 15 1	**Map #:** 58 **Map Date:** 6/18/15
Date: 7/23/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH021	
Investigators: BS, JA			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 476.6	
Latitude: 64 31 33.44	**Longitude:** 149 08 56.47		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 07	**Picture No.:** W84LH021_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Abandoned Channel
Slope (%): 0-5	Local relief (concave, convex, none): Concave, Toesdale
Pre-mapped Alaska LNG/NWI classification: PEMI/SSIC IIIA3, IIB2	Evidence of Wildlife Use: Moose tracks
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) Dry summer	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 Y No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes Y No_____	**Wetland Type:** PEMI/SSIC
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): IIIA3, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Water table at the surface. Standing water. Depressional or Phreatic riverine. Overbank flooding >5 years typically



TEC 160m S

LH021

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix arbusculoides	2		FACW
2. Salix petiolaris	E		
3. Salix alexensis	E		
4. Salix bebbiana	E		
5.			
6.			
7.			
8.			
9.			
incorporated into herb strata <5% Total Cover:			
50% of total cover: 1	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: 35	X 1 =	35
FACW species: 2	X 2 =	4
FAC species 60	X 3 =	180
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 97	(A)	219 (B)

PI = B/A = 2.26

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	60	Y	FACW
2. Comarum palustre	15		OBL
3. Carex aquatilis	5		OBL
4. Carex utriculata	15		OBL
5. Equisetum fluviatile	T		
6.			
7.			
8.			
9.			
10.			
Total Cover: 97			
50% of total cover: 48.5	20% of total cover: 19.4		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

N 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

_____ Total Cover of Bryophytes

12 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

44021

WETLAND DETERMINATION DATA FORM

SOIL	Date 7/23/15	Feature ID W84U021	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
A	0-2								
Ob	2-6								Woody debris - sticks etc...
Cg	6-17	2.5Y 4/3	50	7.5YR 4/6	10	C/OX	PL/RC	S.L	Massive alpha alpha positive
		N 4/0	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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue Y
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Ponded Flooded Reduced Matrix

[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: NA Depth (inches): NA

Hydric Soil Present (Y/N): Y

Notes: Fluvaquent Soil

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

Surface Water Present (Y/N): Y	Depth (in): 5	**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	**EC:** 160 µS 5.34 pH

Notes:

CH021

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_0_ Tall shrub (2-6m)_2_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _75_ Short herb (<1m) _20_ Moss-Lichen_0_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _2_ **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_____ <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_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)_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_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_X_

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_____ Circumneutral (5.5-7.4)_X_ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.84

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

Basin Topographic Gradient (M): Low Gradient (<2%)_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_X_ 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: W84LH021 Field Target: 15159 Date: 7/23/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Jennifer Anderson _____ X _____

Wetland Scientist (print) Signature / Date

X Brian Strong _____ X _____

Field Crew Chief (print) Signature / Date

LH022

WETLAND DETERMINATION DATA FORM

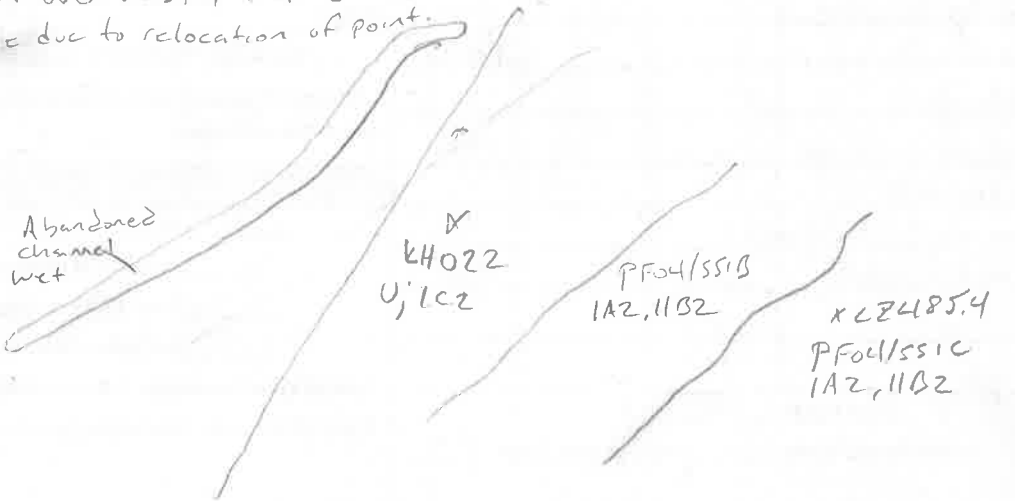
SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15143	**Map #:** NA **Map Date:** 6/18/15
Date: 7/23/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH022
Investigators: BS, SA			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 485.4	
Latitude: 64°24'38.42	**Longitude:** 149°15'09.52		**Datum:** WGS84
Logbook No.: 01	**Logbook Page.No.:** 06	**Picture No.:** W84LH022_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1-2%	Local relief (concave, convex, none): Flat Hummocks small
Pre-mapped Alaska LNG/NWI classification: U; 1C2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Dry Summer	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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1C2, 11B2

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

Open White Spruce and bebb willow. Large willow, mean 15-20' tall. White spruce 30-50' tall. Scattered large Picgla 50-60' tall mixed with smaller Picgla trees 25-30' tall. Understory of large saplings of Picgla and 13-19' tall Bebb willow. Carpet of feather moss. Point moved from selected field target location due to accessability issues. At LZ 484.4 (~.2miles SE of point) the area is very wet. The area transitions relatively slowly over mostly flat ground to a much better drained soil/site. No map available due to relocation of point.



LH022

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	20%	Y	FACU
2. Salix bebbiana	10%	Y	FAC
3. S.			
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. Salix bebbiana	30%	Y	FAC
2. Alnus incana	4%		FAC
3. Rosa acicularis	5		FACU
4. Viburnum edule	4%		FACU
5. Salix pseudomonticola 4-7'	1%		FAC
6. Picea glauca	15	Y	FACU
7. S.			
8.			
9.			

Total Cover: 59

50% of total cover: 29.5 20% of total cover: 11.8

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 98	X 3 =	294
FACU species 25	X 4 =	100
UPL species	X 5 =	
Column Totals: 123	(A)	394 (B)

PI = B/A = 3.20

VEGETATION (use scientific names of plants)

Herb Stratum (2C)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	50%	Y	FAC
2. Calamagrostis canadensis	T		FAC
3. Cornus canadensis	8		FACU
4. Rubus arcticus	T		
5. Mertensia paniculata	1%		FACU
6. Orthelia secunda	T		
7. Chamerion angustifolium	T		
8. Spiraea stevenii	3		FAC
9. Stellaria sp	T		
10. Pyrola sp	T		
Astragalus sp	T		

Total Cover: 62

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N 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

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N N

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

Litter 15

Feather Moss 80

LH022

WETLAND DETERMINATION DATA FORM

7/23/15 WB4LH022

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O1 0-2								
Oe 2-4								nearly Oa
Bw 4-9	10YR 4/4	93	2.5Y 5/1	7	D	PL/RC	vfSaL	
			10YR 5/6	2	C	M		
Bw2 9-13	5Y 5/2	97	10YR 5/6	3	C	M	fSaL	concentrations at bottom of
13-21			5Y 5/1	3	D	PL/RC		horizon - finer texture below
13-21	5Y 5/2	92	7.5YR 4/6	5	C	M	vfSaL	Parent material colors - low chroma

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

Hydric Soil Present (Y/N): N

Notes: Well drained soil profile. No permafrost. Stratified layers of alluvium.

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

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

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LHD22 Field Target: 1514 3 Date: 7/27/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Jennifer Anderson — Wetland Scientist (print)

X Jennifer Anderson 7/23/15 — Signature / Date

X Bryan Strong — Field Crew Chief (print)

X [signature] 7/23/15 — Signature / Date

LH023

WETLAND DETERMINATION DATA FORM

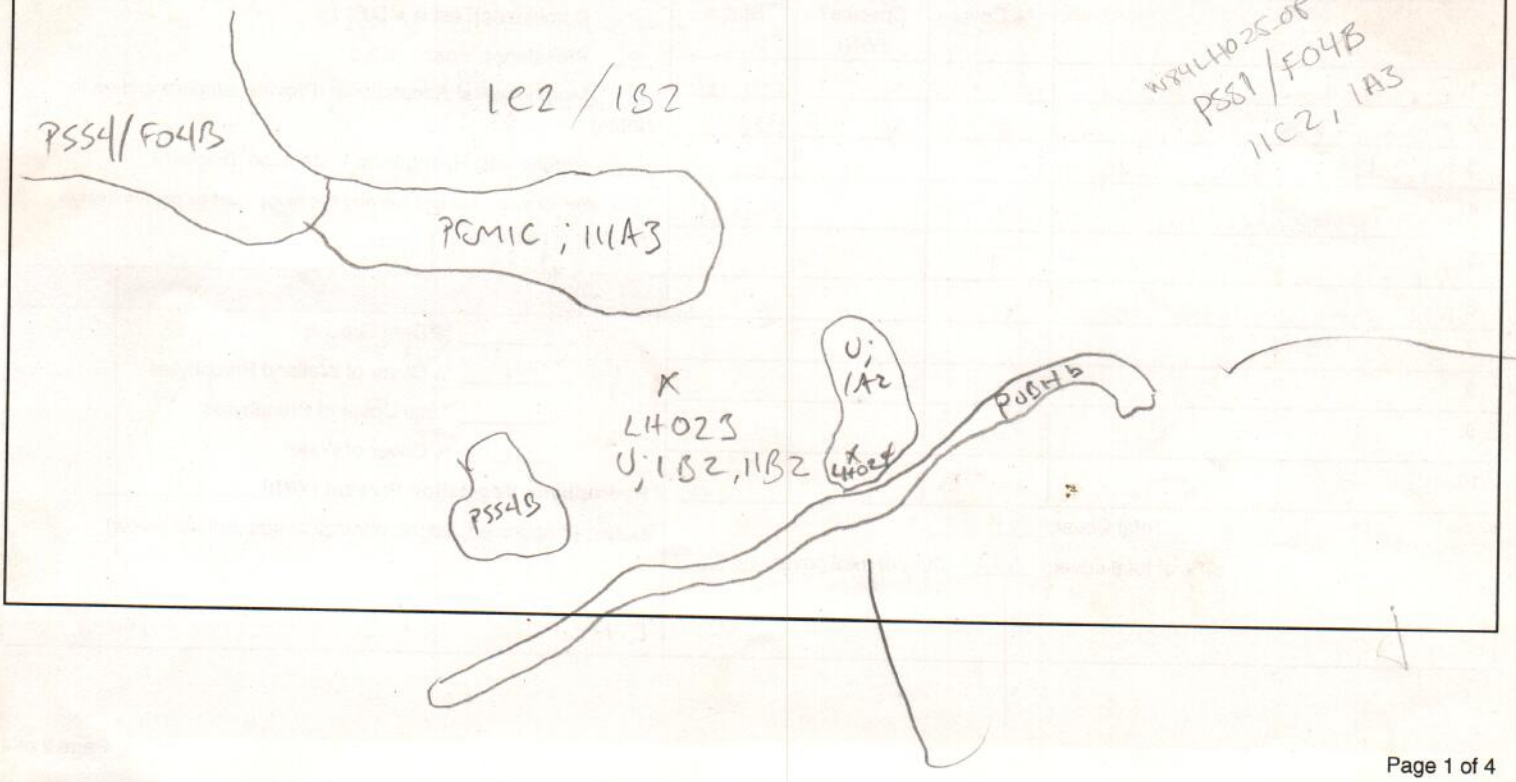
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15189	**Map #:** 65 **Map Date:** 6/18/15
Date: 7/30/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH023	
Investigators: BS, JA				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 432		
Latitude: 65° 04' 48.58		**Longitude:** 148° 40' 28.38		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 08	**Picture No.:** W84LH023_VEG_VEG-PIT_PLOT		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PSS1B 11B2	Evidence of Wildlife Use: Moose sign
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:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 1B2, 11B2

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

A mix of large mature stands of BETNEO (~60') PICGLA (70') with openings in the canopy favoring large Bebb willow (~40') and alder.



LH023

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	40%	Y	Fac U
2. Picea glauca	5%		Fac U
3. Salix bebbiana	15%	Y	Fac
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. Salix bebbiana	2%		Fac
2. Alnus viridis	10%	Y	Fac
3. Rosa acicularis	10%	Y	Fac U
4. V. burnum edule	15%	Y	Fac U
5. Rhododendron groenlandicum	T		Fac
6. Vaccinium vitis-idaea	2%		Fac
7. Linnaea borealis	2%		Fac U
8.			
9. Picea glauca 10'	E		Fac U

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: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 43 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 55	X 2 =	110
FAC species 29	X 3 =	87
FACU species 98	X 4 =	392
UPL species	X 5 =	
Column Totals: 182	(A)	589 (B)

PI = B/A = 3.2

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	55%	Y	Fac W
2. Cornus canadensis	25%	Y	Fac U
3. Mertensia paniculata	T		Fac U
4. Pyrola asarifolia	1%		Fac U
5. Pyrola sp	T		
6. Mobbringia lateriflora	T		
7.			
8.			
9.			
10.			

Total Cover: 81

50% of total cover: 40.5 20% of total cover: 16.2

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

____ Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Litter

LH 023

WETLAND DETERMINATION DATA FORM

7/30/15 WB4LH023

SOIL **Date** _____ **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
O 0-2.5								
BA 2.5-5	7.5YR 3/4	100					SiL	granular
BW 5-14	2.5Y 5/3	96	10YR 5/4	4	C	M	SiL	SiL/vfSaL Platy frost mottle charcoal fragments
BC 14-20	2.5Y 5/3	96	10YR 5/4	4	C	M	SiL	SiL/vfSaL

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

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

CH023

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH023 Field Target: 15189 Date: 7/30/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

☒ Four photos were taken for each 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 7/30/15
Wetland Scientist (print)

Brian Strong 7/30/15

LH024

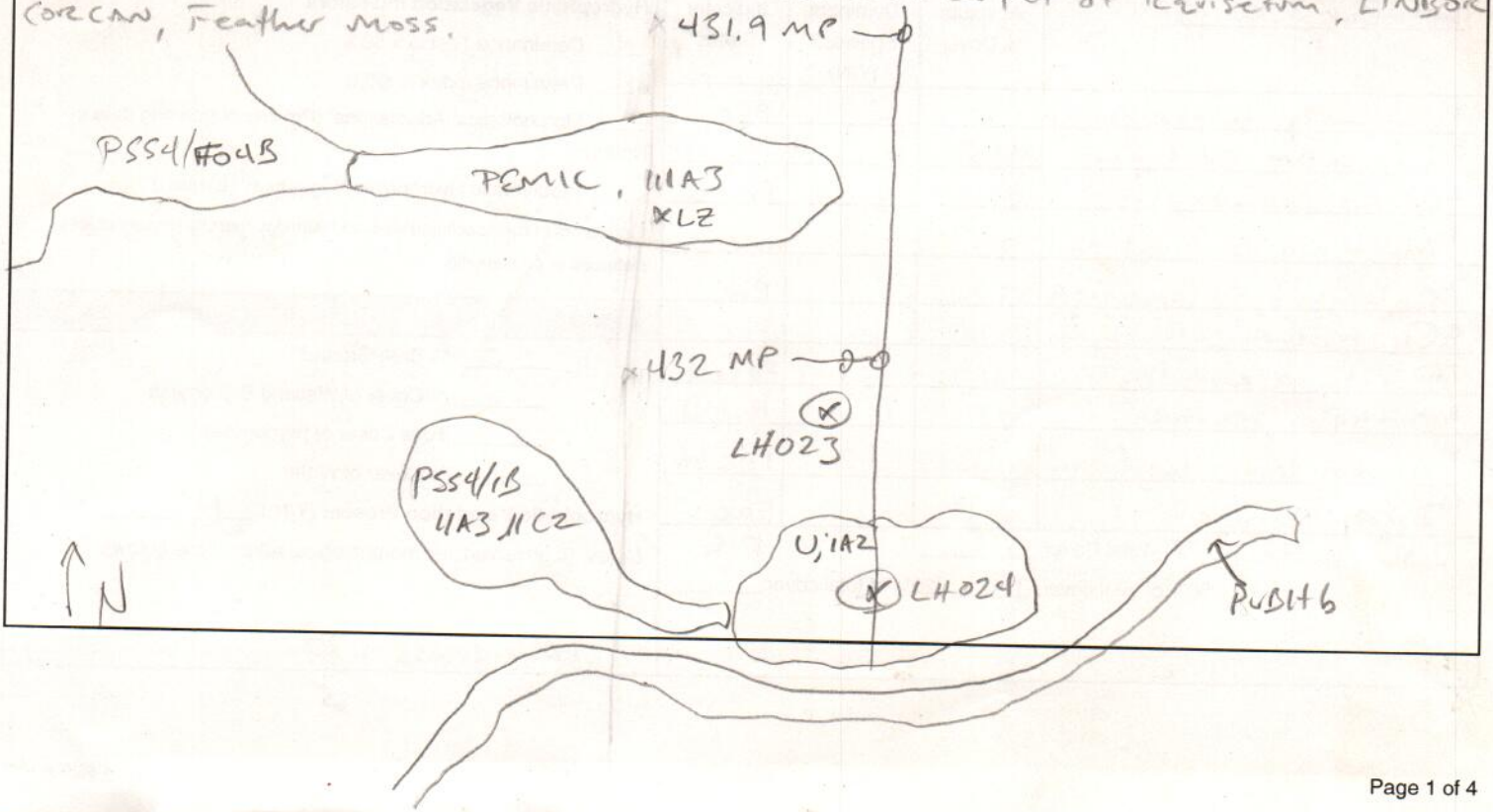
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15190	**Map #:** 65 **Map Date:** 6/18/15
Date: 7/30/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH024	
Investigators: Brian Strang, Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 432		
Latitude: 65°04'44.59		**Longitude:** 148°40.28.12		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 08	**Picture No.:** W84LH024_VEG-VEG-PIT_PLOT		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2	Local relief (concave, convex, none): Flat, Hummocky - small
Pre-mapped Alaska LNG/NWI classification: U; 1C2	Evidence of Wildlife Use: Moose sign, ground squirrels
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:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Mature white spruce forest. Pockets of closed canopy interspersed with openings of bebb willow trees and shrubs. Even carpet of Equisetum, LINBOR, CORCAN, Feather moss.



4H024

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca (~65')	45%	Y	Fac U
2. Salix bebbiana (25')	7%		Fac
3. Betula neoalaskana	5%		Fac U
4.			

Total Cover: 57%

50% of total cover: 28.5 20% of total cover: 11.4

Sapling/Shrub Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 6-15'	3%		Fac U
2. Salix bebbiana 10-15'	1%		Fac
3. V. burum edule	1%		Fac U
4. Linnaea borealis	45%	Y	Fac U
5. Rhododendron groenlandicum T			Fac
6.			
7.			
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: 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: 35	X 2 =	70
FAC species 48	X 3 =	144
FACU species 140	X 4 =	560
UPL species	X 5 =	
Column Totals: 223	(A)	774 (B)

PI = B/A = 3.47

VEGETATION (use scientific names of plants)

Herb Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	10%		Fac
2. Equisetum pretense	35%	Y	Fac W
3. Cornus canadensis	40%	Y	Fac U
4. Mertensia paniculata	T		Fac U
5. Calamagrostis lapponica	T		Fac
6. Equisetum sylvaticum	30%	Y	Fac
7. Pyrola asarifolia	1%		Fac U
8. Orthilia secunda	T		Fac U
9. Arctagrostis latifolia	T		Fac W
10. Pyrola minor	T		Fac
Rubus arcticus T			Fac

Total Cover: 116

50% of total cover: 58 20% of total cover: 23.2

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.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather Moss 80

Litter 15

LH024

WETLAND DETERMINATION DATA FORM

7/30/15 W84LH024

SOIL Date_____ 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
O 0-3								
Bw/Bh 3-5	10yr 4/3	70					S.L	mix of Bw, Bh and E materia
	7.5yr 3/4	30						
Bw, 5-15	5Y 5/2	40	10yr 5/6	5	C	M	vfSaL	Platy Frost mottles
	10yr 4/4	55						
BC 15-21	5Y 5/2	75					vfSaL	Platy, few roots
D 15-21	10yr 4/4	25						

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

Hydric Soil Present (Y/N): N

Notes: Well drained. No restrictive layer in 24"

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

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

Notes:

CH024

AQUATIC SITE ASSESSMENT DATA FORM

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

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH024 Field Target: 1590 Date: 7/30/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

☒ Four photos were taken for each 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 Jfur Ande 7/31/15
Wetland Scientist (print)

Brian Strong Br Stry 7/31/15

LH025

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15198	**Map #:** C1 **Map Date:** 6/18/15
Date: 7/30/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH025	
Investigators: Brian Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 426.7	
Latitude: 65°09'15.70	**Longitude:** 148°41'34.40		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 09	**Picture No.:** W84LH026_VEG_VEG_PIT_PLOT	

SITE PARAMETERS

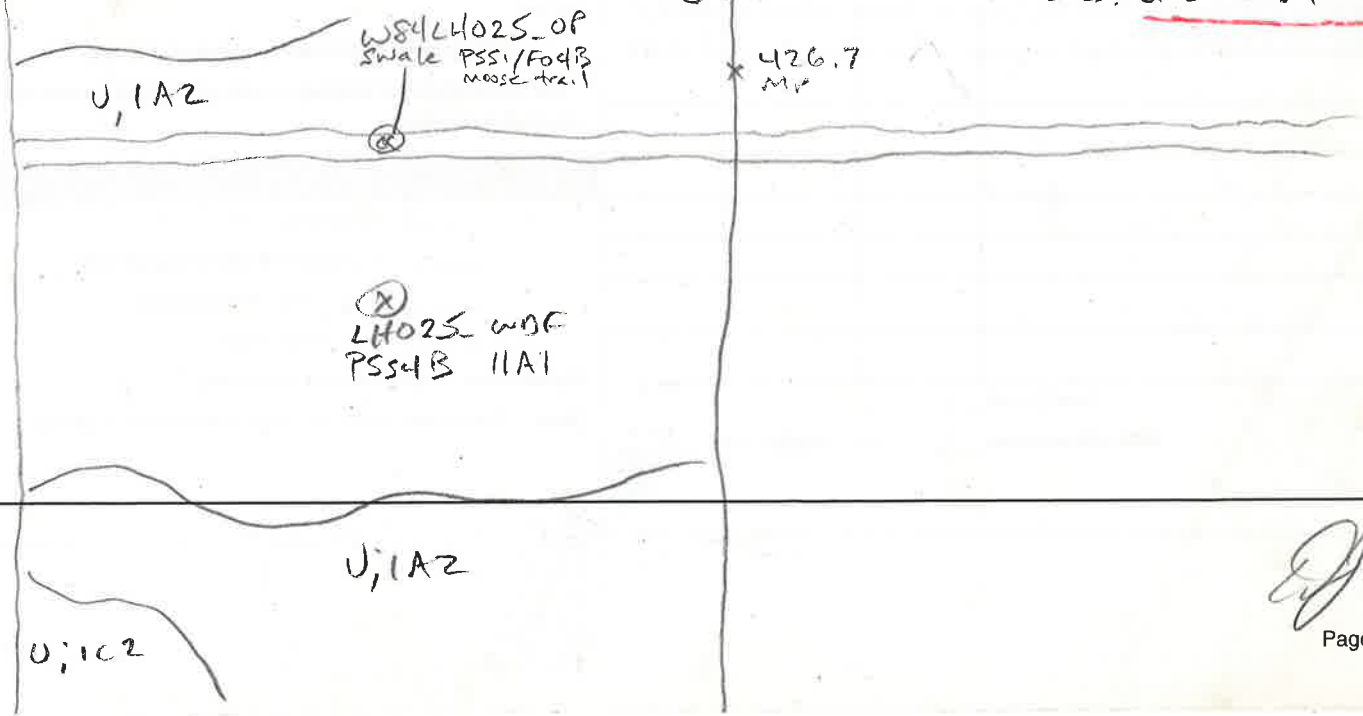
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Toeslope
Slope (%): 6.5% Aspect NE	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS4B	Evidence of Wildlife Use: None observed Hummocky, moderate
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Moose trail downgradient Yes____ No X (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 Y No____	**Wetland Type:** PSS4B
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): ~~IIA1~~ IIA2 agr.

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

Dense even age PICMAR-Saplings. Moderate to large hummocks. Carpet of feather moss. Sparce understory of RHOGRO, ROSACI, CALLAP PICMAR 1-20' tall 60-70' Marginal site. Rain for the past 2-3 days. Thixotropic soils (slight). No saturation in organics. Footslope with slightly concave slope shape. Weak spotty positive alpha alpha reaction in depleted2 pore linings. Not 60% of 4 inches. Site revisit recommended



LH025

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	3%	Y	FacW
2. moved down	↓		
3.			
4.			

Total Cover: 3

50% of total cover: 1.5 20% of total cover: 0.6

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	60%	Y	FacW
2. Spirea stevensii	2%		FacU
3. Rhododendron groenlandicum	5%		Fac
4. Vaccinium uliginosum	1%		Fac
5. Vaccinium vitis-idaea	2		Fac
6. Rosa acicularis	2%		FacU
7.			
8.			
9.			

Total Cover: 77

50% of total cover: 38.5 20% of total cover: 15.4

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	— X 1 =	—
FACW species:	65 X 2 =	130
FAC species	15 X 3 =	45
FACU species	7 X 4 =	28
UPL species	X 5 =	
Column Totals:	87 (A)	203 (B)

PI = B/A = 2.3

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	7%	Y	Fac
2. Cocculon lividicum	3%	Y	FacU
3. Equisetum pratense	T		FacW
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 10

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

6 % Bare Ground

0 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 96

Lichen 4

Sphagnum sp T

Polytrichum sp T

CH025

WETLAND DETERMINATION DATA FORM

7/30/15 WSHCH025 Y

SOIL Date _____ Feature ID _____ Soil Pit Required (Y/N) _____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-6								not saturated
A 6-7	10YR 2/1	100					S.L	
Bh 7-9	10YR 3/3	100					S.L	
Bg 9-12	2.5Y 5/2	85	N5/0	10	D	PL/RC	SiL	Thixotropic, plastic
			10YR 4/6	5	C	M		weak spotty reaction to αα
Cf 12-17	2.5Y 5/2	99	N5/0	1	D	PL/RC	S.L	frozen, Platy w/fine ice lenses
								low ice content

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

[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: Permafrost Depth (inches): 12

Hydric Soil Present (Y/N): Y marginal

Notes: Organics not saturated. Depth ranges from 4-9 inches in the area. Depletions along Pore linings and root channels vary from 5-12% of matrix above the frost table. Weak spotty reaction to alpha alpha in some depleted root channels/pore linings, <60% of 4" αα positive. Borderline A15 call here. Site revisit would be recommended.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N x	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Spotty positive reaction to alpha alpha in depleted zones along pore linings and root channels 5-12% depleted pore linings/RC. Does not meet 60% of 4" criteria for reduced matrix. Borderline site. A15 indicator is marginal	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 9-12"	**EC:** NA

Notes: Based on landscape position, shallow restrictive layer, NE aspect, the site is more likely to meet the technical standard for hydric soils. BPJ - wetland PEM interiors weakly saturated. Dry summer before rains began over the last 2-3 weeks. Rain over the past few days

44025

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_3_ Sapling (<5 dbh, <6m tall)_62_ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_10_ Dwarf shrub (<0.5m) _2_ Tall herb (≥1m) _____ Short herb (<1m) _10_ 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_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_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.)_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_ Permafrost

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)_X_ Medium (10-100 acres)_____ Large (>100 acres)_____

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH025 Field Target: 15198 Date: 7/30/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

☒ Four photos were taken for each 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 7/30/15
Wetland Scientist (print)

Bryan Strong 7/30/15

LH026

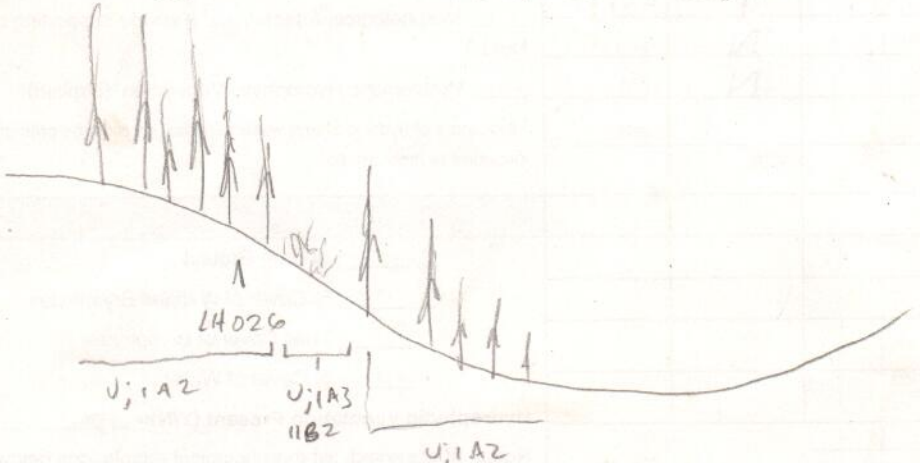
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15213	**Map #:** 54 **Map Date:** 6/18/15
Date: 7/31/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH026	
Investigators: Bryan Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 417.6		
Latitude: 65°15'32.95		**Longitude:** 148°35'02.95		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 10	**Picture No.:** W84LH026_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Ridge
Slope (%): 17% Aspect: N	Local relief (concave, convex, none): Convex, Hummocky-small
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: None observed
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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Pockets of closed PICMAR where layering has created dense colonies / stand. These dense stands of PICMAR are interspersed with more open areas as represented at the plot described. PICMAR 20-35' tall with understory of ALNVIR (4-6'). Carpet of feather moss. Recent rains. Powder dry soil.



LH026

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana 20.35'	40	Y	Fac W
2. Betula neoalaskana	3	N	Fac U
3.			
4.			

Total Cover: 43%

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

Sapling/Shrub Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	4%	N	Fac W
2. Alnus viridis	40%	Y	Fac
3. Vaccinium vitis idaea	10%	N	Fac
4. Vaccinium uliginosum	6%	N	Fac
5. Rhododendron groenlandicum	T	N	Fac
6.			
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: 3 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	44	X 2 =	88
FAC species	57	X 3 =	171
FACU species	8	X 4 =	32
UPL species	0	X 5 =	0
Column Totals:	109	(A)	291 (B)

PI = B/A = 2.670

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geocaulon lividicum	4%	Y	Fac U
2. Calamagrostis lapponica	1%	N	Fac
3. Spiraulum annotinum	1%	N	Fac U
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 6

50% of total cover: 3 20% of total cover: 1.2%

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

12 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 7

lichen 85

litter 5

CH026

WETLAND DETERMINATION DATA FORM

7/31/15 WP4CH026 Y

SOIL **Date**_____ **Feature ID**_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-4								
BC 4-20	2.5Y 5/2	100					GrSiL	Gravel ~ 15%
								dry colors

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

Hydric Soil Present (Y/N): N

Notes: No frost. Powder dry soil

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

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

Notes:

LH026

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH026 Field Target: 15213 Date: 7/31/15

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?

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**

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

8. Photos

- ☐ Four photos were taken for each 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 7/31/15

Wetland Scientist (print)

Brian Strong 7/31/15

LH027

WETLAND DETERMINATION DATA FORM

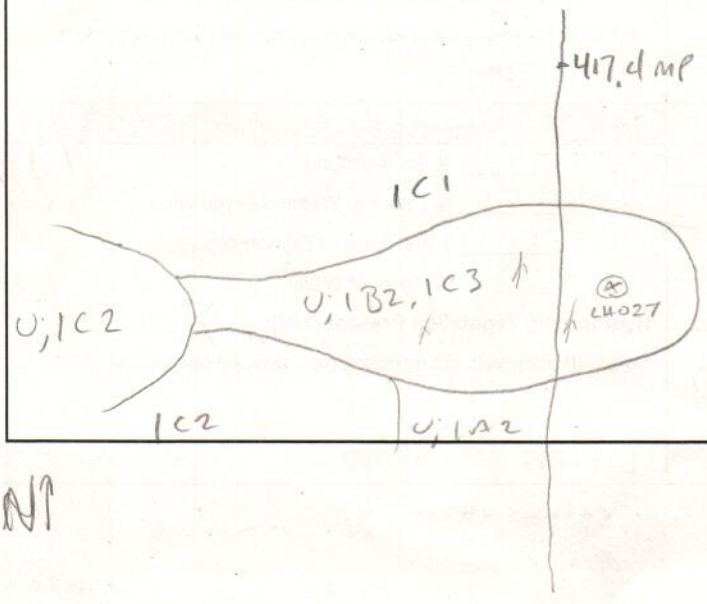
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 5200	**Map #:** 54 **Map Date:** 6/18/15
Date: 7/31/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH027	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 417.5		
Latitude: 65°15'39.44		**Longitude:** 148°35'02.85		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 10	**Picture No.:** W84LH027_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Ridge
Slope (%): 8	Local relief (concave, convex, none): Convex, hummocky-small
Pre-mapped Alaska LNG/NWI classification: U, 1B1, 1C3	Evidence of Wildlife Use: None observed
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_____ 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:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 1B2, 1C3

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

Opening in the canopy. Alder 5-7' tall with RHOGRO, VACULI, Feather Moss. Mostly surrounded by PICMAR forest with some mixed forest in the area



LH027

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 150)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	8%	Y	FacW
2. Betula neoalaskana	1%	N	FacU
3. Picea glauca	1%	N	FacU
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. Alnus viridis	65%	Y	Fac
2. Rhododendron groenlandicum	80%	Y	Fac
3. Ribes triste	T	N	Fac
4. Vaccinium vitis-idaea	15%	N	Fac
5. Vaccinium uliginosum	20%	N	Fac
6. Rosa acicularis	T	N	FacU
7. Linaea borealis	T	N	FacU
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: 4 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 0	X 1 =	0
FACW species: 8	X 2 =	16
FAC species 185	X 3 =	555
FACU species 15	X 4 =	20
UPL species 0	X 5 =	0
Column Totals: 198	(A)	591 (B)

PI = B/A = 2.98

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	5%	Y	Fac
2. Spinulum annotinum	3%	Y	FacU
3.			
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%

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

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Litter 30

Feather Moss 60

L4027

WETLAND DETERMINATION DATA FORM

7/31/15 W84LH027 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
O 0-2								
A 2-4	10yr 2/1	100					SiL	
Bw 4-9	2.5y 5/2	92	10yr 5/6	5	C	M	SiL	Plastic. Moist, not saturated
			2.5y 5/1	3	D	M		
BC 9-20	2.5y 5/2	100					SiL	gravel ~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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

LH027

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8414027 Field Target: 15200 Date: 7/31/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

☒ Four photos were taken for each 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 Jennifer An 7/31/15
Wetland Scientist (print)

Brian Strong 7/31/15

LH028

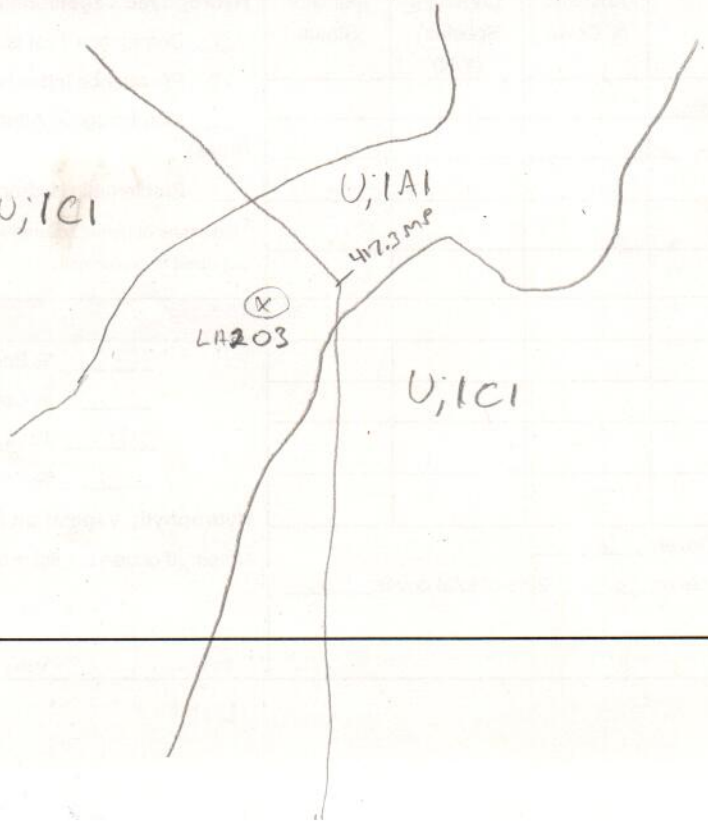
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15203	**Map #:** 52 **Map Date:** 6/18/15
Date: 7/31/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH028	
Investigators: Bryan Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 417.3	
Latitude: 65 °15 '50.88	**Longitude:** 148 °35 '03.10		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 10	**Picture No.:** W84LH028_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Ridge
Slope (%): 14 measured	Local relief (concave, convex, none): Convex, hummocky-moderate
Pre-mapped Alaska LNG/NWI classification: U;1A2	Evidence of Wildlife Use: None observed
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Closed mixed forest south of the point with very dense PICMAR-Sap understo
At point, PICMAR canopy is closed but, marginal/borderline at 65-70% cover



LH028

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana (25-35')	40%	Y	Fac W
2. Betula neoalaskana	T		Fac U
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. Picea mariana	25%	Y	Fac W
2. Rosa acicularis	2%		Fac U
3. Vaccinium vitis idaea	3%		Fac
4. Spirea stevensii	T		Fac U
5. Betula neoalaskana	E/P		Fac U
6.			
7.			
8.			
9.			

Total Cover: 30

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

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: 65	X 2 =	130
FAC species 6	X 3 =	18
FACU species 5	X 4 =	20
UPL species	X 5 =	
Column Totals: 76	(A)	168 (B)

PI = B/A = 2.2

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	3%	Y	Fac
2. Geocaulon lividicum	1%		Fac U
3. Cornus canadensis	2%	Y	Fac U
4. Mertensia paniculata	T		Fac U
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 6

50% of total cover: 3 20% of total cover: 1.2

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

0 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 90

Litter 5

LH028

WETLAND DETERMINATION DATA FORM

7/31/15 WB4LH028 Y

SOIL **Date** _____ **Feature ID** _____ **Soil Pit Required (Y/N)** _____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2								
A 2-4	10YR 2/1	100					S.L	
Bw 4-7	2.5Y 4/3	100					S.L	moist gravel ~3%
BC 7-20	2.5Y 5/3	100					S.L	gravel ~7%

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

Hydric Soil Present (Y/N): N

Notes:

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

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

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH028 Field Target: 1523 Date: 7/31/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

- ☑ Four photos were taken for each 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 7/31/15

Wetland Scientist (print)

Bryan Strong 7/31/15

LH029

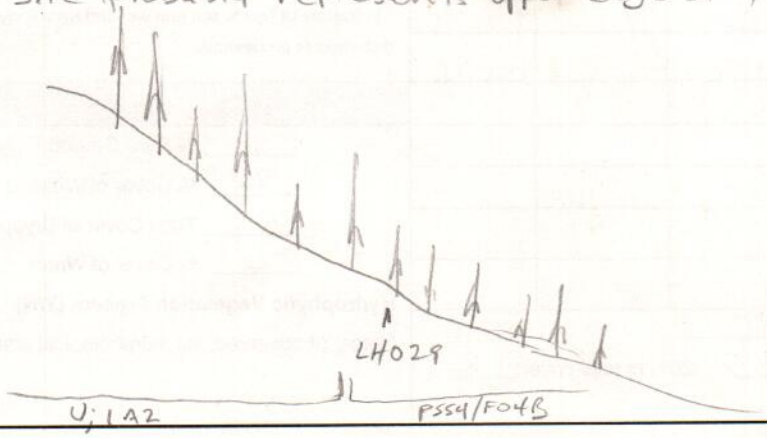
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____		**Field Target:** 15201	**Map #:** 51 **Map Date:** 6/18/15
Date: 7/31/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH029	
Investigators: Brian Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 417	
Latitude: 65°16'03.5686	**Longitude:** 148°35'13.60		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 10	**Picture No.:** W84LH029_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 18% measured N aspect	Local relief (concave, convex, none): Slightly concave Hummocky Moderate
Pre-mapped Alaska LNG/NWI classification: PF04/SS4B 1A2	Evidence of Wildlife Use: None observed
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 marginal No_____	**Wetland Type:** PSS4/F04B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Concave across slope. Slightly concave downslope. Moderate hummocks. No evidence of saturation in organics. Moderately well drained soil above frost table. Soil is moist but not saturated. Alpha alpha positive in permafrost at 17" (9" below mineral surface). Transitional site. 18% slope. North aspect. Fairly thick PICMAR-Sap cover. Stunted more due to cold soils than wet conditions. PICMAR-Sap 2-10' mostly, A few PICMAR-T in area. Less than 10% downgradient. Site probably represents upper edge of the wetland boundary.



L4029

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	7%	Y	FacW
2.			
3.			
4.			
Total Cover: 7%			
50% of total cover: 3.5% 20% of total cover: 1.4%			
Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron groenlandicum	5%		Fac
2. Vaccinium vitis-idaea	7%		Fac
3. Vaccinium Uliginosum	2%		Fac
4. Vaccinium oxycoccus	1%		Obl
5. Rhododendron tomentosum	2%		FacW
6. Picea mariana	45%	Y	FacW
7. Betula neoalaskana	T		FacU
8. Spiraea Stevenii	1%		FacU
9.			
Total Cover: 103			
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: 5 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 1	X 1 =	1
FACW species: 58	X 2 =	116
FAC species 19	X 3 =	57
FACU species 1	X 4 =	4
UPL species	X 5 =	
Column Totals: 79 (A)		178 (B)

PI = B/A = 2.25

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	3%	Y	Fac
2. Rubus chamaemorus	4%	Y	FacW
3. Eriophorum vaginatum	T		FacW
4. Arcongcrom glaskamum	2%	Y	Fac
5. Petasites frigidus	T		FacW
6.			
7.			
8.			
9.			
10.			
Total Cover: 9			
50% of total cover: 4.5 20% of total cover: 1.8			

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

25 % 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):

Sphagnum sp 25
Feather Moss 70
Polytrichum sp 3
Lichen 5

LH029

WETLAND DETERMINATION DATA FORM

7/31/15 W84LH029 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-8								not saturated
A 8-11	10yr 2/2	100					SiL	moist
Bw 11-15	10yr 4/3	100					GR Loam	~25% gravel, moist
15-17	2.5y 3/1	100					SiL	Gravel ~12% moist
ACf 17-20	7.5yr 3/2	100					SiL	Alpha alpha positive frozen

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Permafrost Depth (inches): 17

Hydric Soil Present (Y/N): Y - marginal

Notes: Alpha alpha positive starting at 17 inches (9 inches below mineral surface). No saturation above frost table. Folistic epipedon. Transitional site.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N*	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Alpha alpha positive starting at 17" in the frozen layer (9" below mineral surface) Some saturation likely early in the growing season.	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

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

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 7 Sapling (<5 dbh, <6m tall) 45 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 8 Dwarf shrub (<0.5m) 10 Tall herb (≥1m) 0 Short herb (<1m) 9 Moss-Lichen 103 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M):** Even X Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

HGM Class (P): Slope_____ 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.)_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X Permafrost

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) X Medium (10-100 acres)_____ Large (>100 acres)_____

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH029 Field Target: 15201 Date: 7/31/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

☒ Four photos were taken for each 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 7/31/15
Wetland Scientist (print)

Brian Strong 7/31/15

LH030

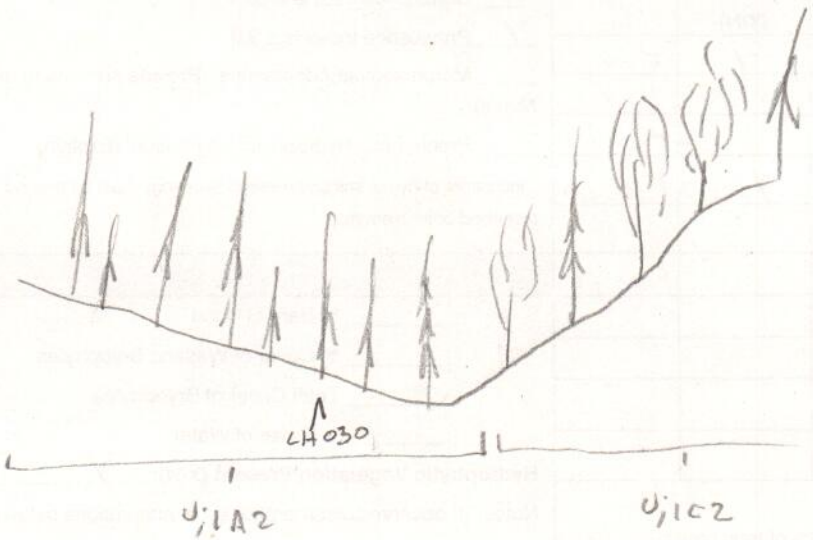
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15202	**Map #:** NA **Map Date:** 6/18/15
Date: 7/31/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH030	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 416.7		
Latitude: 65°16'15.08		**Longitude:** 148°35'34.17		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 11	**Picture No.:** W84LH030_VEG_VEG-PIT-PLUG		

SITE PARAMETERS	
Subregion: Interior Highlands	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 24% Aspect NE measured	Local relief (concave, convex, none): Concave Hummocky-moderate
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: None observed
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 ✓ (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 X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes ✓ No_____	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Pit dug in a wet microsite with concave local relief. Small and moderate hummocks. Pit dug in a patch of mostly sphagnum moss. Point moved north ~.3mi.



LH030

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	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. Picea mariana	25%	Y	FacW
2. Rhododendron groenlandicum	2%		Fac
3. Vaccinium uliginosum	2%		Fac
4. Vaccinium vitis-idaea	3%		Fac
5. Spirea stevensii	3%		FacU
6. Alnus viridis	1%		Fac
7. Rhododendron tomentosum	1%		FacW
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: 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: 58	X 2 =	116
FAC species 16	X 3 =	48
FACU species 6	X 4 =	24
UPL species	X 5 =	
Column Totals: 80	(A)	188 (B)

PI = B/A = 2.35

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	7%	Y	Fac
2. Aconogonon alaskanum	1%		Fac
3. Spiraea annotinum	T		FacU
4. Cornus canadensis	3%	Y	FacU
5. Rubus chamaemorus	2%		FacW
6. Geocaulon lividicum	T		FacU
7.			
8.			
9.			
10.			

Total Cover: 13

50% of total cover: 6.5 20% of total cover: 2.6

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

___ Total Cover of Bryophytes

___ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss

Sphagnum

LH030

WETLAND DETERMINATION DATA FORM

7/31/15 W84LH030 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-5								
A 5-7.5	2.5Y 3/1	100					SiL	
Bw 7.5-14	10YR 5/4	85					Loam	moist, near saturation
	2.5Y 4/1	15						
2C 14-20	2.5Y 6/2	100					VGR Loam	saturated with small amount of free water at 17 inches - residuum. Plastic, massive

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

Hydric Soil Present (Y/N): N

Notes: At 14" very gravelly loam. Plastic, slightly sticky with saturation at ~15 and a small amount of free water at 17". No positive reaction to alpha alpha. No redox features observed.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Some free water at ~17"	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 17 free water	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 15	**EC:** NA

Notes:

LH030

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH030 Field Target: 15202 Date: 7/31/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

- ☒ Four photos were taken for each 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 7/31/15

Wetland Scientist (print)

Brian Strong 7/31/15

LH031

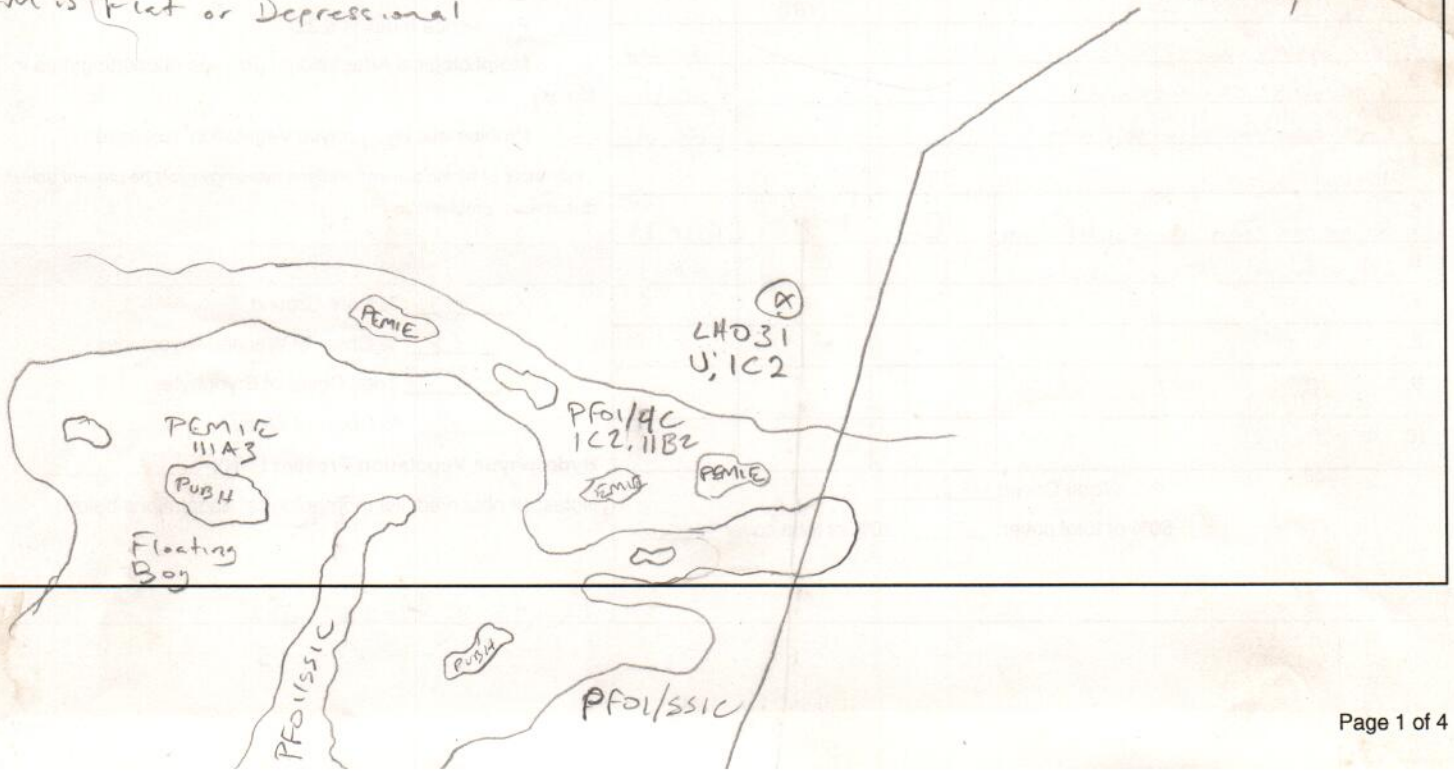
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15312	**Map #:** NA **Map Date:** 6/18/15
Date: 8/1/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84LH031	
Investigators: Brian Strong			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 464.6	
Latitude: 64° 40' 19.48	**Longitude:** 149° 01' 53.28		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 12	**Picture No.:** W84LH031_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PF04/SS4B	Evidence of Wildlife Use: Moose sign
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:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1 C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Gently sloping - increasing elevation to the North and east. large mature White Spruce, BETNEO, POPTRE. Understory (open) with scattered Bebb Willow, PICGLA-Sap POPTRE seedlings. Carpet of feather moss with EQUPRA, CORCAN HGM is Flat or Depressional



LH031

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	35%	Y	Fac U
2. Betula neoalaskana	10		Fac
3. Populus tremuloidies	10%		Fac U
4.			
Total Cover: 55%			
50% of total cover: 27.5	20% of total cover: 11		
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	5%	Y	Fac, U
2. Populus tremuloidies	3%		Fac U
3.			
4. Salix bebbiana	1%		Fac
5. Rhododendron groenlandicum	5%		Fac
6. Sherperdia canadensis	1%		Fac U
7. Linaea borealis	1%		Fac U
8. Vaccinium vitis-idaea	10	Y	Fac
9. Rosa acicularis	1%		Fac U
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: 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: 40	X 2 =	80
FAC species 26	X 3 =	78
FACU species 61	X 4 =	244
UPL species	X 5 =	
Column Totals: 127	(A)	402 (B)

PI = B/A = 3.16

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	40%	Y	Fac W
2. Cornus canadensis	1%		Fac U
3. Geocaulon lividicum	2%		Fac U
4. Pyrola sp	T		
5. Chamerion angustifolium	E		Fac U
6. Mertensia paniculata	T		Fac U
7.			
8.			
9.			
10.			
Total Cover: 43			
50% of total cover: 21.5	20% of total cover: 8.6		

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

85 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather Moss 85

Litter 15

WETLAND DETERMINATION DATA FORM

8/1/15 WB4LH031 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

	Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O	0-3.5								
A/Bs	3.5-5	2.5Y 4/2	90					SiL	7.5Y 4/4 2nd matrix color (10%)
Bw	5-11	2.5Y 5/1	60	10YR 5/6	10	C	M	vfSaL	frost mottles, Low chroma
		2.5Y 5/2	30						parent material
BC	11-22	2.5Y 5/2+	98	10YR 5/6	2	C	M		Fine Platy, Some frost mottles

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

Hydric Soil Present (Y/N): N

Notes: Loess - low chroma parent material.

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

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

Notes:

4403 1

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84214031 Field Target: 15312 Date: 8/1/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

☒ Four photos were taken for each 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 Jennifer Anderson 8/11/15
Wetland Scientist (print)

Brian Strong Brian Strong 8/1/15

LH032

WETLAND DETERMINATION DATA FORM

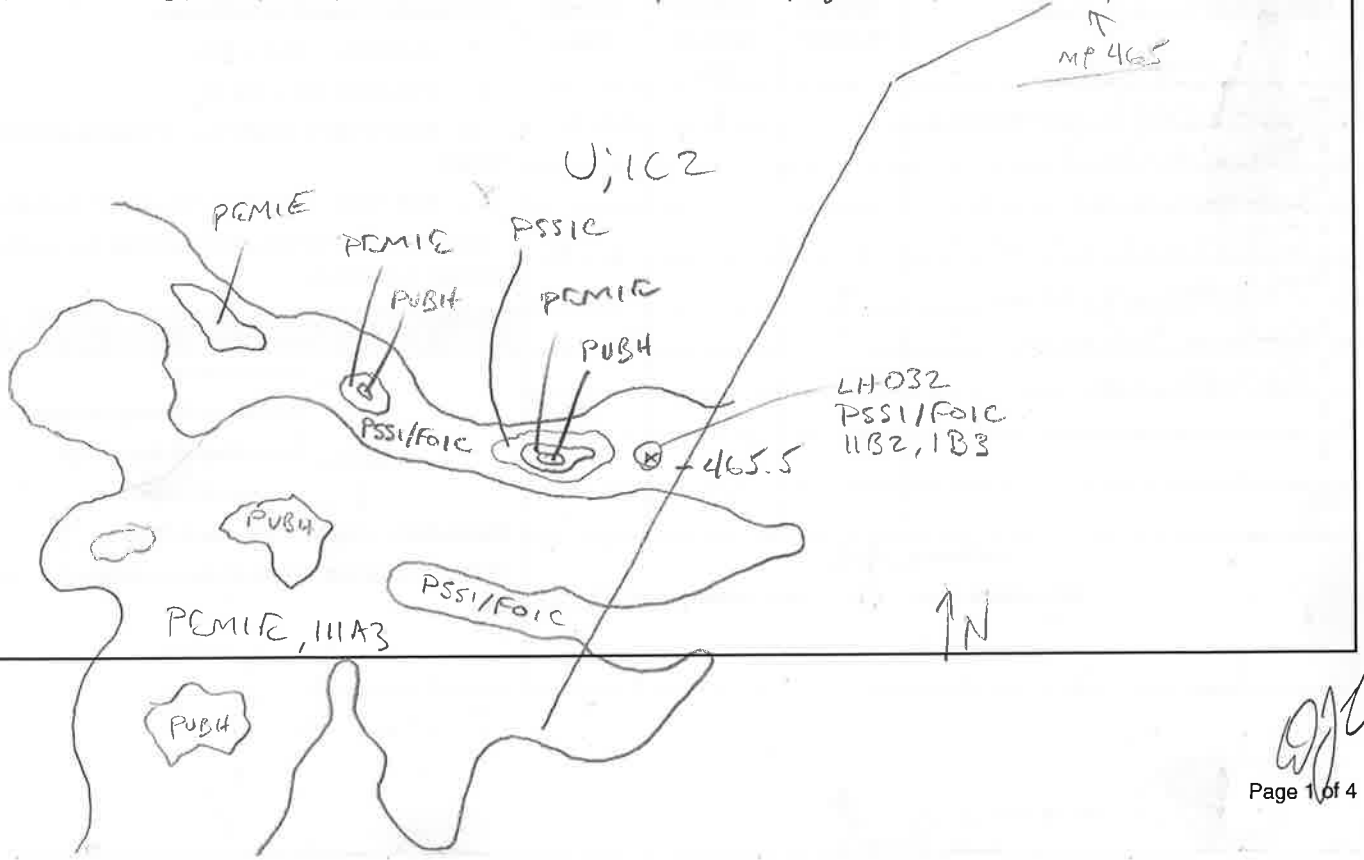
15313 (JA)

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** ~~15299~~	**Map #:** NA **Map Date:** 6/18/15
Date: 8/1/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH032	
Investigators: BS, JA				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 465.5		
Latitude: 64°40'15.11		**Longitude:** 149°01'52.21		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 12	**Picture No.:** W84LH032_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Slightly concave, Hummocky-Moderate
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Moose sign
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/FO1C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIB2, IB3, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Patchwork of PSS1/FO1C, PEMI/SS1C, PEMI C/E and woodland mixed forest along the transitional zone between upland IC2 and PEMI E, IIIA3.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	12	Y	Fac
2. Picea glauca	5%	Y	Fac U
3.			
4.			

Total Cover: 17

50% of total cover: 8.5 20% of total cover: 3.4

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	25%	Y	Fac
2. Picea glauca	2%		Fac U
3. Alnus incana	20	Y	Fac
4. Salix bebbiana	2%		Fac
5. Salix Pulchra	T		Fac W
6. Chamaedaphne calyculata	1.		Fac W
7.			
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: 5 (B)

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 1	X 1 =	1
FACW species: 1	X 2 =	2
FAC species 149	X 3 =	447
FACU species 7	X 4 =	28
UPL species	X 5 =	
Column Totals: 158 (A)		478 (B)

PI = B/A = 3.02

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	90%	Y	Fac
2. Rubus arcticus	T		Fac
3. Comarum palustre	1		Obl
4. Eriophorum vaginatum	1%		Fac W
5. Trientalis europea	T		Fac U
6. Galium trifidum	T		Fac W
7. Carex sp	T		
8.			
9.			
10.			

Total Cover: 92

50% of total cover: 46 20% of total cover: 18.4

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N 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

3 % 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):

Sphagnum 3
Feather Moss 7
Litter 90

LH032

WETLAND DETERMINATION DATA FORM

8/1/15 WP4LH032 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oe 0-3								
A 3-6	10YR 2/2	100					Mk Sil	
Bg 6-8	10YR 5/6	70					Sil	basically a 2 inch band
	N5/0	30						of iron concentration
Cg 8-16	N5/0	100					Sil	Sil/vfSat, Thixotropic
Cg1 16+	N5/0	100					Sil	Sil/vfSat

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) Y		Alaska Gleyed without 5Y Hue or Redder Underlying Layer Y
Thick Dark Surface (A12) N		Other (Explain in Notes) Reduced matrix

[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: Permafrost Depth (inches): 16

Hydric Soil Present (Y/N): Y

Notes: Thixotropic Soil. Alpha alpha positive. Weak H_2S odor. High n-value soils Poor bearing strength

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

Surface Water Present (Y/N): N	Depth (in): NA	**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): 3	EC: NA

Notes:

LH032

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__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)__17__ Sapling (<5 dbh, <6m tall)__27__ Tall shrub (2-6m)__22__ Short shrub (0.5-2m)__3__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __90__ Short herb (<1m) __2__ Moss-Lichen__3__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven __7__Moderately even _____

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

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

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

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

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

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

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

HGM Class (P): Slope_____ 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.)_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

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 Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84C1032 Field Target: ~~15299~~ 15313 Date: 8/1/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

☒ Four photos were taken for each 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 8/1/15
Wetland Scientist (print)

Brian Strong 8/1/15

LH033

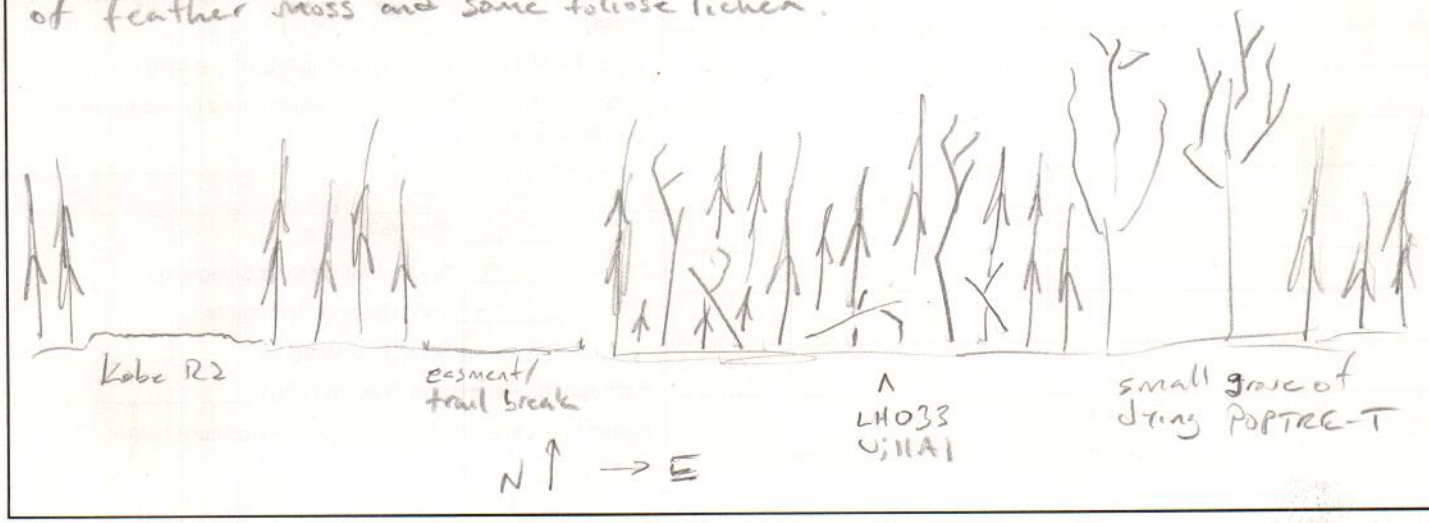
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)_____ **Other** (explain) off ROW			**Field Target:** 3256	**Map #:** _____ **Map Date:** 6/18/13
Date: 8/2/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH033	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 499.1		
Latitude: 64°12'52.56		**Longitude:** 149°19'08.09		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 13	**Picture No.:** W84LH033_VEG_VEG-PIT-PLOT, N, S		

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1%	Local relief (concave, convex, none): Flat, Hummocky-small
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: None observed
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:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): II A 1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Old burn. Quite a few old standing dead POPTRE, BETNEO, A good number of downfall-stems. One small opening near the edge of the 50' radius tree-plot has a colony of POPTRE-T in steep decline. Very flat, very well drained. Very dense even aged stand of PICMAR-Sap 12-18' tall. Was likely an open MIXED forest with POPTRE, BETNEO, PICMAR. Very sparse understory and a carpet of feather moss and some foliose lichen.



LH033

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 10G)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana 20'	7	Y	FacW
2. Populus tremuloides	1		FacU
3.			
4.			

Total Cover: 8

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

Sapling/Shrub Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana 15'	70	Y	FacW
2.			
3. Linnaea borealis	T		FacU
4. Vaccinium vitis-idaea	2		FacU
5.			
6.			
7.			
8.			
9.			

Total Cover: 73

50% of total cover: 36.5 20% of total cover: 14.6

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: 77	X 2 =	154
FAC species 2	X 3 =	6
FACU species 2	X 4 =	8
UPL species	X 5 =	
Column Totals: 81	(A)	168 (B)

PI = B/A = 2.07

VEGETATION (use scientific names of plants)

Herb Stratum (26) included in shrub stratum	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geocaulon lividicum	1		FacU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 1

50% of total cover: 0.5 20% of total cover: 0.2

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

0 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 97

Nephroma arctica 3

Litter T

Lichen T

LH033

WETLAND DETERMINATION DATA FORM

8/2/15 W84LH033 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-6								
Ah 6-8	10YR 4/1	100					Sil	
Bhs 8-11	5YR 4/6	100					vfSaL	
Bw 11-17	10YR 5/4	85					vfSaL	
	2.5Y 6/4	15						
2C 17-21	10YR 5/6	100				CR	Loamy fine Sand gravels ~17%	

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

Hydric Soil Present (Y/N): N

Notes: Somewhat excessively drained. Loess over gravelly alluvium. Spodic material

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

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

Notes:

LH033

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH033 Field Target: 15256 Date: 8/2/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each 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 8/2/15

Wetland Scientist (print)

Bryan Strong 8/2/15

LH034

WETLAND DETERMINATION DATA FORM

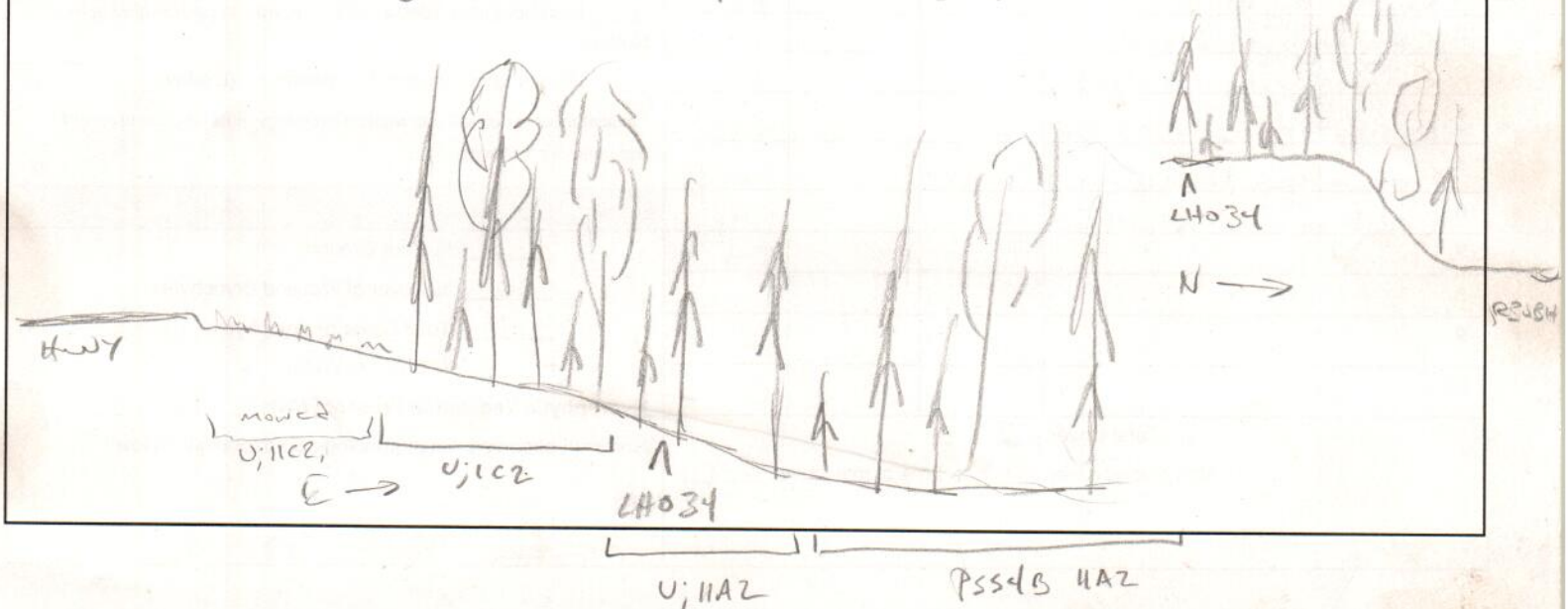
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 5126	**Map #:** _____ **Map Date:** 6/18/15
Date: 8/2/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH034	
Investigators: Bryan Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 502.2		
Latitude: 64°10'28.0950		**Longitude:** 149°17'26.54		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 13	**Picture No.:** W84LH034_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 5% Aspect: E	Local relief (concave, convex, none): Flat to slightly concave hummocky - moderate
Pre-mapped Alaska LNG/NWI classification: PF04B 1A2	Evidence of Wildlife Use: Game trail
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 Y No_____	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2, 1C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Dense, even aged Mixed Forest between the point and the highway becoming more of an open canopy downslope to the east. BETNEO scattered throughout the area. Borderline mixed forest. A short distance to the north a 40' deep gulch contains a nice gravel bottomed creek. All upland between the point and the creek to the north at this elevation. Transitions to wetland downslope



LH034

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	35	Y	FacW
2. Betula neoalaskana	20	Y	Fac
3.			
4.			
Total Cover: 55			
50% of total cover: 27.5	20% of total cover: 11		

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	7%	Y	FacW
2. Betula neoalaskana	3%	Y	Fac
3. Salix bebbiana	T		Fac
4. Salix pulchra	T		FacW
5. Rhododendron groenlandicum	2%		Fac
6. Vaccinium vitis-idaea	2%		Fac
7. Linnaea borealis	T		Fac
8. Rosa acicularis	T		FacU
9.			
Total Cover: 14			
50% of total cover: 7	20% of total cover: 2.8		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 42	X 2 =	84
FAC species 52	X 3 =	156
FACU species 2	X 4 =	8
UPL species	X 5 =	
Column Totals: 96	(A)	248 (B)

PI = B/A = 2.58

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	2%		Fac
2. Calamagrostis lapponica	20	Y	Fac
3. Calamagrostis canadensis	2%		Fac
4. Equisetum sylvaticum	1%		Fac
5. Geocaulon lividum	1%		FacU
6. Goodyera Repens	T		Fac
7. Pyrola asarifolia	1		FacU
8.			
9.			
10.			
Total Cover: 27			
50% of total cover: 13.5	20% of total cover: 5.4		

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

0 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Feather Moss 90

lichen 7

litter 3

CH034

WETLAND DETERMINATION DATA FORM

8/2/15 W84CH034 7

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-6								
A 6-11	10YR 2/2	100					SiL	
BW 11-13	2.5Y 3/1	15					SiL	5YR 4/6 - spodic material 7%
	2.5Y 4/1	78						
BCf 13-17	2.5Y 4/1	78					SiL	5YR 4/6 spodic material 7%
	2.5Y 3/1	15						
BCf 17-20	5Y 6/1	85					LFSa	10YR 5/6 - weathered sand 15

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Permafrost Depth (inches): 13

Hydric Soil Present (Y/N): N

Notes: No positive alpha alpha reaction. No saturation

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

CH034

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84CH034 Field Target: 15126 Date: 8/2/17

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☐ A detailed site sketch is included?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☐ Cover calculations are complete and correct?
- ☐ All dominant species have been determined and recorded per strata?
- ☐ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☐ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☐ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☐ Each logbook page is initialed and dated?

7. Maps

☒ Wetland boundaries have been corrected if necessary?
☐ Maps are initialed and dated?

8. Photos

☐ Four photos were taken for each 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 8/5/15
Wetland Scientist (print)

Brian Stang 8/2/15

W84LH035

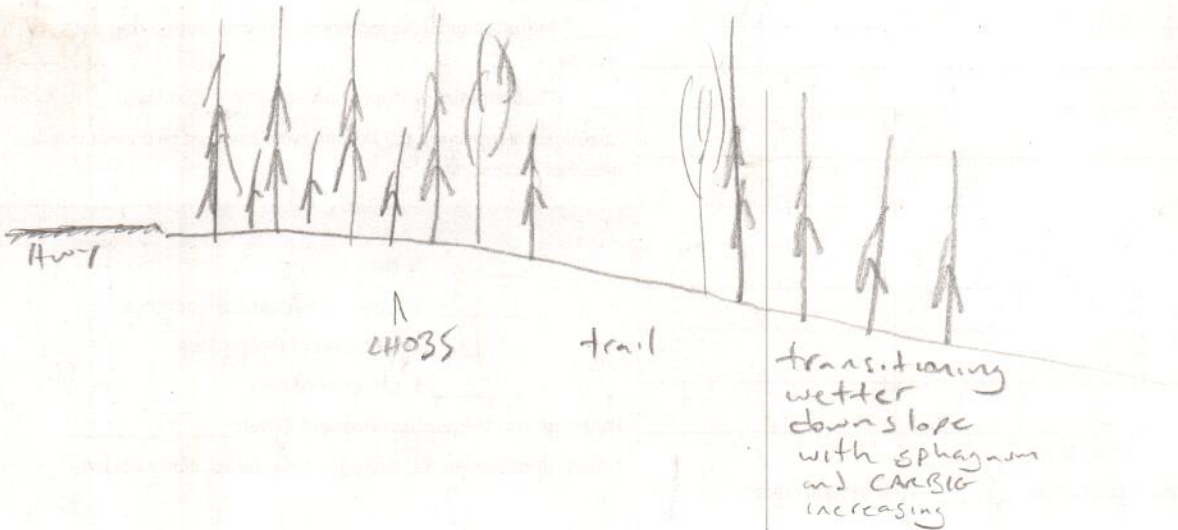
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15127	Map #: ____ Map Date: 6/18/15
Date: 8/2/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH035
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 502	
Latitude: 64° 10' 40.68	Longitude: 149° 17' 34.56		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 14	Picture No.: W84LH035_VEG_VEG-PIT-PLOT	

SITE PARAMETERS	
Subregion: Tanana-Kuskokwim Lowlands	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 5 Aspect E	Local relief (concave, convex, none): Flat to slightly concave hummocky-small
Pre-mapped Alaska LNG/NWI classification: PSSYB, 1A2	Evidence of Wildlife Use:
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:** U
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 1A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Dense even aged PICMAR-T with some BETNEO mixed in. Nearly closed canopy. Carpet of feather moss. Squirel middens. Very sparce understory of CALLAP, GEOLIV, Few/no shrubs in understory



LH035

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	50%	Y	Fac W
2. Betula neoalaskana	5%		Fac
3.			
4.			
Total Cover: 55			
50% of total cover: 27.5 20% of total cover: 11			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Picea mariana	7	Y	Fac W
2.			~~Fac~~ 1255
3. Vaccinium vitis-idaea	1%		Fac
4. Rhododendron groenlandicum	T		Fac
5. Salix bebbiana	1		Fac
6. Rosa acicularis	T		FACU
7.			
8.			
9.			
Total Cover: 9			
50% of total cover: 4.5 20% of total cover: 1.8			

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: 57	X 2 =	114
FAC species 17	X 3 =	51
FACU species 5	X 4 =	20
UPL species	X 5 =	
Column Totals: 79	(A)	185 (B)

PI = B/A = 2.34

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	10%	Y	Fac
2. Geocaulon lividicum	5%	Y	Fac U
3. Equisetum sylvaticum	T		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 15			
50% of total cover: 7.5 20% of total cover: 3			

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

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

0 % Cover of Wetland Bryophytes

97 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Feather Moss 87
Litter 3
Lichen 10

LH035

WETLAND DETERMINATION DATA FORM

8/2/15 W84LH035 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-6								
A 6-9	10YR 4/1	85						10YR 4/3 2nd matrix color 15%
Bw1 9-12	5Y 5/1	90	10YR 5/6	10	C	M	vfSaL	frost mottles/1st matrix color
Bw2 12-17	10YR 5/6	85					vfSaL	
	5Y 5/1	15						
Bsf/Cgf 17-20+	2.5Y 4/1	70					vfSaL	spodic, 7.5YR 4/4, 2.5Y 5/2

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Permafrost Depth (inches): 17

Hydric Soil Present (Y/N): N

Notes: No saturation. Low chroma parent material.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

LH035

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH035 Field Target: 1527 Date: 8/2/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☐ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

☒ Wetland boundaries have been corrected if necessary?
☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each 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 8/2/15
Wetland Scientist (print)

Brian Strong 8/2/15

~~LH004~~

WETLAND DETERMINATION DATA FORM

W84LH036

SITE DESCRIPTION

Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 1512	Map #: 139 Map Date: 6/19/15
Date: 8/25/15	Project Name & No.: Alaska LNG 60418403		Feature Id: ~~W84HT044~~ BSS ~~W84LH004~~
Investigators: Bryan Strong Jessie Brownlee			Team No.: 84
State: Alaska	Region: Alaska	Milepost: 527.4	
Latitude: 63° 50' 21.544"		Longitude: 149° 03' 37.644"	Datum: WGS84
Logbook No.: 03	Logbook Page No.: 011	Picture No.: ~~W84HT044-VEG-VEG-PIT-PLUG~~ W84LH004-VEG-VEG-PIT-PLUG BSS	

SITE PARAMETERS

Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace / Footslope
Slope (%): 2% measured	Local relief (concave, convex, none): Flat, to slight concave Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: U; IC2, IIA2	Evidence of Wildlife Use: None observed
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.)

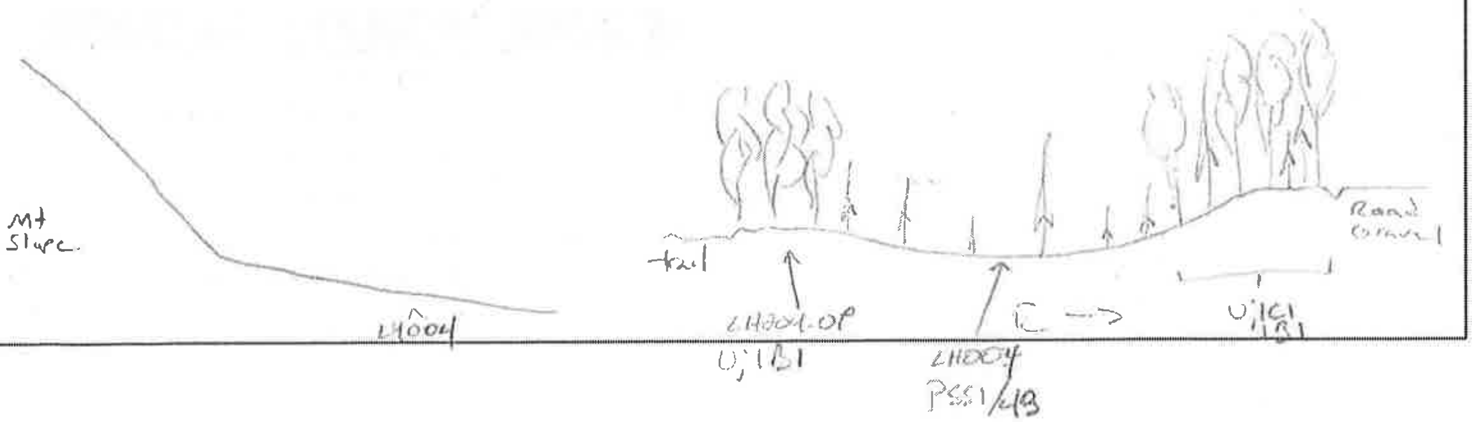
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed? No X (If yes, explain in Notes)

Are Vegetation____, Soil Y, or Hydrology____ Naturally Problematic? No____ (If yes, explain in Notes.) Problematic Soils

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: PSS1/4B
Wetland Hydrology Present? Yes Y 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. Open stunted mixed spruce woodland, Mostly PICGLA-Sap with a few PICMAR mixed in, Good cover of BETNAN 2-2.5' tall with quite a bit of VACULI. ARCLAT and some CARBIG comprise the herbaceous component of the site. A mix of feather moss, Aloumnium moss and a hand full of other wetland cryptogams/briof No sphagnum at the point. A few microlows have evidence of standing water and are saturated to the surface with water stained leaves. Hummocks are small to moderate in size



~~LH006~~
LH036

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Picea glauca	10		FACU
2. Picea mariana	2		FACW
3. Betula glandulosa	5		FAC
4. Betula nana	32	Y	FAC
5. Salix pulchra	8		FACW
6. Vaccinium uliginosum	25	Y	FAC
7. Vaccinium vitis-idaea	14		FACU
8. Empetrum nigrum	T		
9. Rhododendron lapponicum	T		
Total Cover: 96			
50% of total cover: 48 20% of total cover: 19.2			

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:	X 1 =	
FACW species: 28	X 2 =	56
FAC species 81	X 3 =	243
FACU species 10	X 4 =	40
UPL species	X 5 =	
Column Totals: 119	(A)	339 (B)

PI = B/A = 2.85

VEGETATION (use scientific names of plants)

Herb Stratum (2)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	15	Y	FACW
2. Carex bigelowii	5	Y	FAC
3. Pedicularis sp.	2		FACW
4. Mertensia paniculata	T		
5. Festuca altaica	T		
6.			
7.			
8.			
9.			
10.			
Total Cover: 23			
50% of total cover: 11.5 20% of total cover: 4.6			

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 8/25/15	Feature ID W84LH004 ~~W84HT004~~	Soil Pit Required (Y/N)

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4.5								Macromium fibres
4.5-6	2.5Y 5/2	100					vfSaL	
6-8	2.5Y 3/2	100					vfSaL	or Sandy
8-9.5	2.5Y 3/2	20	5YR 4/6	40	C	PL/M	vfSaL	basically a band of iron sta[ining]
	2.5Y 4/1	30	5Y 5/1	10	D	PL/M		indicating persistent water ta[ble]
9.5-13	10YR 4/6	90	5Y 5/1	10	D	PL	vfSandy Loam	
13-20	5Y 6/1	75	10YR 5/6 N 6/0	15 20	C D	M M	vfSaL	textures like loam: plastic, sticky

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) Y*	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue Y*
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Y see notes High water Ta[ble] Low chro[ma]

[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: Y massive vfSaL Depth (inches): 13

Hydric Soil Present (Y/N): Y

Notes: Mica rich, mica fine sands give finer texture by feel than lab data would yield. Slightly thixotropic, plastic, sticky, mica rich. Soils fit the concept of AK Redox (A14) and AK Redox 2.5Y hue but depth and location of features are incorrect. The low chroma, in context with a band of concentrations/iron staining with water table strongly indicates a hydric h[orizon]

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) Y	Stunted or Stressed Plants (D1) Y
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y Marginal
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Preferential flow/free water at 7" w/ Saturation at 4". Recent rains reinforce the hydrology here at the time of site visit.	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	Wetland Hydrology Present (Y/N): Y
Water Table Present (Y/N): free water Y	Depth (in): 7	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4	EC: No standing water.

Notes:

EC: 48m pH 4.9 38°C - Soil pit

AQUATIC SITE ASSESSMENT DATA FORM

084LH034 ~~084LH004~~ ~~W84HT044~~ 8 25 15

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved__/__ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__02__ Sapling (<5 dbh, <6m tall)_12___ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)_70___ Dwarf shrub (<0.5m) __10___ Tall herb (≥1m) __10___ Short herb (<1m) __7___ Moss-Lichen_95___ Floating__0___ Submerged__0___

Number of Wetland Types (M): __1___ **Evenness of Wetland Type Distribution (M):** Even __/___Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X___

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X___ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X___ High (>25) _____

Presence of Islands (M): Absent (none) __X___ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X___

Dead Woody Material (P): Low Abundance (0-25% of surface) __/___ 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__X___ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

Flat/Slope complex

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__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)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X___ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)__/___ 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__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__/___ 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: BrSMC GPS Technician QA/QC check:

~~LH005~~

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15118	Map #: 132 Map Date: 6/19/15
Date: 8/25/15	Project Name & No.: Alaska LNG 60418403			Feature Id: ~~W84LH045~~ W84LH037
Investigators: Brian Strang Jessie Brownlee				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 522.1		
Latitude: 63 54 45.135		Longitude: -149 04 25.396		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 11	Picture No.: ~~W84LH045~~ W84LH005 -VEG -VEG -PIT- PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2.5	Local relief (concave, convex, none): Flat Hummocky - small
Pre-mapped Alaska LNG/NWI classification: PSSIR 11C2	Evidence of Wildlife Use: Moose bones
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) ATV trail - well vegetated adjacent
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____ No N
Hydric Soil Present? Yes____ No N	Wetland Type: ( )
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 11C1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Closed Low Shrub Birch community, Good sized PICGLA forest community to the north of the plot. Gravel pit west of point, No hydrology.

~~111095~~
~~LH0035~~
LH037

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	3		FACU
2.			
3.			
4.			
Total Cover: ___ 50% of total cover: ___ 20% of total cover: ___			

combined w/ shrub stratum

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	T		
2. Betula nana 3'	70	Y	FAC
3. Vaccinium uliginosum	3		FAC
4. Salix pulchra	2		FACW
5. Rhododendron groenlandicum	T		
6. Salix bebbiana 3'	T		
7. Vaccinium vitis idaea	25	Y	FAC
8.			
9.			
Total Cover: ___ 50% of total cover: ___ 20% of total cover: ___			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species:		X 1 =
FACW species:	2	X 2 = 4
FAC species	108	X 3 = 324
FACU species	3	X 4 = 12
UPL species		X 5 =
Column Totals:	113 (A)	340 (B)

PI = B/A = 3.01

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	10	Y	FAC
2. Equisetum silvaticum	T		
3. Mertensia paniculata	T		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 10 50% of total cover: 5 20% of total cover: 2			

Hydrophytic Vegetation Indicators:

Y 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
100 Total Cover of Bryophytes
0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Feather Moss 75
Moss 20
[illegible] sp 5
Foliose lichen T

WETLAND DETERMINATION DATA FORM

8/25/15 WB4LH005 WB4LH045 TSS

~~LH005~~ WB4LH037 Y

SOIL Date Feature ID Soil Pit Required (Y/N)

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-3								
3-5	10YR 3/1	100					SiL	
5-6	5YR 3/4	100					SiL	
6-9	2.5Y 6/1	90					SiL	
	10YR 5/6	10						
9-2	2.5Y 5/4	100					vFSaL	

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	EC: NA

Notes:

W84LH037

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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

LH006

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X Access Road (explain)____ Other (explain)____		**Field Target:** 5117	**Map #:** 134 **Map Date:** 6/19/15
Date: 8/25/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** ~~W84LH006~~ DSS ~~TOAS~~ W84LH038	
Investigators: Bryan Strong Jessie Brownlee			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 577.16	
Latitude: 63° 54' 21.80"	**Longitude:** 149° 04' 42.064"		**Datum:** WGS84
Logbook No.: 03	**Logbook Page No.:** 012	**Picture No.:** ~~W84LH006~~ VEG-VEG-PIT-PLUG W84LH006 DSS VEG-VEG-PIT-PLUG	

SITE PARAMETERS

Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 3	Local relief (concave, convex, none): Flat Hummocky in wetter areas
Pre-mapped Alaska LNG/NWI classification: U, IIC2, IIA2	Evidence of Wildlife Use: Game trails - moose sign

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.)

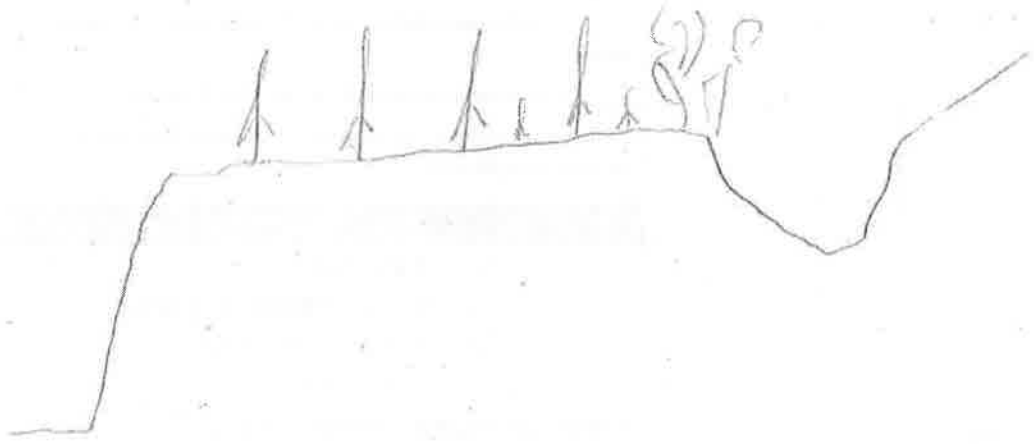
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed? No X (If yes, explain in Notes)

Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic? No____ (If yes, explain in Notes.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS4/FOUB
Wetland Hydrology Present? Yes Y 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. Picea somewhat stressed/stunted, particularly the few Picea in plot. Small amounts of standing water in moose prints. Recent rains (past 2 weeks). Marginal site.



~~LH036~~
LH038

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana 20.25	12	Y	FACW
2. Picea glauca 20.25	T		
3.			
4.			

Total Cover: 12

50% of total cover: 6 20% of total cover: 2.4

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	22	Y	FACW
2. Picea glauca	3		FACW
3. Betula nana 1'	10		FAC
4. Betula glandulosa 5'6	T		
5. Vaccinium uliginosum	30	Y	FAC
6. Rhododendron tomentosum	7		FACW
7. Rhododendron groenlandicum	4		FAC
8. Salix pulchra	2		FACW
9. Vaccinium vitis-idaea	20	Y	FAC

Total Cover: 98

50% of total cover: 49 20% of total cover: 19.6

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: 56	X 2 =	112
FAC species 86	X 3 =	258
FACU species 3	X 4 =	12
UPL species	X 5 =	
Column Totals: 145	(A)	382 (B)

PI = B/A = 2.63

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	22	Y	FAC
2. Arctagrostis latifolia	10	Y	FACW
3. Petasites frigidus	3		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

____ Morphological 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

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Feather Moss

Aleocarpum sp

Moss sp

Lichen sp

WETLAND DETERMINATION DATA FORM

8/25/15 W84LH038

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-7								Saturated black
7-8	2.5Y 2.5/1	100					Mk SiL	
8-10	2.5Y 3/1	100					vfSaL	
10-22	2.5Y 5/3		10YR 5/6	3			vfSaL	Thixotropic
			5Y 5/1	5				Weak platy below 15
								massive above 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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N	
Histic Epipedon (A2) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N	
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N	
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N	
Thick Dark Surface (A12) N		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: Massive vfSaL Depth (inches): 10

Hydric Soil Present (Y/N): Y marginal histic epipedon with Muck/SiL A. Free water at 8 recent rains reinforcing hydrology

Notes: Marginal histic with 7" Oe (black, saturated) over 1" Muck SiL. Episaturated thixotropic soil. Evidence of seasonal frost starting at 15 inches (platy structure) massive vfSaL above 15"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) M
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Episaturated	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): .05	Wetland Hydrology Present (Y/N): Y
Water Table Present (Y/N): Y	Depth (in): 8 free water	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6	EC: No surface water

Notes:

EC 44 µs 37°C) Soil
pH 5.25 pit

8/13/15
~~WSHH0065~~
W84CH038

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__12__ Sapling (<5 dbh, <6m tall)__25__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__45__ Dwarf shrub (<0.5m) __27__ Tall herb (≥1m) __10__ Short herb (<1m) __25__ Moss-Lichen__95__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ 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.)_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits__X__ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)__X__

Evidence of Seeps and Springs (P): No Seeps or Springs__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: BWM GPS Technician QA/QC check:

PA001
N

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline____ Access Road (explain)_____ Other (explain) X Trail		Field Target: 15265	Map #: 12 Map Date: 6/29
Date: 7/6/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84PA001	
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W8CC
State: Alaska	Region: Alaska	Milepost: N/A off ROW	
Latitude: 68°27'43.39"N	Longitude: 149°28'58.68"W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 37	Picture No.: PW84PA001_VEG_VEG-PIT_PLOT	

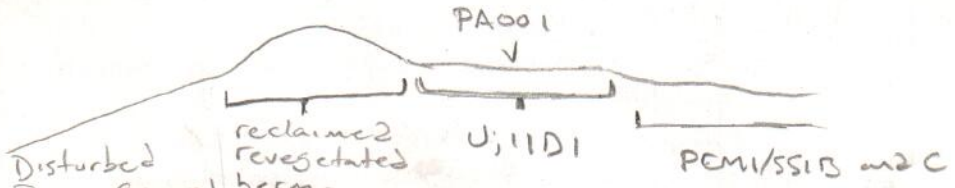
SITE PARAMETERS

Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Kame Terrace
Slope (%): 3-4%	Local relief (concave, convex, none): Flat to slight concave
Pre-mapped Alaska LNG/NWI classification: PSS1FMIE, UC2UBAs	Evidence of Wildlife Use: Ground squirrels
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry Conditions	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) Large gravel pit adjacent to plot
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? Yes_____ No N	Is the Sampled Area within a Wetland? Yes_____ No X
Hydric Soil Present? Yes_____ No N	Wetland Type: U — Most of area is wetland
Wetland Hydrology Present? Yes_____ No N	Alaska Vegetation Classification (Viereck): II D 1 Dryas Shrub Tund

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. A few scattered SALRIC - mostly DRYINT, VACULI with numerous non-acidic moist tundra species. Upland moraine deposit. Transitions quickly to a sedge dominated moist tundra wetland at the edge of the facility foot print PEMI/SSIB and PEMIC mixed.



PA001

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100Ft)	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. Vaccinium uliginosum	25	Y	Fac
2. Salix reticulata	7	N	Fac
3. Dryas integrifolia	60	Y	FACU
4. Arctous rubber	T	N	Fac
5. Salix arctaus	T	N	FacU
6. Salix Richardsonai	T	N	FacW
7.			
8.			
9.			
Total Cover: 92			
50% of total cover: 46 20% of total cover: 18.4			

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:	3	X 1 =	3
FACW species:	—	X 2 =	—
FAC species	32	X 3 =	96 + 26 AF
FACU species	10	X 4 =	280
UPL species		X 5 =	
Column Totals:	105	(A)	379 (B)

PI = B/A = 3.61

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Stellaria longipes	T		Fac
2. Bistorta plumosa	10	Y	FacU
3. Silene acaulis, lanata	T		UPL
4. Pedicularis ~~Kanei~~ AF (verec2)	T		Fac
5. Pedicularis Oederi	T		NI
6. Carex sp (Single spike unisexual)	T		—
7. Carex vagnata	3	Y	OBL
8. Leguminosea sp Hedysarum alpinum?	T		—
9. Saxifraga hirculus	T		OBL
10. Saussurea angustifolium	T		Fac
Total Cover: 13			
50% of total cover: 6.5 20% of total cover: 2.6			

Papaver Macounii T FacU

Oxytropis nigrescens T

Rock T

Potentilla biflora (verc2) T

Moss

lichen

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50% 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N 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

99 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

PA001

WETLAND DETERMINATION DATA FORM

7/6/15 W84PA001 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
A 0-3	10YR 2/2	100					SiL	
Bw 3-8	10YR 4/3						Loam	
BC 8-16	10YR 3/2						GR Loam	32% gravel - Till

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes: Well drained, No evidence of saturation. No redox features observed

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7)	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	EC: NA

Notes:

PA001

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m)_____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA001 Field Target: PA 209 Date: 7/6/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- N/A ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/6/15

X Brian Strong — **Field Crew Chief (print)**

X — **Signature / Date** 7/6/15

PA002

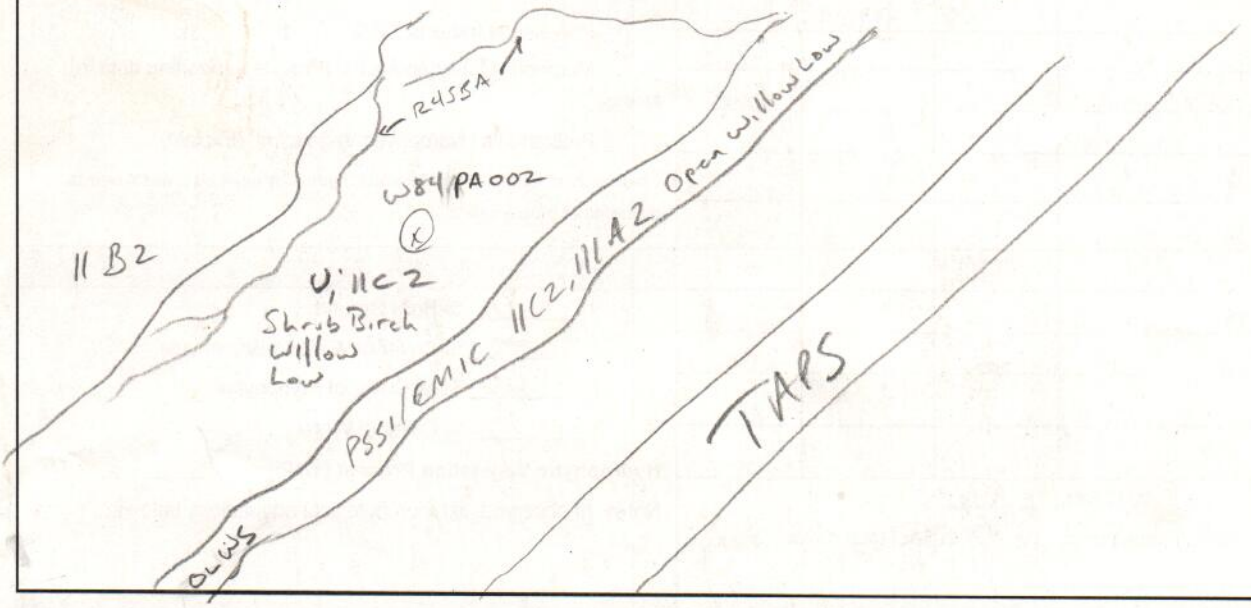
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15235	**Map #:** 7 **Map Date:** 6/29
Date: 7/8/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA002	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:**		
Latitude: 68°46'04.88"N	**Longitude:** 148°53'24.49"W		**Datum:** WGS84	
Logbook No.: 01	**Logbook Page No.:** 38	**Picture No.:** P_W84PA002_VEG_VEG_PIT_PIC		

SITE PARAMETERS			
Subregion: Arctic Foothills		Landform (hillslope, terrace, hummocks, etc.): Stream terrace	
Slope (%): 2		Local relief (concave, convex, none): Rolling w/ small hummocks	
Pre-mapped Alaska LNG/NWI classification: PSS1E, IIC2		Evidence of Wildlife Use: Yes, Bear scat	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry Conditions		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:** U	
Wetland Hydrology Present? Yes____ No X		Alaska Vegetation Classification (Viereck): IIC2 SBW	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Well drained stream terrace. Very gravelly loamy sand below 19 inches. No frost table observed in 23". A band of low willow occurs between the channel in point and the field transect (west of FT 15235 that is mostly wet. PSS1C



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100 ft)	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 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	20	Y	Fac
2. Empetrum nigrum	2		Fac
3. Betula nana	40	Y	Fac
4. Rhododendrum tomentosum	45	Y	FacW
5. Vaccinium vitisidaea	10		Fac
6. Salix glauca	15		Fac
7. Salix pulchra	3		FacW
8. Salix richardsonii	1		FacW
9.			
Total Cover: 136			
50% of total cover: 68	20% of total cover: 27.2		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: 55	X 2 = 100
FAC species 90	X 3 = 270
FACU species 4	X 4 = 16
UPL species —	X 5 = —
Column Totals: 149 (A)	396 (B)

PI = B/A = 2.66

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Valeriana capitata	1		Fac
2. Equisetum arvense	T		Fac
3. Bistorta plumosa	4	Y	FacU
4. Arctagrostis latifolia	6	Y	FacW
5. Stellaria longipes	T		Fac
6. Poa sp.	T		—
7. Eriophorum vaginatum	T		FacW
8. Festuca altaica	2		Fac
9. Saussurea angustifolia	T		Fac
10. Polemonium acutiflorum	T		Fac
Total Cover: 13			
50% of total cover: 6.5	20% of total cover: 2.6		
11. Pedicularis labradorica	T		FacW
12. Agrostis	T		
13. Petasites frigidus	T		

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

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

PA002

WETLAND DETERMINATION DATA FORM

7/8/15 W84PA002 7

SOIL **Date** _____ **Feature ID** _____ **Soil Pit Required (Y/N)** _____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-4							Fibric	
A 4-5.5	10YR 2/2	100					SiL	Granular
Bw 5.5-19	10YR 4/2	95	2.5Y 5/1	3	D	M		Platy - weak, moist
			10YR 4/6	2	C	PL	VGLSa	Alluvial gravel and sand
2C 19-21+	10YR 4/3	100						No permafrost in 23"

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) NA	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N small hummocks w/ a few sm tussocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

P1002

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA002 Field Target: 15235 Date: 7/8/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — X — 7/9/15

Wetland Scientist (print) — **Signature / Date**

X Brian Strong — X — 7/9/15

Field Crew Chief (print) — **Signature / Date**

P003

WETLAND DETERMINATION DATA FORM

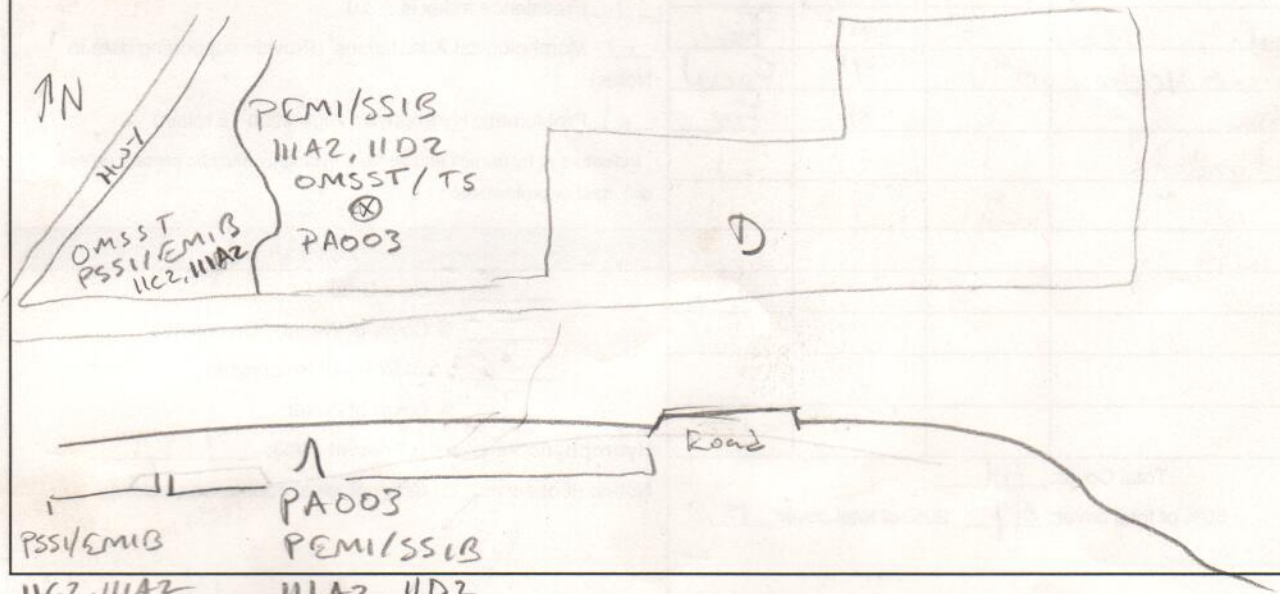
SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) X Trail flag			**Field Target:** 15266	**Map #:** 8 **Map Date:** 6/29
Date: 7/8/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA003	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** N/A off ROW		
Latitude: 68°45'40.22"N		**Longitude:** 148°52'39.36"W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 3	**Picture No.:** P_W84PA003_VEG_VEG_PIT-PLOT		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Flat to slight convex
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B IIIA2, IID2	Evidence of Wildlife Use: none observed tussock-small
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry Conditions	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:** PEMI/SS1B TS/OMSST
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIIA2, IID2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Moist acidic tundra, Small tussock cotton grass dominates the area with dwarf ericaceous species co-dominant in some areas, 8" saturated organics over massive, plastic SiL loam 4/2 Alpha alpha positive. Small amounts of free water seeping at interface of organics with mineral soil. No real watertable.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (26ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Vaccinium uliginosum	16	Y	Fac
2. Betula nana	4	N	Fac
3. Rhododendrum tomentosum	6	Y	FacW
4. Empetrum nigrum	4	N	Fac
5. Vaccinium vitis-idaea	1	N	Fac
6. Andromeda polifolia	2	N	FacW
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: 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: 98	X 2 =	196
FAC species 19	X 3 =	57
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 117	(A)	253 (B)

PI = B/A = 2.16

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Pedicularis lanata	2	N	Fac
2. Eriophorum vaginatum	90	Y	FacW
3. Tofieldia	2	N	Fac
4. Carex rotundata	T		
5. Luzula sp.	T		
6. Pedicularis sp.	T		
7.			
8.			
9.			
10.			
Total Cover: 94			
50% of total cover: 47	20% of total cover: 18.8		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N 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

30 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

PA003

WETLAND DETERMINATION DATA FORM

7/8/15 W8d PA003 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
Oi 0-4								Saturated at 2"
Oe 4-8								Saturated
Bw 8-15	10YR 4/2	100					SiL	Massive. Saturated Alpha alpha positive. One flag - cobble sized
Bcf 15-17+	10YR 4/2	100					SiL	Alpha alpha positive

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Reduced matrix

[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: Permafrost Depth (inches): 15"

Hydric Soil Present (Y/N): Y

Notes: Small amounts of free water seeping at the mineral/organic interface and between peds - soil structural units, Interiors of peds marginally saturated and alpha alpha positive

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y - Marginal	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) Y	Stunted or Stressed Plants (D1) N
High Water Table (A2) N X	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	Microtopographic Relief (D4) N small tussocks and hummocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Very small amounts of standing water in a few microlows <0.5" deep. Free water at mineral/organic interface.	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y - m	Depth (in): 0.5"		
Water Table Present (Y/N): N	Depth (in): NA free water at 8"	**Wetland Hydrology Present (Y/N):** Y	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2"	EC: NA	not enough water collecting in pit or available at the surface to measure.

Notes:

PA003

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__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)__16__ Dwarf shrub (<0.5m) __7__ Tall herb (≥1m) __0__ Short herb (<1m) __94__ Moss-Lichen__30__ 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_____

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_____ 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** too little to measure

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

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: W84PA003 Field Target: 15266 Date: 7/8/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher X 7/9/15

Wetland Scientist (print) **Signature / Date**

X Brian Strong X 7/9/15

Field Crew Chief (print) **Signature / Date**

PA004

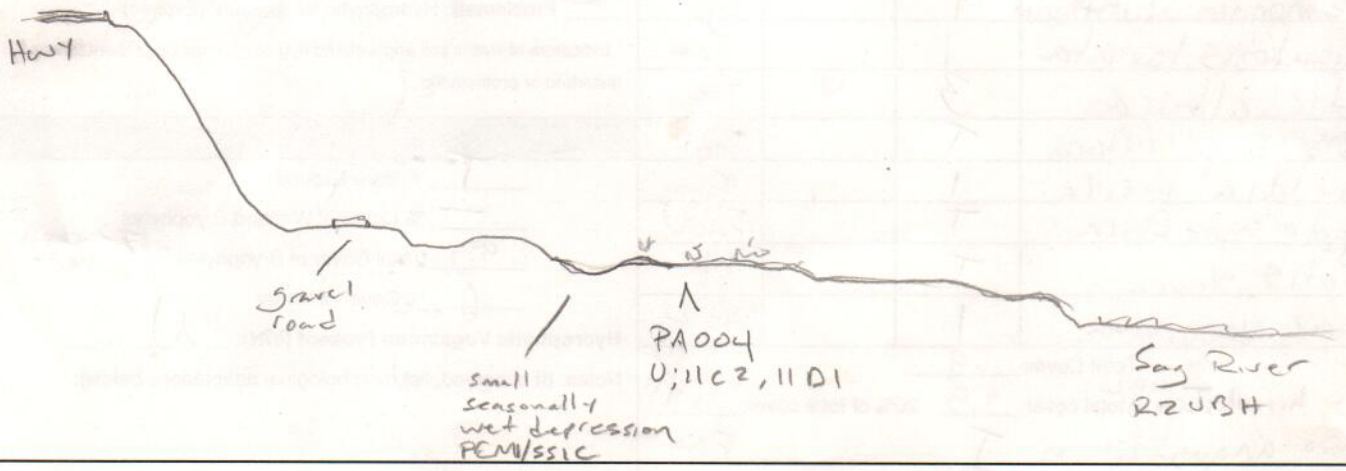
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ Access Road (explain)____ Other (explain) X Fac. Hwy			Field Target: 19267	Map #: ___ Map Date: 6/29
Date: 7/9/15	Project Name & No.: Alaska LNG 60418403			Feature Id: WS4PA004
Investigators: Bryan Strong, Abigayle Fisher				Team No.: WS4
State: Alaska	Region: Alaska	Milepost: N/A off ROW		
Latitude: 69°08' 44.09"N		Longitude: 148°49' 49.46" W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 38	Picture No.: P_WS4PA004_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1-2	Local relief (concave, convex, none): Flat, some undulations and small hummocks
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B,11C2,11D1a	Evidence of Wildlife Use: Ground squirels
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry conditions	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:** U open low willow/dryas tundra
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): II C2 II D1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Well drained stream terrace, No evidence of saturation or reduction. Low chroma parent material colors - river silt/loess. Open Low Willow and Dwarf Dryas tundra. No permafrost observed in 24 inches. A few small depressions appear to be seasonally wet. Dry summer.



PA021

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (20ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctous ruber	12		Fac
2. Vaccinium uliginosum	5		Fac
3. Dryas integrifolia	70	Y	FacU
4. Salix glauca	12		Fac
5. Salix richardsonii	10		FacW
6. Salix pulchra	2		FacW
7. Salix reticulata	T		Fac
8. Rhododendron lapponicum	T		Fac
9. Dasiphora fruticosa	1		Fac
Total Cover:	114		
50% of total cover:	57	20% of total cover:	22.8

Betula

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	1	X 1 =	1
FACW species:	13	X 2 =	26
FAC species	37	X 3 =	111
FACU species	72	X 4 =	288
UPL species	—	X 5 =	—
Column Totals:	121 (A)		426 (B)

PI = B/A = 3.5

Betula glandulosa T Fac
Betula nana 1 Fac
Rhododendron tomentosum T FacW
Empetrum nigrum 1 Fac
Andromeda polifolia T FacW

VEGETATION (use scientific names of plants)

Herb Stratum (2ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cassiope tetragona	2	Y	FacU
2. Equisetum variegatum	1		FacW
3. Polemonium acutiflorum	T		Fac
4. Pedicularis lanata	1		Fac
5. Festuca altaica	3	Y	Fac
6. Anemone parviflora	T		FacU
7. Tofieldia pusilla	1		Fac
8. Pyrola asarifolia	T		FacU
9. Lagotis glauca	T		N
10. Carex vaginata	1		OBL
Total Cover:	9		
50% of total cover:	4.5	20% of total cover:	1.8
Saxifraga hirculus T OBL			
Saussurea angustifolium	T		Fac
Salix sp.	T		—
Pedicularis capitata	T		FacW
Brassica sp	T		—
Carex scirpoidea	T		FacW

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.

T % Bare Ground

— % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes 17 - Lichen 73 - Moss

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

PA004

WETLAND DETERMINATION DATA FORM

7/9/15 W84PA004 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-4							fibric	
A 4-5	10YR 2/2	100					SiL	
C 5-10	N4/0	100					SiL	Loess mantle w/thin buried surfaces - parent material colors
2C 10-22	5Y 4/1	100					vGrLSa	River gravel/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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N low chroma parent material, well drained alluvium

Notes: No saturation. No positive reaction to alpha alpha. No frost table in 24"

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

P4004

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA004 Field Target: 5267 Date: 7/9/2015

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X [signature] 7/9/15 — **Signature / Date**

X Bryan Strong — **Field Crew Chief (print)**

X [signature] 7/9/15 — **Signature / Date**

PA005

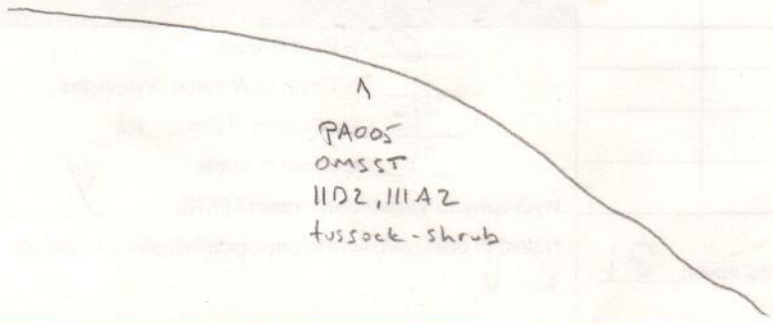
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15307	**Map #:** 10 **Map Date:** 6/29
Date: 7/9/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84PA005	
Investigators: Bryan Strong, Abigayle Fisher			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 131.6	
Latitude: 68°37'12.93"N	**Longitude:** 149°23'34.12"W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 38	**Picture No.:** P_W84PA005_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): shoulder slope
Slope (%): 3-4	Local relief (concave, convex, none): Slightly convex - Moderate hummocks w/ small tussocks
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B, 11D3, 111A2	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry conditions	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 Y No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1/EM1B TS/OMSST
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11D2, 111A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Rolling hills of weathered glacial moraines with erratics/boulders on the surface. Slightly convex - transitioning from hilltop of glacial terrace to shoulder slope. Subtle swales form incipient water tracks. Flat HGM. Permafrost at 12. Organics & Mineral below is marginally saturated. Strong positive reaction to alpha alpha. Tussock sedge with dwarf ericaceous shrub. Some sphagnum. small pocket of standing water at edge of plot. 2" deep. Dry Summer



PA005

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendrum tomentosum	35	Y	FacW
2. Vaccinium vitis-idaea	17	Y	Fac
3. Betula nana	15	Y	Fac
4. Andromeda polifolia	2		FacW
5.			
6.			
7.			
8.			
9.			
Total Cover: 69			
50% of total cover: 34.5	20% of total cover: 13.8		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 142	X 2 =	284
FAC species 32	X 3 =	96
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 174	(A)	380 (B)

PI = B/A = 2.18

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	30	Y	FacW
2. Eriophorum vaginatum	75	Y	FacW
3. Pedicularis labradorica	T		FacW
4. Pedicularis capitata	T		FacU
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 105			
50% of total cover: 52.5	20% of total cover: 21		

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

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Rock

PA005

WETLAND DETERMINATION DATA FORM

7/8/15 W84PA005

SOIL	Date	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
Oi	0-2.5							fibric	
Oe	2.5-9.5							hemic	Saturated
C_{ss}	9.5-12	2.5Y 5/1	99	7.5YR 4/6	1	C	PL	Loam	weakly saturated Alpha alpha positive ~10% Gravel.
C_{ssf}	12-16	2.5Y 5/1	100					Loam	~10% Gravel. 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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Reduced matrix

[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: Permafrost Depth (inches): 12

Hydric Soil Present (Y/N): Y

Notes: Glacial till, Low chroma parent material, massive structure. Slightly plastic. Weakly saturated. Strong positive reaction to alpha alpha. 100% in thawed mineral and in frost table.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	Microtopographic Relief (D4) Y - tussocks - small on top of moderate hummocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Small amount of surface water in micro low next to a glacial erratic	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 2"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5	EC: 36 µS pH 6.5

Notes:

PA005

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__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)__50__ Dwarf shrub (<0.5m)__19__ Tall herb (≥1m)__0__ Short herb (<1m)__165__ Moss-Lichen__95__ Floating__0__ Submerged__6__

Number of Wetland Types (M): __1__ | **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) __X__

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__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** 6.5

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)__X__

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ 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: W84PA005 Field Target: 15307 Date: 7/9/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Morgayle Fisher — **Wetland Scientist (print)**

X [signature] 7/9/15 — **Signature / Date**

X Brian Strong — **Field Crew Chief (print)**

X [signature] 7/9/15 — **Signature / Date**

PA006

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15309	Map #: 9 Map Date: 6/29
Date: 7/9/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84PA006	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: W81.15		
Latitude: 68°37'27.60"N	Longitude: 149°22'46.19"W		Datum: WGS84	
Logbook No.: 01	Logbook Page No.: 38	Picture No.: P_W84PA006_VEG_VEG PIT PLOT		

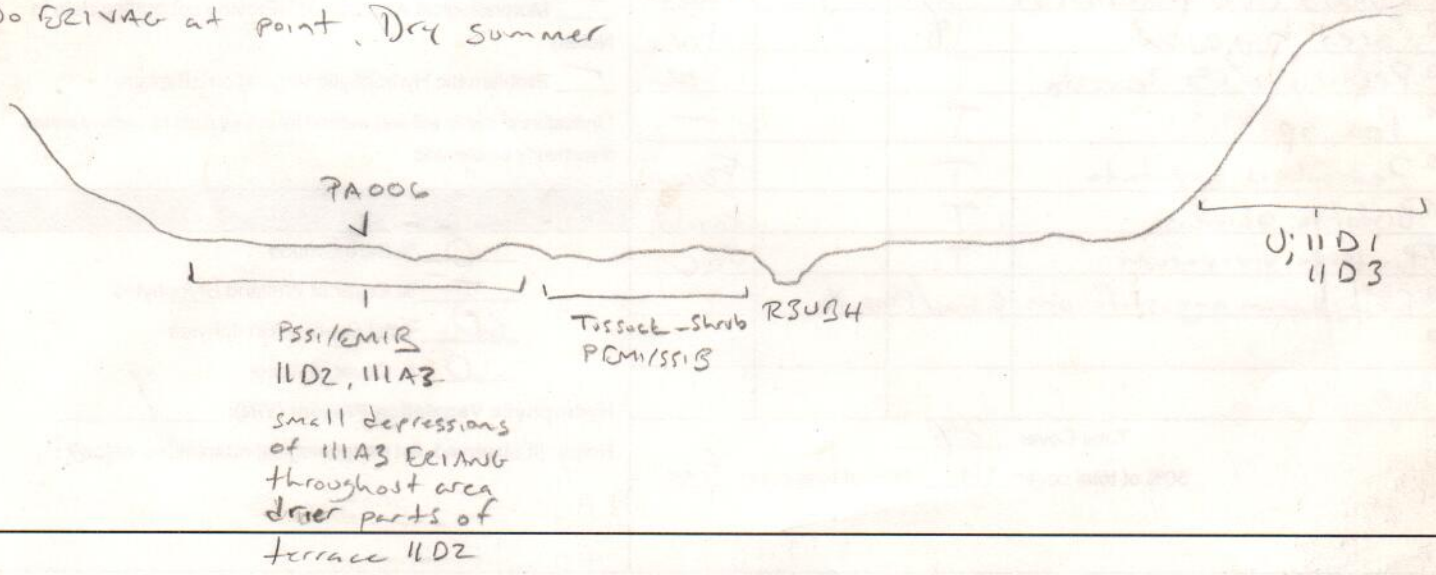
SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): ~2%	Local relief (concave, convex, none): Flat to slightly convex w/ small hummocks
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1E, IIIA2, HE3	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry conditions	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 D2, III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Dry microsite chosen for 26' diameter plot. Small wet depressions are dominated by ERIANG and show evidence of standing water. Drier sites as described here show evidence of a persistent water table above frost table. At point, CARBIG RUBCHA are co-dominant with BETNAN, SALPUL, EMPNIG, RHOTOM. Adjacent to point, toward stream to the west is open mixed shrub-tussock tundra.

No ERIVAG at point. Dry summer



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (26ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	9		Fac
2. Empetrum nigrum	35	Y	Fac
3. Vaccinium vitis-idaea	7		Fac
4. Rhododendrum tomentosum	7		FacW
5. Andromeda polifolia	1		FacW
6. Salix pulchra	6		FacW
7. Vaccinium uliginosum	4		Fac
8.			
9. Salix fuscescens	Edge/Present		
Total Cover: 69			
50% of total cover: 34.5 20% of total cover: 13.8			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	24	X 2 =	48
FAC species	73	X 3 =	219
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	97 (A)		267 (B)

PI = B/A = 2.75

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	10	Y	FacW
2. Carex bigelowii	18	Y	Fac
3. Pedicularis lanata	T		Fac
4. Poa sp.	T		—
5. Pedicularis capitata	T		FacU
6. Bistorta plumosa	T		FacU
7. Bistorta viviparum	T		Fac
8. Eriophorum angustifolium	Edge/Present		
9.			
10.			
Total Cover: 28			
50% of total cover: 14 20% of total cover: 5.6			

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

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

PA006

WETLAND DETERMINATION DATA FORM

7/9/15 WS4PA006 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O1 0-6								
AOa 6-7							Mk Sil	
Oab 7-8	5YR 3/4 2.5Y 4/1	75 30						5YR 3/4 is a band of iron staining indicating persistent water table
C 8-10	2.5Y 4/2							
Cf 10-14	2.5Y 4/2						Stoney Sil	Permafrost

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) Y - marginal	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Permafrost Depth (inches): 10

Hydric Soil Present (Y/N): Y

Notes: Dry microsite selected for soil pit location. No positive alpha alpha or saturation observed at time of site visit. A ~1" band of iron staining within cryoturbated organic and mineral above the permafrost table shows there is a persistent shallow water table perching over the permafrost table. Slightly convex microsite with small depressional features surrounds area. Organic and mineral material, Soil classification is Ruptic Histic. Redox not quite Organic depths are variable with cryoturbation mixing

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) Y - edge of plot	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) N**	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: **Saturated early in the growing season and in wet periods.	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	EC: NA

Notes:

PA006

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved 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) 0 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 26 Dwarf shrub (<0.5m) 43 Tall herb (≥1m) 0 Short herb (<1m) 28 Moss-Lichen 60 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%) X

Interspersion of Cover & Open Water (P): 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

Presence of Islands (M): Absent (none) X One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover X

Dead Woody Material (P): Low Abundance (0-25% of surface) X Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ 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 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.) 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable X Permafrost

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: W84PA006 Field Target: 1530 Date: 7/9/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/9/15

X — **Field Crew Chief (print)**

X Brian Strong 7/9/15 — **Signature / Date**

PA007

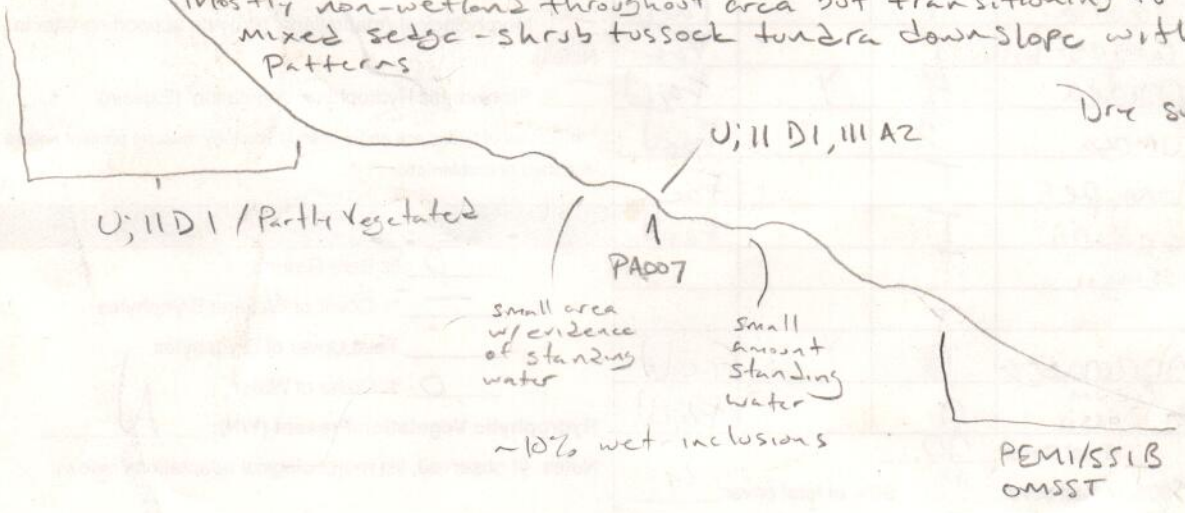
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15308	**Map #:** 11 **Map Date:** 6/29
Date: 7/9	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA007	
Investigators: Bryan Stroney, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 136.15		
Latitude: 68°33'55.76"N		**Longitude:** 149°28'29.94"W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 39	**Picture No.:** P_W84PA007_VEG_VEG_PIT_PLUG		

SITE PARAMETERS			
Subregion: Arctic Foothills		Landform (hillslope, terrace, hummocks, etc.): Solufluction bench glacial terrace - Moraine	
Slope (%): 13		Local relief (concave, convex, none): Undulating w/ small hummocks	
Pre-mapped Alaska LNG/NWI classification: U; IID2, IIIA1		Evidence of Wildlife Use: No	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry conditions		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:** U	
Wetland Hydrology Present? Yes Y - marginal No____		Alaska Vegetation Classification (Viereck): IID1, IIIA2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Sol. fluction topography with undulating and rolling topography. Small to moderate hummocks. No frost table observed in 24 inches, Soil pit dug in a moderately wet concave microsite on a solufluction bench. Wetter areas occur in some concave microsites and swales. Small depressions show evidence of standing water while standing water was observed in a few rock-bottomed microsites. Mostly non-wetland throughout area but transitioning to wetter open mixed sedge-shrub tussock tundra downslope with drainage patterns



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium uliginosum	8		Fac
2. Salix reticulata	15	Y	Fac
3. Dryas integrifolia	46	Y	FacU
4. Betula nana	10		Fac
5. Salix pulchra	10		FacW
6. Salix richardsonii	T		FacW
7. Empetrum nigrum	5		Fac
8.			
9.			
Total Cover: 88			
50% of total cover: 44 20% of total cover: 17.6			

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:	—	X 1 =	—
FACW species:	16	X 2 =	32
FAC species	39	X 3 =	117
FACU species	53	X 4 =	212
UPL species	—	X 5 =	—
Column Totals:	108	(A)	361 (B)

PI = B/A = 3.3

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cassiope tetragona	4	Y	FacU
2. Saussurea angust. folia	T		Fac
3. Carex scirpoidea	4	Y	FacU
4. Bistorta plumosa	3		FacU
5. Stellaria longipes	T		Fac
6. Papaver Macouniii	T		FacU
7. Arnica Lessingii	T		
8. Saxifraga Nelsoniana	T		
9. Carex membranacea	6	Y	FacW
10. Potentilla Geum Rossii	2		FacU
Total Cover: 20			
Parrya nudicaulis T 50% of total cover: 10		20% of total cover: 4	
Poa sp.	T		
Festuca altaica	T		Fac
Equisetum arvense	T		Fac
Bistorta vivipara	T		Fac

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

— Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

PA007

WETLAND DETERMINATION DATA FORM

7/9/15 WB4PA007 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O; 0-3								
A 3-7.5	10YR 2/2	100					SiL	
Bw 7.5-10	10YR 5/3	100					VGR Loam	~35% gravel
Bw2 10-20+	10YR 4/3	92	7.5YR 4/6	3	C	M	VGR SaL	~35% gravel
		5	10YR 5/2	5	D	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes: No permafrost observed in 24" Pit located in a concave microsite below a solufluction lobe. Wetter sites are nearby. Much drier sites are within plot/nearby.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N not in Plot	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N*
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Surface water observed in a few microlows just beyond the plot.	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y - Other - standing water in a few microlows at edge of 26' diameter plot	
Water Table Present (Y/N): N	Depth (in): NA		
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA	

Notes:

PA007

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA007 Field Target: 15308 Date: 7/9/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in ~~logbook~~ form?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — X

Wetland Scientist (print) — **Signature / Date**

X Bryan Strong — X 7/9/15

Field Crew Chief (print) — **Signature / Date**

PA008
N-T

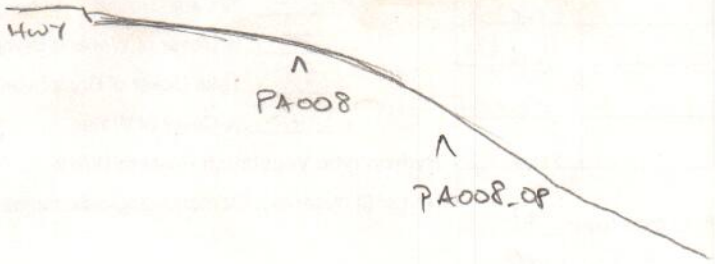
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X Facility			**Field Target:** 15268	**Map #:** 1 **Map Date:** 6/29/15
Date: 7/10/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA008	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** N/A off ROW		
Latitude: 69° 08' 46.27" N		**Longitude:** 148° 50' 24.14" W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 40	**Picture No.:** P_W84PA008_VEG, VEG-PIT-PVG		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Shoulder slope
Slope (%): 7-8% measured Aspect: W 290°	Local relief (concave, convex, none): Convex, tussocky-moderate
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B, III A2, II C2	Evidence of Wildlife Use: Caribou sheds
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry Conditions	Are "Normal Circumstances" present: Dry conditions 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:** U OMSST
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. Dry conditions. Soil has low moisture content above the frost table. Low chroma parent material. Concentrations appear to be driven by frost processes and may form primarily out of the growing season. Spotty reaction to alpha alpha (~5%) starting at 13" below the mineral soil surface. No evidence of surface water. Mixed shrub-tussock sedge tundra. Do to dry conditions, a site revisit would be advisable. Marginal but, appears to be non-wetland.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix glauca	8	Y	FAC
2. Betula nana	17	Y	FAC
3. Rhododendron tomentosum	4		FacW
4. Vaccinium vitis-idaea	1		Fac
5. Empetrum nigrum	4		Fac
6. Salix reticulata	T		Fac
7. Vaccinium uliginosum	T		Fac
8. Salix pulchra	4		FacW
9. Salix richardsonii	T		FacW

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: 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:	33	X 2 =	66
FAC species	59	X 3 =	177
FACU species	4	X 4 =	16
UPL species	—	X 5 =	—
Column Totals:	96	(A)	259 (B)

PI = B/A = 2.70

Shrubs

Arctous rubber 2 Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	4		FacW
2. Bistorta plumosa	2		FacU
3. Cassiope tetragona	1		FacU
4. Arctagrostis latifolia	20	Y	FACW
5. Stellaria longipes	T		Fac
6. Carex bigelowii	25	Y	FAC
7. Pyrola asarifolia	T		FacU
8. Eriophrum vaginatum	1		FacW
9. Saussurea angustifolium	1		Fac
10. Pedicularis labradorica	T		FacW

Total Cover: 55

50% of total cover: 27.5 20% of total cover: 11

Saxifraga nelsonii T UPL

Luzula sp T —

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

2 % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

6 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

PA008

WETLAND DETERMINATION DATA FORM

7/10/15 WB4PA008 Y

SOIL Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-2							fibric	feather moss fibers
Oe 2-5							hemic	
5-11	2.5Y 4/2 +	85	10YR 4/4 —	5	C	M	Loam	3% gravel
	2.5Y 5/1	10						
11-13.5	2.5Y 4/1		10YR 4/4 —	8	C	M	Loam	4% gravel
13.5-16	2.5Y 4/1	82						
	10YR 3/1	10	10YR 4/4 —	8	C	M	Loam	4% gravel, frozen, ~50% alpha alpha positive

[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) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[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: Permafrost Depth (inches): 13.5

Hydric Soil Present (Y/N): N - Marginal Concentrations are not associated with pore linings or roots. They appear to be driven by seasonal frost conditions

Notes: Alpha alpha positive is spotty starting at 13 inches below the mineral soil surface ~50% Alpha alpha positive. Dry conditions. No saturation. Soil has low moisture content above the frost table. Saturation will occur above the frost table early in the growing season and during wet periods. Reduction appears to be limited here - steeper convex slope

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) Y moderate tussocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Saturation will occur early in the growing season and during periods of very wet weather. Alpha alpha positive (~50%) starting at 13 inches below the mineral soil surface.	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

PA008

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none)_____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA008 Field Target: 15768 Date: 7/10/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in ~~logbook~~ Form?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☐ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☐ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☐ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/10/15

X Brian Stang — **Field Crew Chief (print)**

X — **Signature / Date** 7/10/15

PA009
Y-T

WETLAND DETERMINATION DATA FORM

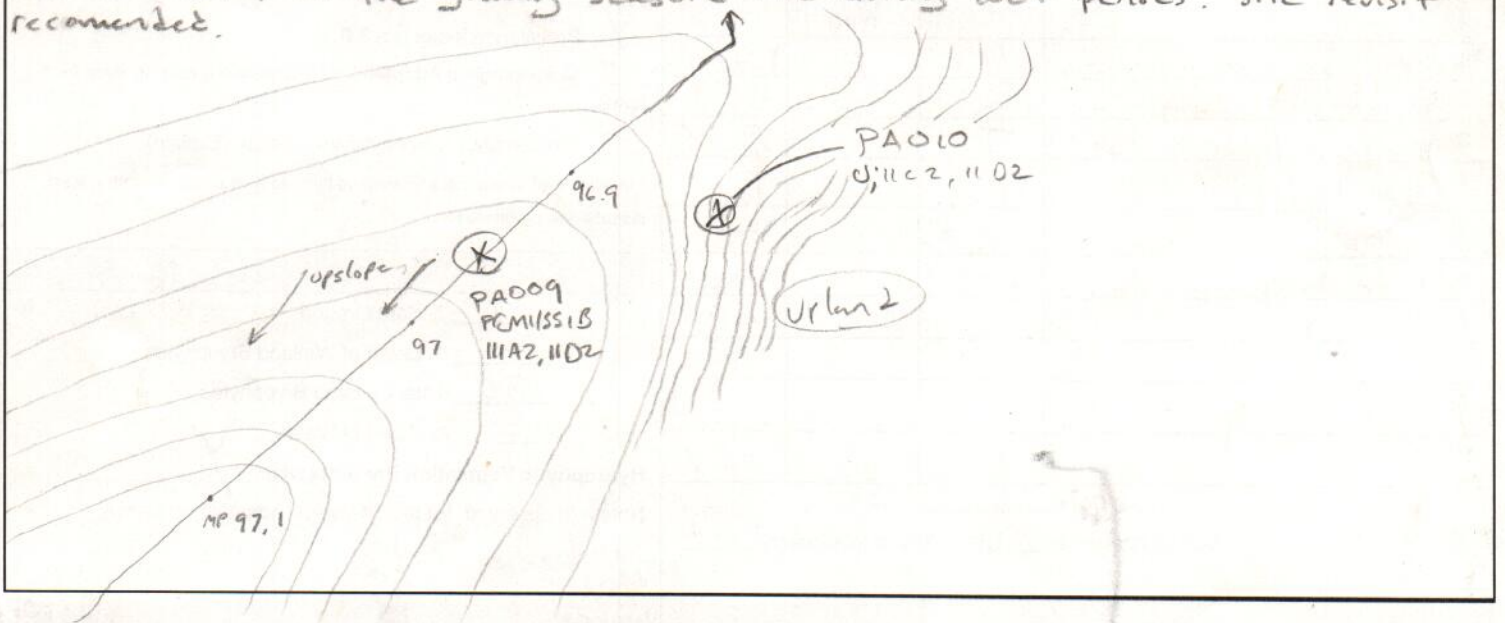
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15239	**Map #:** 5 **Map Date:** 6/29
Date: 7/10/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA009	
Investigators: Bryan Strong, Abigayle Fisher			**Team No.:** W84	
State: Alaska	**Region:** Alaska	**Milepost:** 96.95		
Latitude: 69°00'27.11"N	**Longitude:** 148°51'12.78"W		**Datum:** WGS84	
Logbook No.: 01	**Logbook Page No.:** 41	**Picture No.:** P_W84PA009_VEG_VEG_PT_RVG		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Ridge - near shoulder slope
Slope (%): 5% measured Aspect: East 80°	Local relief (concave, convex, none): Convex, hummocky - small
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB, IIC2, IIIA2	Evidence of Wildlife Use: Caribou scat
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No X (if no explain in Notes) Dry conditions	Are "Normal Circumstances" present: Dry conditions 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 X, 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 marginal No_____	**Wetland Type:** PEMI/SSIB mixed shrub-sedge tussock
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): IIIA2, IID2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Very marginal site. Frozen organics mixed (cryoturbated) with A and C material. Thin mineral A horizon over the frost table. Dry conditions. Saturation assumed early in the growing season and during wet periods. Site revisit recomended.



PA009

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	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 (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	20	Y	Fac
2. Rhododendrum tomentosum	13	Y	FacW
3. Salix reticulata	1		Fac
4. Empetrum nigrum	10		Fac
5. Vaccinium uliginosum	2		Fac
6. Betula nana	8		Fac
7. Salix pulchra	1		FacW
8. Artous rubra	T		Fac
9. Salix phlebophylla	T		FacW
Total Cover: 55			
50% of total cover: 27.5 20% of total cover: 11			

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: 61	X 2 = 122	
FAC species 53	X 3 = 159	
FACU species 2	X 4 = 8	
UPL species —	X 5 = —	
Column Totals: 116	(A) 289	(B)

PI = B/A = 2.49

Shrub
Andromeda polifolia T FacW

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	47	Y	FacW
2. Bistorta plumbosa	2		FacW
3. Cassiope tetragona	T		FacU
4. Carex bigelowii	12		Fac
5. Pedicularis sp.	T		—
6. Pedicularis capitata	T		FacU
7.			
8.			
9.			
10.			
Total Cover: 61			
50% of total cover: 30.5 20% of total cover: 12.2			

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.

2 % 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):

Sphagnum sp 10
Moss 60
Lichen 15
Litter 12

PA009

WETLAND DETERMINATION DATA FORM

7/10/15 W84PA009

SOIL	Date	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
Oe 0-5							Hemic	
A/Oe 5-8	10YR 2/2	100					SiL	not quite mucky SiL
OAC,f 8-16	10YR 2/1	15						ice lenses throughout
	2.5-7 5/1	10						¼" ice lenses at the surface of the frost table. Alpha alpha positive ~60% 70% organic fibers
	7.5-12 2.5/2	85+Organic fibers						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

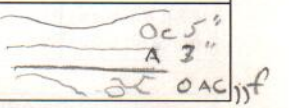
HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) Reduced matrix

[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: Permafrost Depth (inches): 8

Hydric Soil Present (Y/N): Y - Marginal Frozen organics-cryoturbated horizons mixing mineral A and C material with organics.

Notes: Alpha alpha positive in ~60% of frozen material. Most of 8-16" (OAC,f) is organic. Marginal reduced matrix here.



HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N*	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y** marginal	Microtopographic Relief (D4) N mostly small tussocks w/ some moderate hummocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: **Marginal C4. Alpha alpha positive in ~60% of frozen material. 8-16" is mostly organic, but still alpha alpha positive. *No saturation above frost table. Saturation assumed early in the growing season and during wet periods	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

PA009

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent__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)__34__ Dwarf shrub (<0.5m)__34__ Tall herb (≥1m)__0__ Short herb (<1m)__61__ Moss-Lichen__80__ Floating__0__ Submerged__8__

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) __X__

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_____ 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 Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)__X__

Evidence of Seeps and Springs (P): No Seeps or Springs__X__ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__X__

Watershed Land Use: 0-5% Rural__X__ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ 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: W89PA009 Field Target: 15239 Date: 7/10/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ Form?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☐ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☐ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☐ Appropriate hydrology indicators are marked?
- ☐ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/10/15

X Brian Strong — **Field Crew Chief (print)**

X — **Signature / Date** 7/10/15

PA010

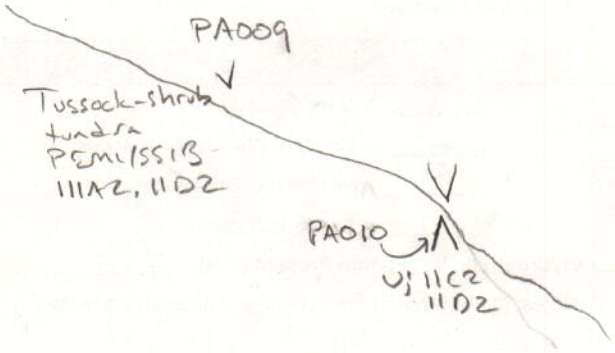
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)___ **Other** (explain)___			**Field Target:** 15238	**Map #:** 5 **Map Date:** 6/29
Date: 7/10/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA010	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 96.9		
Latitude: 69°00'28.49"N		**Longitude:** 148°51'05.19"W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 41	**Picture No.:** P_W84PA010_VEG_VEG_PIT_PLOTS		

SITE PARAMETERS			
Subregion: Arctic Foothills		Landform (hillslope, terrace, hummocks, etc.): Solufluction bench/Shoulder slope	
Slope (%): 13-15 *estimated		Local relief (concave, convex, none): Convex down; Hummocky moderate	
Pre-mapped Alaska LNG/NWI classification: U IID3		Evidence of Wildlife Use: Caribou scat	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes___ No X (if no explain in Notes) Dry Conditions		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:** U	
Wetland Hydrology Present? Yes___ No___		Alaska Vegetation Classification (Viereck): IIC2, IID2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Shoulder slope with solufluction lobes. Convex downslope and undulating to slightly concave across slope. Soft frost encountered at 22 inches. No saturation. Low chroma glacial till reworked by slope processes. Mix of shrub birch-willow and dwarf ericaceous shrub, Dryas is a minor component of the community.



PA010

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100 ft.)	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 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	38	Y	Fac
2. Betula glandulosa	1		Fac
3. Empetrum nigrum	10		Fac
4. Vaccinium vitis-idaea	1.2	Y	Fac
5. Rhododendron tomentosum	4		Fac
6. Salix pulchra	3		FacW
7. Salix glauca	2		Fac
8. Vaccinium uliginosum	4		Fac
9. Salix phlebophylla	1		FacU
Total Cover: 79			
50% of total cover: 39.5	20% of total cover: 15.8		

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:	11	X 2 =	22
FAC species	85	X 3 =	255
FACU species	2	X 4 =	8
UPL species	3	X 5 =	15
Column Totals:	101	(A)	300 (B)

PI = B/A = 2.97

Shrub

Dryas octopetala 3 UPL

Oxytropis sp. T

Arctous rubor 1 Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	3		FacW
2. Bistorta plumosa	1		FacU
3. Carex bigelowii	12	Y	Fac
4. Cassiope tetragona	T		FacU
5. Arnica lessingii	T		UPL
6. Pedicularis labradorica	T		—
7. Rubus chamaemorus	T		FacW
8. Stellaria longipes	T		Fac
9. Arctagrostis latifolia	5	Y	FacW
10. Saussurea angustifolia	1		FAC
Total Cover: 22			
50% of total cover: 11	20% of total cover: 4.4		
Poa sp.	T		—

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.

1 % Bare Ground

— % Cover of Wetland Bryophytes

99 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Feather Moss — 20%

Lichen — 10%

Sphagnum — 9%

Moss — 60%

PA010

WETLAND DETERMINATION DATA FORM

7/10/15 W84PA010 Y

SOIL Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 6-3							fibric	Platy parting to granular
Bw 3-7.5	5Y 5/2	100					SaL	
C 7.5-22	N4/0	90					GrSaL	Massive ~15% gravel
	5Y 5/2	10						
Cgf 22-24	N4/0	90					GrSaL	soft ice - thin ice lenses, - diggable, active layer/ seasonal frost
	5Y 5/2	10						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix. ~15% gravel

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		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: Seasonal frost/ active layer Depth (inches): 22

Hydric Soil Present (Y/N): N Low chroma parent material colors. No saturation

Notes: No positive reaction to alpha alpha. Solufluction benches. Colluvial soils - glacial till parent material

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

PA010

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species)_____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA010 Field Target: 15238 Date: 7/10/15

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?
- [ ] A detailed site sketch is included in ~~logbook~~ form?

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)?
- N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/10/15

X Brogan Strong — **Field Crew Chief (print)**

X — **Signature / Date** 7/10/15

PA011
Y-T

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15304	Map #: 2 Map Date: 6/29
Date: 7/10/11	Project Name & No.: Alaska LNG 60418403		Feature Id: W84PA011
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 87.15	
Latitude: 69°08'25.27"N	Longitude: 148°92'21.15"W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 41	Picture No.: P_W84PA011_VEG_VEG_PIT_PLUG	

SITE PARAMETERS

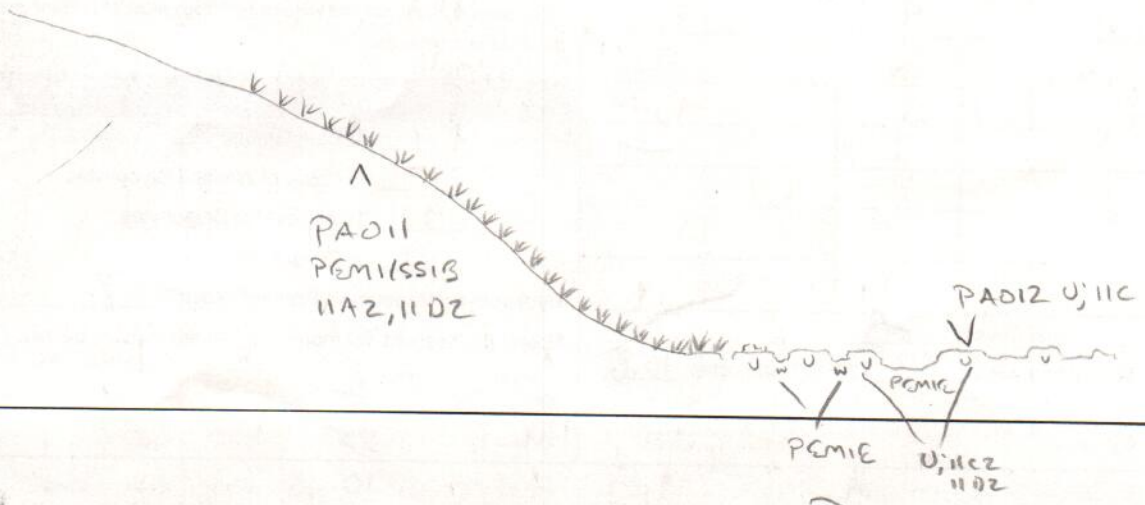
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 7 measured Aspect: S 220°	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: PEMI/SSIB IIIA2, IID2	Evidence of Wildlife Use: Ptarmigan Scat tussocky - moderate
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry Conditions	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) X, or Hydrology____ Naturally Problematic?	No SSS (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 marginal No____	Wetland Type: PEMI/SSIB
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): IIIA2 IID2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mixed shrub-sedge tussock tundra. 5-10% cover low willow and dwarf birch. - Mostly RHOTOM in the shrub strata. ERIVAG dominates the site. Dry conditions Marginal hydric soil. Positive reaction to alpha alpha dipiridyl in frozen mineral soil. Greater than 60% of 4 inches alpha alpha positive soil material (frozen) starting at 11 inches below the mineral soil surface, Spotty positive reaction above 11 inches in frozen soil material. ~1% positive reaction in unfrozen soil material.



Polygonal - High centered polygons