Part 7 of 19 of Appendix G of Resource Report No. 2

HT001

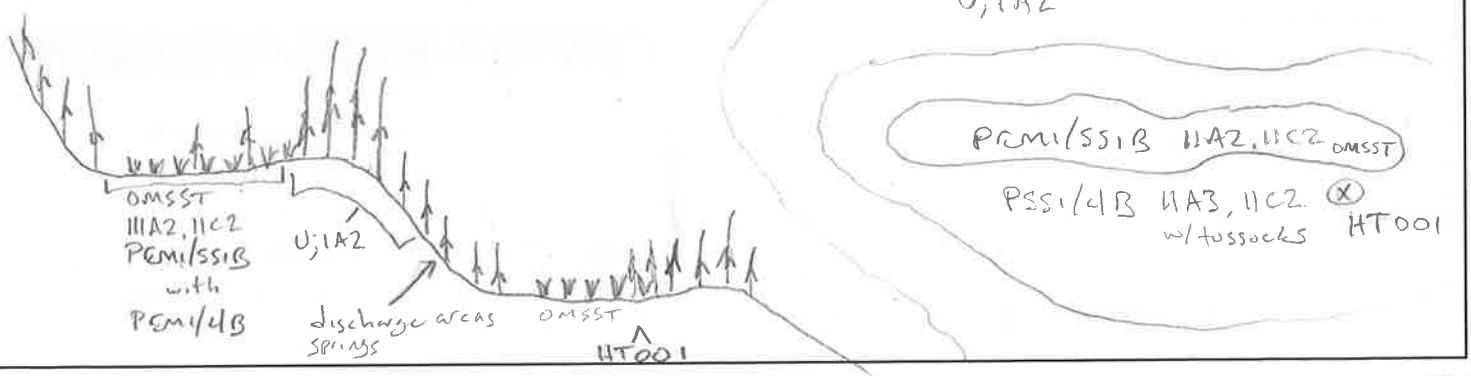
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 1509	Map #: 151 Map Date: 6/18/15
Date: 8/3/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT001	
Investigators: Bryan Strong Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 543.5		
Latitude: 63° 40' 52.168		Longitude: 148° 46' 14.05		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 15	Picture No.: W84HT001_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Flat to slightly concave tussocky - Moderate
Pre-mapped Alaska LNG/NWI classification: PEMI/SSIB IIIA2, IIC2	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: PSS1/4B ~~PSS1~~ ?
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIC2, IIA3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. A series of terraces with open mixed shrub tussock grading into stunted Picmar woodland and forest around the edges. Significant amounts of standing water between tussocks where spruce cover is sparse. Small amounts of standing water in the 13' radius plot. Areas of groundwater discharge on the steep slope south of point. Despite a few spring features, this area is precipitation driven EC49. Flat HGM or



HT001

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	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 mariana 2-15	20%	Y	FacW
2. Betula nana 1.5-2'	25%	Y	Fac
3. Salix pulchra	10%		FacW
4. Vaccinium uliginosum	7%		Fac
5. Vaccinium vitis idaea	1%		Fac
6. Vaccinium oxycoccus	2%		obl
7. Empetrum nigrum	10%		Fac
8. Rhododendron tomentosum	15%		FacW
9.			

Total Cover: 91

50% of total cover: 45.5 20% of total cover: 18.2

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	5	X 1 =	5
FACW species:	90	X 2 =	180
FAC species	53	X 3 =	159
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	148	(A)	344 (B)

PI = B/A = 2.32

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	35%	Y	FacW
2. Rubus chamaemorus	10%		FacW
3. Carex bigelowii	10%		Fac
4. Petasites frigidus	T		FacW
5. Pinguicula	T		
6. Carex aquatilis	3		obl
7.			
8.			
9.			
10.			

Total Cover: 58

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

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
- 75 % Cover of Wetland Bryophytes
- 85 Total Cover of Bryophytes
- 1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp 35
Aulacomium sp 40
Feather Moss 10
Water 1
lichen T

HT001

WETLAND DETERMINATION DATA FORM

8/3/15 WP4HT001 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 0-10								Sphagnum fibers
Oa 10-13								
Oaf 13-18+								

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) Y	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2)	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): Y

Notes:

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) 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:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
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): 6	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 3	EC: 49 ms 2.2°C pH 5.92

Notes: Soil pH - 50 2.6°C pH 5.74

HT001

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)_1_ Sapling (<5 dbh, <6m tall)_20_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_42_ Dwarf shrub (<0.5m) _28_ Tall herb (≥1m) _3_ Short herb (<1m) _5_ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _2_ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

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

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

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

Presence of Islands (M): Absent (none) _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_X_ 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_X_ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/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** _5.92_

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_____ Seeps Observed_____ Intermittent Spring_X_ 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 Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8HT001 Field Target: 15096 Date: 8/3/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators 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 8/3/15
Wetland Scientist (print)

Brian Strong 8/3/15

HT002

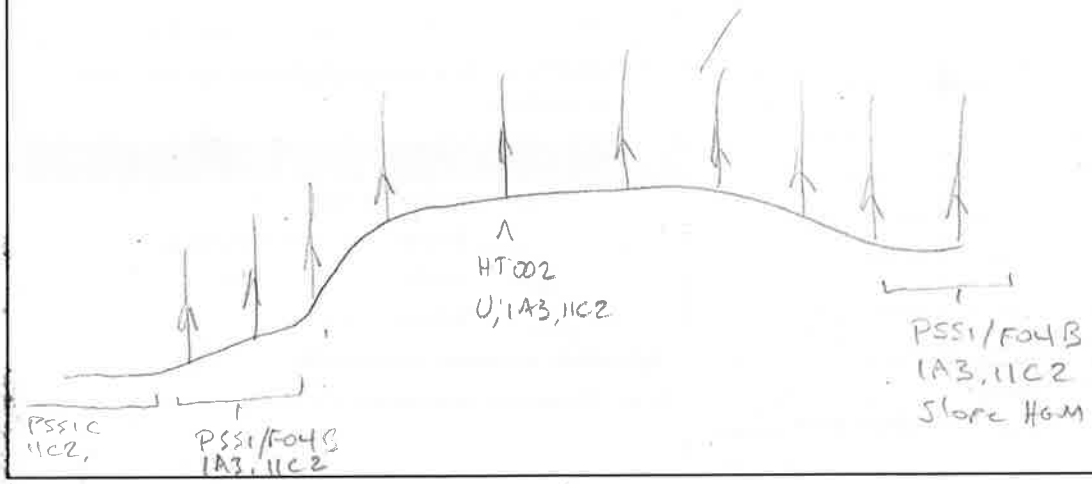
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15098	Map #: 152 Map Date: 6/18/15
Date: 8/3/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT002
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 544.35	
Latitude: 63° 40' 12.84	Longitude: 148° 45' 45.25		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 15	Picture No.: W84HT002_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%):	Local relief (concave, convex, none): Flat Hummocky - Small
Pre-mapped Alaska LNG/NWI classification: PSS4/1B UA2, IIC1, IIC2	Evidence of Wildlife Use: Passerine birds
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: non-wetland U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. White spruce woodland. Trees are 20-45' tall. Mostly 40-45' tall. Few saplings BETGLA, SALPUL, SALGLA 3-5' tall with RHOGRO, VACULI,



24002

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	12%	Y	FACU
2.			
3.			
4.			

Total Cover: 12

50% of total cover: 6 20% of total cover: 1.4

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 6-10'	10%		FACU
2. Salix glauca 3-4'	15%	Y	FAC
3. Salix pulchra 3-4'	2%		FACW
4. Betula glandulosa 3-6'	25%	Y	FAC
5. Salix myrtillifolia	3%		FACW
6. Vaccinium uliginosum	15%	Y	FAC
7. Vaccinium vitis-idaea	15%	Y	FAC
8. Rhododendron groenlandicum	10%		FAC
9. Rhododendron tomentosum	5%		FACW

Arctous rubra
Salix bebbiana

Total Cover: 100

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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: 21	X 2 =	42
FAC species 85	X 3 =	255
FACU species 22	X 4 =	52
UPL species	X 5 =	
Column Totals: 128 (A)		349 (B)

PI = B/A = 2.72

Arctous rubra 5%
Salix bebbiana 2%
Rosa acicularis T
Dasphoria fruticosa T

VEGETATION (use scientific names of plants)

Herb Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	8%	Y	FACW
2. Carex bigelowii	3%		FAC
3. Petasites frigidus	3%		FACW
4. Saussurea angustifolia	2%		FAC
5. Festuca altaica	T		
6.			
7.			
8.			
9.			
10.			

Total Cover: 16

50% of total cover: 8 20% of total cover: 3.2

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 75
Foliose Lichen 10
Lichen 15

HT002

WETLAND DETERMINATION DATA FORM

8/3/15 W84HT002 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	0-3								2.4" Oi horizon
BC	3-12	5Y 5/1	95	7.5YR 4/6	5	C	PL	S.C.L	Granular / fine
C	12-19	5Y 5/1	97	7.5YR 4/6	2	C	PL	S.C.L	Massive, saturation ~15"
				N5/0	1	D	RC		
Cf	19-20+	5Y 5/1	100					S.C.L	Massive, 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) 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): 19

Hydric Soil Present (Y/N): N

Notes: Low chroma parent materials. Glacial lake sediments. The soil is transitional with some redox features. No positive alpha alpha reaction. Non-hydric soil. Areas with concave slope shape are likely to host hydric soils in nearby areas

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) Y	Depth (in): 15	EC: NA

Notes: Small amount of free water seeping over the frost table at 19 inches

LH002

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: W84HT002 Field Target: 15098 Date: 8/3/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators 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 8/3/15
Wetland Scientist (print)

Bryan Stone 8/3/15

HT003

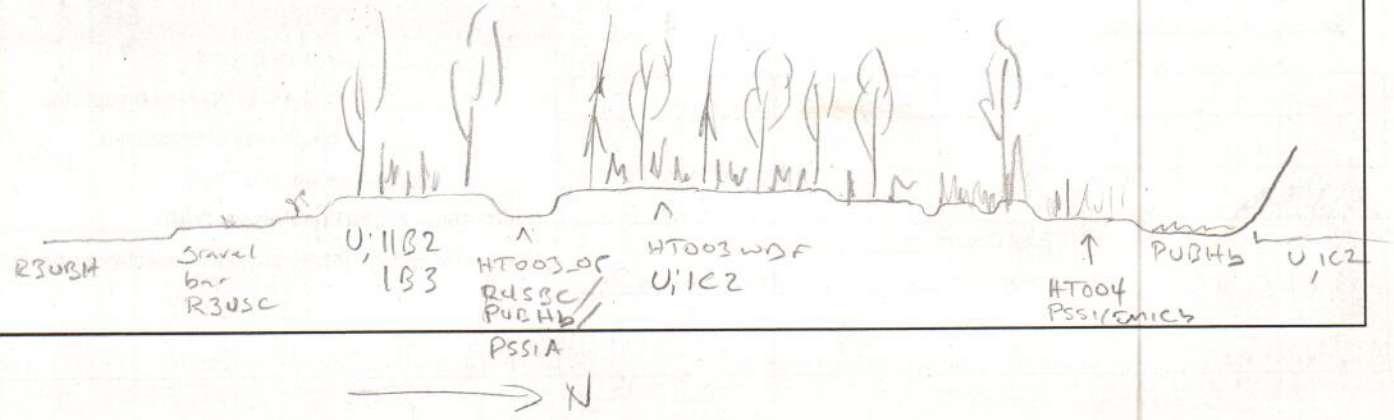
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15083	Map #: 168 Map Date: 6/18/15
Date: 8/3/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT003	
Investigators: Brian Strong Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 586.1		
Latitude: 63°12'46.09		Longitude: 149°19'36.75		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 17	Picture No.: W84HT003_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Flat Flat
Pre-mapped Alaska LNG/NWI classification: PF04/SS1C 1A2, 1182	Evidence of Wildlife Use: Live king, dead kings, bear 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.) Moose sign, beaver
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 N	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No N	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. Upland alluvial terrace bisected by old channels with beaver activity in some areas. These old channels are a mosaic of PUBH ponds, PUSC gravel bar/stream beds, PSS1A and PEMIC/F areas associated with some ponded areas. Terrace hosts open deciduous forest and open mixed forest, Cottonwood and White Spruce dominate. Understory is open and closed tall willow Live and dead king salmon, Bear, Moose, beaver sign.



1HT003

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	30%	Y	Fac U
2. Populus balsamifera	15%	Y	Fac U
3.			
4.			

Total Cover: 45%

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

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	5%		Fac U
2. Salix alexsensis	7%	Y	Fac
3. Salix barclayi	2%		Fac
4. ~~Salix~~ Bst			
5. Sherperdia canadensis	7%	Y	Fac U
6. Viburnum edule	7%	Y	Fac U
7. Vaccinium uliginosum	T		Fac
8. Vaccinum vitis-idaea	1%		Fac
9. Empetrum nigrum	T		

Total Cover: 29

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 11	X 3 =	33
FACU species 104	X 4 =	194
UPL species	X 5 =	
Column Totals: 115	(A)	227 (B)

PI = B/A = 1.97

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Hedysarum alpinum	2%		Fac U
2. Chamerion angustifolium	3%		Fac U
3. Lupinus arcticus	3%		Fac U
4. Equisetum arvense	1%		Fac
5. Aconitum delphinifolium	T		Fac
6. Sanguisorba sp	3%		N/A
7. Geranium erianthum	2%		Fac U
8. Cornus canadensis	30%	Y	Fac U
9. Actaea rubra	T		
10. Orchid sp	T		

Total Cover: 44

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

Mertensia paniculata T

Calamagrostis canadensis T

Galium boreale T

Anemone T

Artemesia tilesii T

Solidago multiradiata T

Pyrola sp T

Rubus arcticus T

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):

HT003

WETLAND DETERMINATION DATA FORM

8/3/15 W84HT003 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
O 0-2.5								
AC 2.5-6	2.5Y 4/1	100					Loamy Sand	
C 6-16	10YR 3/1	100					GR Sand	
C2 16-20	10YR 3/1	100					VGR 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: Somewhat excessively drained gravelly 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):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	**EC:** NA

Notes:

HT003

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: W84HT003 Field Target: 15083 Date: 8/3/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators 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 Andersen 8/3/15
Wetland Scientist (print)

Bryan Strong 8/3/15

HT004

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 1582	Map #: 68 Map Date: 6/18/15
Date: 8/3/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HT004	
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 586	
Latitude: 63° 12' 52.41	Longitude: 149° 19' 43.34		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 17	Picture No.: W84HT004_VEG_VEG_PIT_PLOT	

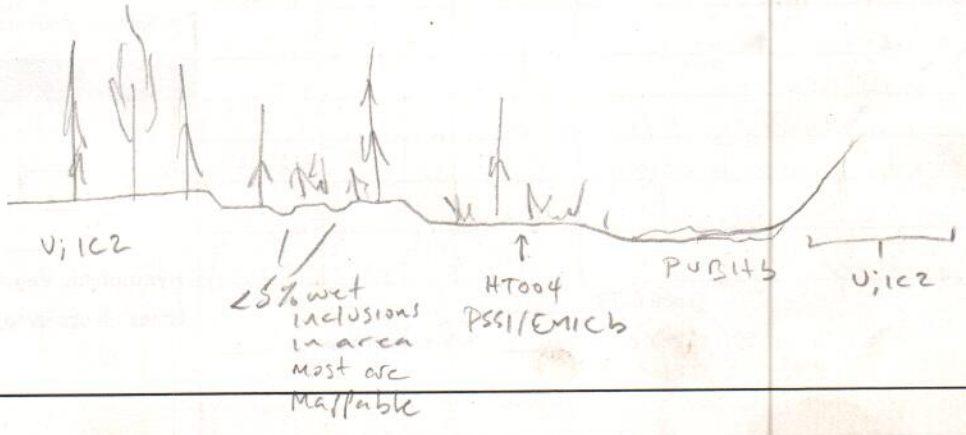
SITE PARAMETERS

Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Undulating, hummocky-mod
Pre-mapped Alaska LNG/NWI classification: PFO4/SSIC 1A2, 11B2	Evidence of Wildlife Use: Moose sign, bear sign, beaver 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 Y No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1/EMICb
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11B2, 111A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Beaver pond just north of point. Undulating topography with small channel-like features throughout the area. Scattered white Spruce 40-60' tall growing on small mounds. Mostly SALBAR (4-6') SALPUL (3') and CALCAN. Moderately dry microsite chosen for plot. Depressions and swale features showing evidence of standing water. Other areas just beyond plot with standing water.



HT004

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 40-60'	1%		FacU
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 barclayi 4-6'	30%	Y	Fac
2. Salix pulchra 2-3'	1%		FacW
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 32

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:		X 1 =	
FACW species:	25	X 2 =	50
FAC species	104	X 3 =	312
FACU species	2	X 4 =	8
UPL species		X 5 =	
Column Totals:	131	(A)	370 (B)

PI = B/A = 2.82

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	65%	Y	Fac
2. Equisetum arvense	7%		Fac
3. Equisetum pratense	13%		FacW
4. Sanguisorba canadensis	5%		FACW
5. Petasites frigida	6%		FacW
6. Rubus arcticus	2%		FAC
7. Chamerion angustifolium	1%		FacU
8. Mertensia paniculata	T		FacU
9. Cornus canadensis	T		FacU
10. Viola sp	T		

Total Cover: 99

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

_____ % 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):

1-HT004

WETLAND DETERMINATION DATA FORM

8/3/15 W84HT004 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
Oe 0-3								OcA - good deal of mineral
A 3-6	5YR 3/1	100						
Bg 6-18	N4/0	88	7.5YR 4/6	12	C	PL/RC	SiL	
Cg 18-21	N5/0	95					SiL	
			7.5YR 4/6	5	C	PL		

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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

Hydric Soil Present (Y/N): Y

Notes: Moderately dry microsite chosen for soil pit, Most of area is wetter with standing water, etc...

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) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) Y	Geomorphic Position (D2) Y
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) Y	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
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: Standing water near by. Saturation assumed at times during the growing season. Fluctuating water table due to beaver activity	
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:

HT004

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)_1_ Sapling (<5 dbh, <6m tall)_0_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_31_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _65_ Short herb (<1m) _34_ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _2_ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <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)_____ Moderate (broken irregular rings)_X_ High (small groupings, diverse and interspersed)_____

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_X_ 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_X_ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

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

LANDSCAPE VARIABLES (M)

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

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

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

Size: Small (<10 acres)_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: W84HT004 Field Target: 15082 Date: 8/3/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators 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 8/3/15

Wetland Scientist (print)

Brian Strong 8/3/15

H T005

WETLAND DETERMINATION DATA FORM

15110

SITE DESCRIPTION

Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15110	**Map #:** 140 **Map Date:** 6/18/15
Date: 8/4/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84HT005	
Investigators: Brenna Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 528.4	
Latitude: 63°49'50.27"	**Longitude:** 149°02'27.65		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 18	**Picture No.:** W84HT005_VEG_VEG_PIT-PLOT	

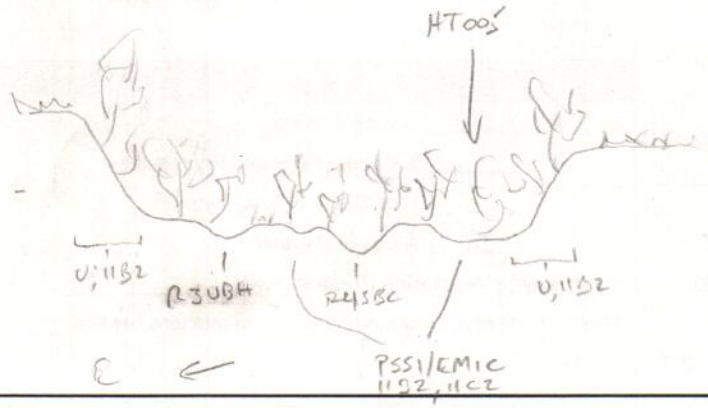
SITE PARAMETERS

Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Gully
Slope (%): 10-12% measured	Local relief (concave, convex, none): Concave across, undulating
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB 11C2, 11A2	Evidence of Wildlife Use: Moose sign
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 ✓ 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 X No____	**Wetland Type:** PSS1/EMIC
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11B2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Perennial stream on east side of gully feature. Tall willow (7-10' tall) interspersed with Bluejoint and SALPUL (2-3'). Numerous discontinuous channels and seepage areas. Some hoof iron deposits. Slope or Riverine HGM. West side of gully more Slope in nature. Betula glandulosa may be better characterized as B. kenaica - larger shrub form with leaves more similar to small B. neoalaskana. New nomenclature B. papyrifera. Stream channels numerous of various depths .5' to 1' deep generally fine sandy substrate. The channel on the east side is most likely perennial but, possibly still R4SBC



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 (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix alaxensis	15	Y	FAC
2. Salix Pulchra	12%		FACW
3. Salix glauca	2%		FAC
4. Betula glandulosa	10%		FAC
5. Alnus viridis	7%		FAC
6. Spiraea stevenii	+		FACU
7. Vaccinium uliginosum	20	Y	FAC
8. Betula nana	4		FAC
9. Ribes Triste	1%		FAC
Total Cover: 66			
50% of total cover: 33	20% of total cover: 13.2		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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: 13	X 2 =	26
FAC species 144	X 3 =	146
FACU species 12	X 4 =	48
UPL species	X 5 =	
Column Totals: 169 (A)		220 (B)

PI = B/A = 1.3

VEGETATION (use scientific names of plants)

Herb Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	80%	Y	FAC
2. Equisetum arvense	5%		FAC
3. Cornus canadensis	10%		FACU
4. Polemonium acutiflorum	3%		FAC
5. Chamerion angustifolium	2%		FACU
6. Ribes triste	1%		FAC
7. Rumex arcticus	T		FAC
8. Viola sp	T		
9. Arctagrostis lat. folia	1		FACW
10. Carex bigelowii	1		FAC
Total Cover: 103			
50% of total cover: 51.5	20% of total cover: 20.6		

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

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

HT005

WETLAND DETERMINATION DATA FORM

8/4/15 W84HT005 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
Bw	0-4	10yr 4/4	80	7.5yr 5/6	10	C	PL	fSaL	
		10yr 2/1	10						
C_1	4-9	N3/0						vfSaL	mica rich alpha elp
C_2	9-12	5GY 4/1	95	7.5yr 4/6	5	C	PL	fSaL	mica rich, alpha elpha positive
C	12-20	10yr 3/2	100					VGRCSand	~67% 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) weak Y		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: NA Depth (inches): NA

Hydric Soil Present (Y/N): Y

Notes: Reduced matrix, high water 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) Y	Stunted or Stressed Plants (D1) N
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)	Oxidized Rhizospheres along Living Roots (C3)	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	Microtopographic Relief (D4) N
Sediment Deposits (B2) X	Hydrogen Sulfide Odor (C1) Y	Salt Deposits (C5) N	FAC-Neutral Test (D5) Neutral
Drift Deposits (B3) Y	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) Y			

Surface Water Present (Y/N): Y	Depth (in): 3	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 7	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4	EC: 221 µs @ 11.3°C 6.1 pH

Notes:

HT005

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)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m) 90 Short shrub (0.5-2m) 20 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) 30 Short herb (<1m) 10 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_____ <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 X Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet X 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 X Fluvaquent Soils Sediment Created_____

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.1

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%) X High Gradient (≥2%)_____

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HTODS Field Target: 1510 Date: 8/4/15

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 8/4/15
Wetland Scientist (print)

Brian Strong 8/4/15

HTOOG

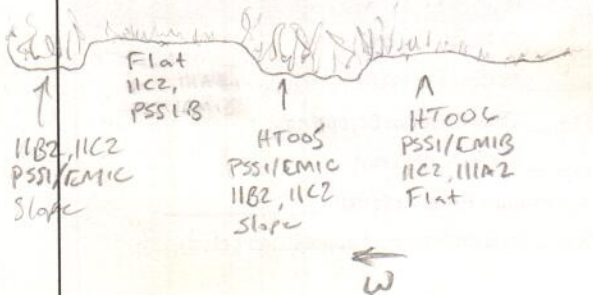
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15111	Map #: 140 Map Date: 6/18/15
Date: 8/4/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT006	
Investigators: Bruce Strong Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 528.5		
Latitude: 63°49'49.86		Longitude: 149°02'24.71		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 18	Picture No.: W84HT006_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 8	Local relief (concave, convex, none): Slightly concave - hummocky moderate
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB IIC2, IIIA2	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 Y No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1/EMIB
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Low open willow-birch scrub with moderate hummocks and tussocks. Sparcely distributed PICGLA saplings. Point located in a drier part of the polygon. Low open willow-birch scrub transitions into ericaceous dwarf shrub to the northeast. Permafrost at 19 inches. Active layer between 15-19 inches has very fine platy structure from ice lense formation. Several gullies/swales west of point have small streams/groundwater discharge and host tall willow-alder interspersed with bluejoint and SALPUL. Probably best represented as slope HGM rather than riverine.



HT006

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: 0			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 4-6'	5E/P	E/P	
2. Salix glauca 2-3'	Fac	10	Y
3. Salix pulchra 2-3'	FacW	2	
4. Alnus viridis 2-3'	Fac	5%	
5. Betula nana 2-3'	Fac	10	Y
6. Vaccinium uliginosum	Fac	7%	Y
7. Rhododendron tomentosum	FacW	5%	
8. Vaccinium vitis-idaea	Fac	3%	
9. Betula neoalaskana	Fac	T	
Total Cover: 42			
50% of total cover: 21 20% of total cover: 8.4			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 23	X 2 =	46
FAC species 50	X 3 =	150
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 73	(A)	196 (B)

PI = B/A = 2.68

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	Fac	10	Y
2. Eriophorum vaginatum	FacW	15	Y
3. Equisetum arvense	Fac	5	Y
4. Petasites frigidus	FacW	1	
5. Arctagrostis latifolia	FacW	2	
6. Festuca altaica	T	T	
7.			
8.			
9.			
10.			
Total Cover: 33			
50% of total cover: 16.5 20% of total cover: 6.6			

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

____ % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

HT006

WETLAND DETERMINATION DATA FORM

8/4/15 W84HT006

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								
Oe 3-5								
Oa 5-6								
A 6-8	2.5Y 2.5/1	100					MK VFSaL	very rich in organics, saturated
G. 8-15	5Y 5/1	75	10YR 5/8	25	C	PL	fSaL	mica rich
Cg 15-20	5Y 5/1	97	10YR 5/8	3	C	PL	fSaL	fine platy - firm. Reflects seasonal frost table

[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 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): 19 — Firm fine platy fine sandy loam also a perching layer at 15". This material indicates the active layer of seasonally frozen material

Hydric Soil Present (Y/N): Y — 15-19+ is not saturated.

Notes: Some free water seeping in over fine platy, firm, fSaL (high in mica). Seasonal frost will occur here for extended periods. Very coarse iron concentrations are weakly cemented occuring in very large areas and initialy texture as loamy sand before pressure is applied. Histic epipedon invoked with mucky vfSaL included in organic measurments.

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) M
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4)	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: Small amount of free water seeping above perching layer at 15". Not saturated from 15-19". Permafrost below 19".	
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): 12 free water	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 7 - 15	EC: NA

Notes:

HT006

AQUATIC SITE ASSESSMENT DATA FORM

15111

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__35__ Dwarf shrub (<0.5m) __8__ Tall herb (≥1m) __2__ Short herb (<1m) __31__ Moss-Lichen__90__ 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__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_____ 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 Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84H1006 Field Target: 15111 Date: 8/4/15

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 8/4/15
Wetland Scientist (print)

Brian Strong 8/4/15

HT007

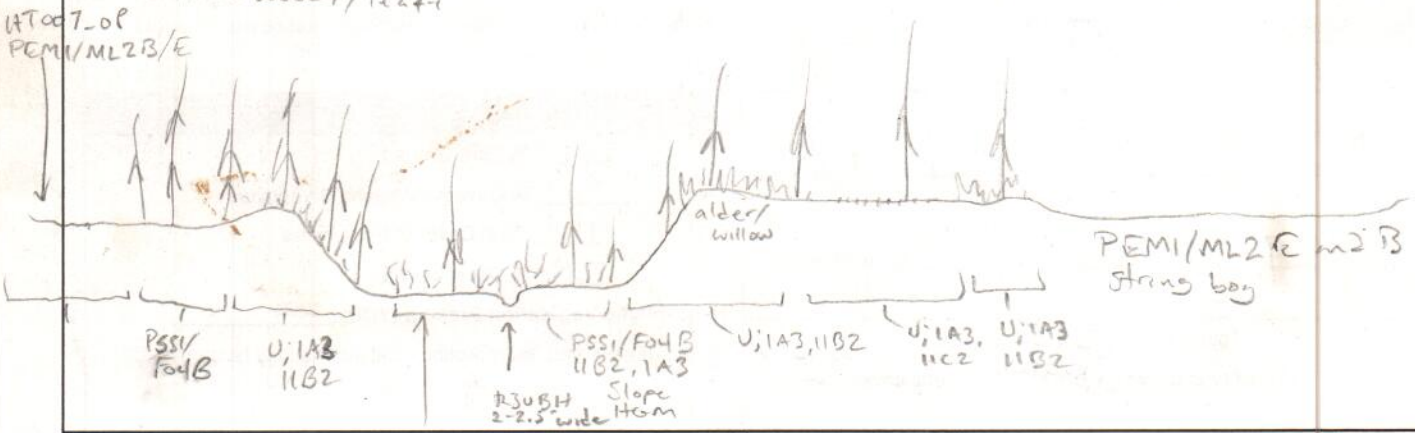
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 5081	Map #: 170 Map Date: 6/18/15
Date: 8/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT007	
Investigators: Bryan Strong Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 589.1		
Latitude: 63°10'42.30		Longitude: 149°21'41.12		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 19	Picture No.: W84HT007_VEG_VEG_PIT PLUG		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Gully - stream terrace
Slope (%): 2-3%	Local relief (concave, convex, none): Concave across, hummock mod moderate
Pre-mapped Alaska LNG/NWI classification: U;1A2, 11B2	Evidence of Wildlife Use: Moose sign
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes Y No____
Hydric Soil Present? Yes ✓ No____	Wetland Type: PSS1/FO4B
Wetland Hydrology Present? Yes ✓ No____	Alaska Vegetation Classification (Viereck): 11B2, 1A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Gully 15-20' deep. Nearly closed canopy of willow - SALPUL 5-7' SALRIC, SALBAR Scattered PICGLA 35-60' with a few large saplings. Stream in plot draining to the South obscured by closed willow canopy 2-2.5' wide .5-1.5' deep. lamic, slow moving No evidence of overbank flooding. Area is mostly sphagnum. A few microlows show evidence of standing water. High diversity in vegetation community. SALRIC has some intermediate characteristics and appears to be hybridizing with S. barclayi Wet sedge meadow just north of the plot. Slope HGM FEC 77mS @ 7.2°C. Stream has a substrate of litter-woody/leafy



HT007 WDF
PSS1/FO4B
11B2, 1A3
Slope HGM
Open willow
Nearly closed canopy

Soil pit FEC 77mS 7.2°C
pH 5.7

HT007

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	7%	Y	FacU
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. Picea glauca 8-15'	3%		FacU
2. Salix pulchra 5-7'	55	Y	FacW
3. Salix barclayi 4-6'	5		Fac
4. Spirea stevensii	2%		FacU
5. Vaccinium uliginosum	5%		Fac
6. Linnaea borealis	3%		FacU
7. Vaccinium vitis-idaea	7%		Fac
8. Betula nana 2'	10%		Fac
9. Salix richardsonii 3-6'	10		FacW

Total Cover: 106

50% of total cover: 53 20% of total cover: 21.2

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	3	X 1 =	3
FACW species:	73	X 2 =	146
FAC species	45	X 3 =	135
FACU species	22	X 4 =	88
UPL species		X 5 =	
Column Totals:	143	(A)	372 (B)

PI = B/A = 2.60

Empetrum nigrum 6% Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	2%		Fac
2. Equisetum arvense	8%	Y	Fac
3. Sanguisorba canadensis	6%	Y	FacW
4. Rhodiola rosea	T		
5. Petasites frigidus	2%		FacW
6. Comarum palustre	2%		Obl
7. Cornus canadensis	7%	Y	FacU
8.			
9. Equisetum fluviatile	1%		Obl
10. Viola sp	T		

Total Cover: 30

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

Aconitum delphiniifolium T Fac

Rubus chamaemorus T Valeriana capitata T

Anemone sp T

Rumex arcticus 2% Fac

Poa sp T

Stellaria sp 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.

1 % Bare Ground

90 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp 85

Water 2

Bare 1

Litter 5

Liverwort 5

HT007

WETLAND DETERMINATION DATA FORM

8/5/15 W84HT007 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
O 0-3								Sphagnum fibers
Ag 3-8	N3/0	20					GR S.L granular	saturated
	5Y4/1	80						
Bw 8-12	10YR 4/4	100					GR S. CL granular	basically a band of iron staining marking persistent water table
Cg 12-16+	N4/0	90	7.5YR 4/4	10	C	PL	VG Clay massive	alpha alpha positive
								massive VG clay

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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 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: Massive Clay Loam Depth (inches): 12

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	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) Y	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3)	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) 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): Y	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 11"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6	EC: 77mS @ 7.2°C pH 5.7 → Soil pit water

Notes: Stream in plot. No evidence of overbank flooding
Stream EC 26mS @ 9.1°C pH 5.7
Soil pit EC 77mS @ 7.2°C pH 5.7

HT007

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 __70__ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__7__ Sapling (<5 dbh, <6m tall)__3__ Tall shrub (2-6m)__70__ Short shrub (0.5-2m)__22__ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) __2__ Short herb (<1m) __28__ Moss-Lichen__90__ 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__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_____ Mineral: Silty_____ Mineral: Clayey__X__

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__X__ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** __5.7__

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_____ 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: HT007 Field Target: 15081 Date: 8/5/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 8/5/15 — **Signature / Date**

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

X [signature] 8/5/15 — **Signature / Date**

HT008

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: L079	Map #: ____ Map Date: 6/18/15
Date: 8/5/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT008	
Investigators: Brian Strong Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 589.6		
Latitude: 63° 10' 20.66		Longitude: 149° 21' 38.20		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 1	Picture No.: W84		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace / Flood plain
Slope (%): 2-3%	Local relief (concave, convex, none): Flat Flat
Pre-mapped Alaska LNG/NWI classification: PFO4/1C 1C2, 11B2	Evidence of Wildlife Use: Moose nibbles on cottonwood + willow
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 Y No____
Hydric Soil Present? Yes Y* No____	**Wetland Type:** PSS1A
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11B2

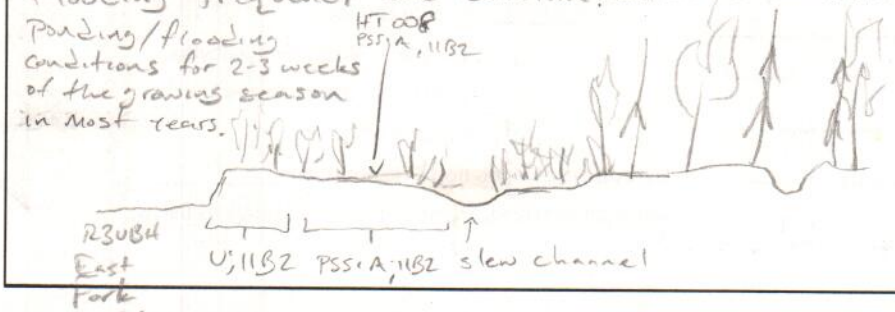
Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Revegitated gravel bar. Evidence of overbank flooding every 1-2 years - some rack, drift, recent sediment deposits. May not flood long enough to make flooded criteria. Soil shows no evidence of reducing conditions. Based on sediment deposits and rack / drift, PSS1A 11B2 over part of the low terrace where shrubs are lower

Problematic Soils - Fluventic. Low terrace shows evidence of regular overbank flooding likely occuring once each year during spring breakup.

Problematic veg - Early successional community with young cottonwood saplings mixed with willow.

Marginal site. Further investigation of flooding conditions would be needed to confirm flooding frequency and duration. Based on available evidence, The site is likely to experience ponding/flooding conditions for 2-3 weeks of the growing season in most years.



HT008

WETLAND DETERMINATION DATA FORM

linear shaped plot

VEGETATION (use scientific names of plants)

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

Tree stratum added to shrub stratum <5% cover

Total Cover: _____

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Picea glauca	T		FacU
1. Populus balsamifera	25	Y	FacU
2. Salix glaxensis	10	Y	Fac
3. Salix richardsonii	7%		FacW
4. Salix barclayi	2%		Fac
5. Alnus viridis	8%		Fac
6. Shepherdia canadensis	5%		FacU
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: 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: 10	X 2 =	20
FAC species 27	X 3 =	81
FACU species 40	X 4 =	160
UPL species	X 5 =	
Column Totals: 77	(A)	261 (B)

PI = B/A = 3.3

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	5%	Y	Fac
2. Equisetum variegatum	3%		FacW
3. Hedysarum alpinum	T		FacU
4. Agrostis scabra	T		Fac
5. Geranium erianthum	T		FacU
6. Artemesia norvegica	T		FacU
7. Lupinus arcticus	4	Y	FacU
8. Chamerion angustifolium	2%		FacU
9. Trisetum sp	T		
10. Poa sp	T		

Total Cover: 17

50% of total cover: 8.5 20% of total cover: 3.4

Rubus arcticus 2% FAC Fac

Aster sibericus T

Equisetum arvense T Fac

Cornus canadensis 1% FacU

Astragalus sp T

Elymus trachycaules T FacU

Mertensia paniculata T

Rhodiola rosea T

Pedicularis sp T

Luzula sp T

Petasites Frigidus FacW T

Stellaria sp T

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

Y Problematic Hydrophytic Vegetation[1] (Explain)

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

90 % Bare Ground

0 % 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):

Problematic vegetation, Early successional gravel bar/low riverine terrace showing evidence of regular overbank flooding

HT008

WETLAND DETERMINATION DATA FORM

8/5/15 W84 HT008

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)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Notes
C_1	0-5	5Y 3/1	100					Sand	
C_2	5-11	10YR 3/1	100					Sand	Gravel ~10%
C_3	11-17	10YR 3/1	100					VGR Sand	~35% Cobble and 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 Depth (inches): N

Hydric Soil Present (Y/N): Y - Ponded/flooded for 2+ weeks based on sediment deposits, rack and drift. No evidence of anerobic conditions. No redox features. Well drained sand.

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) Y	Geomorphic Position (D2) Y
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) Y	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) Y	Dry-Season Water Table (C2) N	Notes: Small ~~pond~~/slew channel at edge of plot.	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 12"	**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:

A1008

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)_3_ Sapling (<5 dbh, <6m tall)_25_ Tall shrub (2-6m)_27_ Short shrub (0.5-2m)_5_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _0_ Short herb (<1m) _17_ Moss-Lichen_10_ 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) _____ 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_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 _____ Riverine _X_ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_ "A" 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.)_X_ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_X_ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____ Possibly 2-3

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

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

Surficial 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_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT008 Field Target: 15079 Date: 8/5/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Jennifer Anderson — X [signature] 8/5/15

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

X Brian Strong — X [signature] 8/5/15

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

HT009

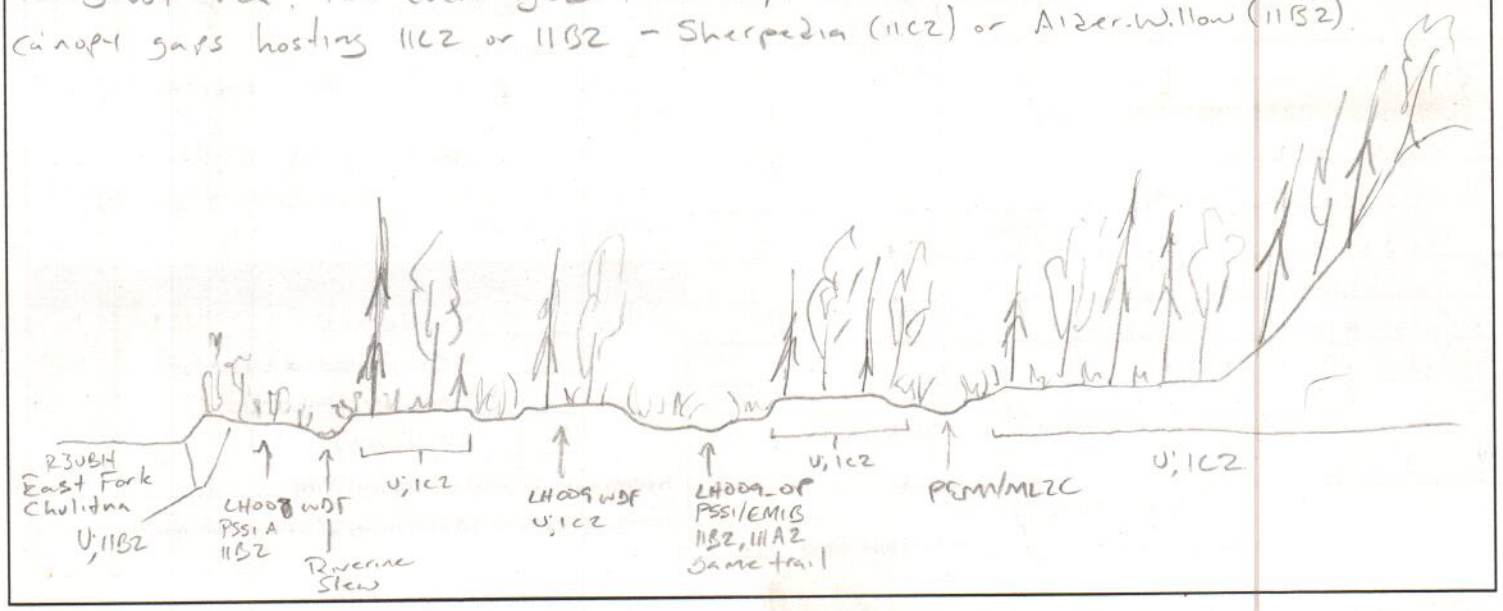
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)_____ Other (explain)_____			Field Target: 150 80	Map #: 171 Map Date: 6/18/15
Date: 8/5/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT009	
Investigators: Bryan Strong Jennifer Anderson				Team No.: 84
State: Alaska	Region: Alaska	Milepost: ~89.6		
Latitude: 63.172955		Longitude: -149.360258		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 21	Picture No.: W84HT009_VEG_VEG-PIT-PLUG		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2-3	Local relief (concave, convex, none): Flat to slightly convex Flat micro
Pre-mapped Alaska LNG/NWI classification: PF04/1C 1C2, 11B2	Evidence of Wildlife Use: Beaver 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 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): 1C2, 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Dry terrace. Small abandoned channels occur as wet swales on the terrace. Most appear to be PSS1/EM1B but a few may be PSS1/EM1C. Beaver sign throughout area. Tall even aged PICGLA, POPTRE dispersed somewhat unevenly with canopy gaps hosting 11C2 or 11B2 - Sherpedia (11C2) or Alder.Willow (11B2).



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	19%	Y	FacU
2. Populus balsamifera	16%	Y	FacU
3.		N	
4.		N	

Total Cover: 35

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	4	N	FacU
2. Populus balsamifera	3%	N	FacU
3. Sherperdia canadensis	20%	Y	FacU
4. Alnus viridis	3%	N	Fac
5. Viburnum edule	3%	N	FacU
6. Salix glaxensis	5	Y	Fac
7. Ribies triste	T	N	Fac
8. Empetrum nigrum	5%	Y	Fac
9.		N	

Total Cover: 43

50% of total cover: ~~21.5~~ 26.5 20% of total cover: 8.6

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 8 (B)

% Dominant Species that are OBL, FACW, or FAC: 28% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 14	X 3 =	42
FACU species 78	X 4 =	312
UPL species	X 5 =	
Column Totals: 92	(A)	354 (B)

PI = B/A = 3.84

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	3%	Y	FacU
2. Pirola minor	T	N	Fac
3. Rubus arcticus	T	N	Fac
4. Mertensia paniculata	1%	N	FacU
5. Hedysarum alpinum	T	N	FacU
6. Spiraea anotinum	3%	Y	FacU
7. Calamagrostis canadensis	T	N	Fac
8. Aster sibericus	T	N	?
9. shy maiden	T	N	?
10. Orthilia secunda	3%	Y	FacU

Total Cover: 14

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

Astragalus sp T Fac

Crepis capillaris 3% FacU

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):

Feather Moss 10

litter 90

HT009

WETLAND DETERMINATION DATA FORM

8/5/15 W841HT009

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 0-3	~~10YR 3/3~~						GRSaL	~30% gravel
C 3-18	10YR 3/1						VGRSaL	~45% 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: 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:

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: WRHT009 Field Target: 15080 Date: 8/5/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 8/5/15 — **Signature / Date**

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

X [signature] 8/5/15 — **Signature / Date**

HTO10

WETLAND DETERMINATION DATA FORM

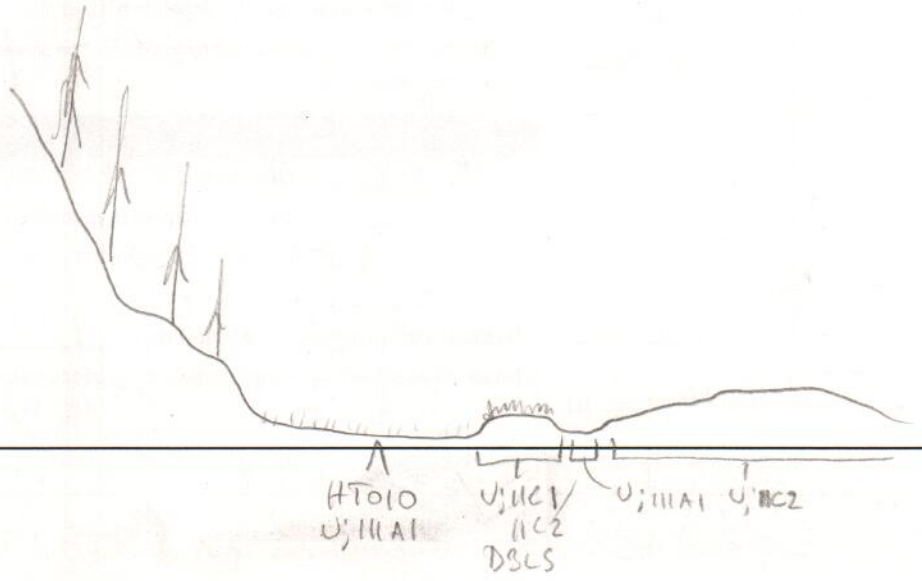
SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15085	**Map #:** 167 **Map Date:** 6/18/15
Date: 8/6/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84 HTO10	
Investigators: Bryan Stong, Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 585.7	
Latitude: 63° 13' 05.84	**Longitude:** 149° 19' 56.50		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 22	**Picture No.:** W84HTO10_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 2.5	Local relief (concave, convex, none): Concave, Hummocky-small
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B UC2, IIIA2	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) ATV trail in plot
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): III A 1

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

Swale with very well drained soil. Mesic herb community. Downgradient to the east is a dry stream channel incised ~1' deep into the swaling landscape. No evidence of water but, likely drains snowmelt seasonally as an RUSBA channel.



HT010

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: _____

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

Sapling/Shrub Stratum (2-6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix reticulata	7	Y	FAC
2. Salix myrtillifolia	3%	Y	FACW
3. Dasiphora fruticosa	3%	Y	FAC
4. Betula glandulosa	T		FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 13

50% of total cover: 6.5 20% of total cover: 2.6

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:	X 1 =	
FACW species: 5	X 2 =	10
FAC species 97	X 3 =	291
FACU species 16	X 4 =	64
UPL species	X 5 =	
Column Totals: 118	(A)	365 (B)

PI = B/A = 3.09

VEGETATION (use scientific names of plants)

Herb Stratum (2-6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Festuca altaica	20%	Y	FAC
2. Festuca rubra	65%	Y	FAC
3. Artemesia norvegica	3		FACU
4. Solidago multiradiata	10%		FAC U
5. Aconitum delphinifolium	4%		FAC
6. Sanguisorba canadensis	2%		FACW
7. Papaver sp	T		
8. Bistorta vivipara	T		FAC
9. Gentiana sp	T		
10. Rhodiola integrifolia	T		FAC

Total Cover: 107

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

- Rhinanthus minor 3 FACU
- Achillea millifolium T
- Gentiana propinqua T
- Stellaria sp T
- Viola sp T
- Carex sp T
- Agrostis scabra FAC T
- Senecio lugens T
- Potentilla sp T
- Gentianella 2 T
- Orientalis europea T
- Pleum alpinum T

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

_____ Total Cover of Bryophytes

_____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather moss

Lichen

HT010

WETLAND DETERMINATION DATA FORM

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

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-2								
A 2-5	10YR 3/2	100					SiL	GR 7
Bw1 5-12	10YR 4/3	100					STSiL	Granular GR 10, Stone 10
								One large Stone in horizon
Bw2 12-16	10YR 4/3	100					GRSiL	Granular GR 15
2C 12-20	2.5Y 5/3	100					VGRfSaL	Glacial 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:

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) 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:

HT010

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: W84H T010 Field Target: 15085 Date: 8/6/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson X 8/6/15

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

X Bryan Strong X 8/6/15

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

HTO11

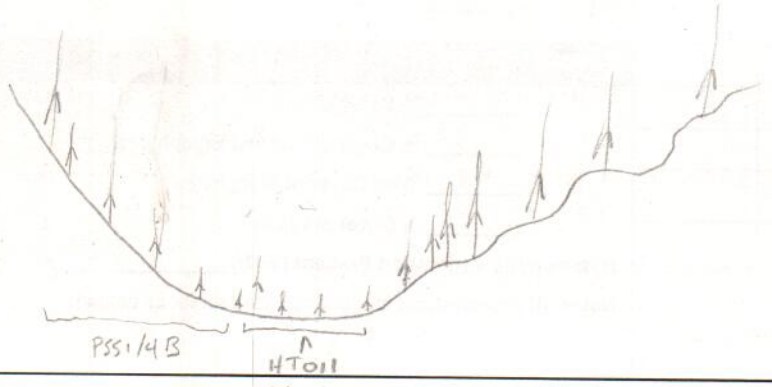
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 5099	Map #: 148 Map Date: 6/18/15
Date: 8/6/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HTO11	
Investigators: Brian Strang Jennifer Anderson				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 542.3		
Latitude: 63°41'44.27		Longitude: 148°47'03.61		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 22	Picture No.: W84HTO11_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 5 Aspect: W	Local relief (concave, convex, none): Concave, Hummocky - moderate
Pre-mapped Alaska LNG/NWI classification: PSS4/1B IIA2, IIB2, IIC2	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 Y No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1/EM1B
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Swale at the base of a Steep Hillslope/Mountain Slope low willow and birch scrub but mostly dwarf ericaceous shrub in the swale bottom. Scrub birch and willow 3-4' tall on the foot/toeslope above point with 10-20% mixed spruce 4-10' tall stunted saplings. To the west of the swale more tree sized PICGLA. Small pond upgradient feeds groundwater through the trough/swale. A mix/transition of groundwater and more recent precipitation - Slope - Flat transition here.



1+T011

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 400)	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 2.6'	5%		FacU
2. Picea mariana 2.6'	1%		FacW
3. Salix pulchra 1.5'	10%		FacW
4. Rhododendron tomentosum	20%	Y	FacW
5. Vaccinium uliginosum	20%	Y	Fac
6. Vaccinium vitis-idaea	15%		Fac
7. Empetrum nigrum	35%	Y	Fac
8. Arctous ruber	T		Fac
9. Betula nana 1.5'	10%		Fac

Total Cover: 116

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

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: 31	X 2 =	62
FAC species 130	X 3 =	390
FACU species 5	X 4 =	20
UPL species	X 5 =	
Column Totals: 166	(A)	472 (B)

PI = B/A = 2.84

Vaccinium oxycoccus T
Andromeda polifolia T
Salix glauca T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	50%	Y	Fac
2. Rubus chamaemorus	4%		FacW
3. Arctagrostis latifolia	T		FacW
4. Equisetum arvense	T		Fac
5. Tofieldia	T		
6. Pinguicula villosa	T		
7. Pedicularis lapponica	T		FacW
8. Petasites frigidus	T		
9. Saussurea angustifolia	T		
10.			

Total Cover: 54

50% of total cover: 27 20% of total cover: 10.8

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

95 % Cover of Wetland Bryophytes

98 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum 95
Feather Moss 3
Water T
Litter T
Moss T

1+T011

WETLAND DETERMINATION DATA FORM

8/6/15 W844T011 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 0-9							Fibric	sphagnum fibers
Oe 9-13							Hemic	
Oa 13-16							Sapric	
Oaf 16-18+							Sapric	some mineral incorperated but still Sapric

[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)

[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:

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) 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): Y	Depth (in): 1"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 10-12"	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	EC: $68_{\mu S}$ @ 4.0 5.1

Notes: Water table is at 10-12" depending on hummock microhigh vs microlow.

pH 5.1 47 µS @ 2.6°C = Soil Pit

HT011

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)_0_ Sapling (<5 dbh, <6m tall)_6_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_20_ Dwarf shrub (<0.5m) _70_ Tall herb (≥1m) _0_ Short herb (<1m) _54_ Moss-Lichen_95_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _1_ | **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

FEC 65ms @ 4.0 Slope/Flat transition

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_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** 5.63

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: W844T011 Field Target: 15099 Date: 8/6/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — X — 8/6/15

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

X Bryan Strong — X — 8/6/15

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

HT012

WETLAND DETERMINATION DATA FORM

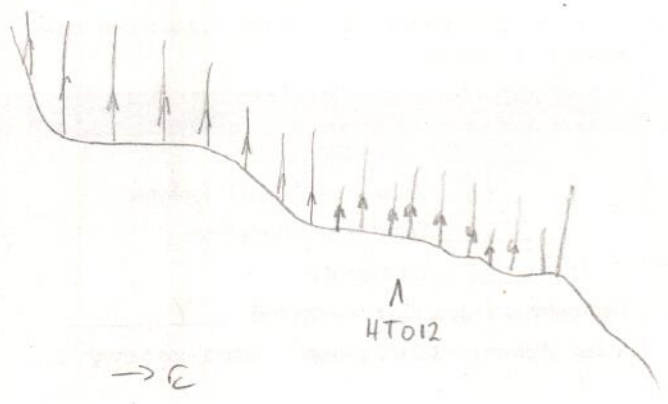
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15095	Map #: 149 Map Date: 6/18/15
Date: 8/6/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT012
Investigators: Bryan Strong, Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 542.8	
Latitude: 63°41'25.95		Longitude: 148°46'44.87	Datum: WGS84
Logbook No.: 62	Logbook Page No.: 23	Picture No.: W84HT012_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench
Slope (%):	Local relief (concave, convex, none): Slightly concave across + down. Hummocky - moderate
Pre-mapped Alaska LNG/NWI classification: U; IA2, IIC2	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 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): IIA2, IIC2

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

Benching area with a couple broad, somewhat subtle swale features. A mix of PICGLA and PICMAR - Sap and trees - mostly in 10-15' height range. Open understory with scattered SALGLA (3-4') and SALPUL (2-3') with RHAGRO, VACULI, VACVIT, EMPNIG, SALMYR, CARBIG. Even mix of larger saplings and small trees in the 12-25' range.



HT012

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	11%	Y	FacU
2. Picea mariana	9%	Y	FacW
3.			
4.			

Total Cover: 20

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	15%	Y	FacU
2. Picea mariana	5%		FacW
3. Salix glauca	7%		Fac
4. Salix pulchra	1%		FacW
5. Salix myrtifolia	7%		FACW
6. Rhododendron groenlandicum	20%	Y	Fac
7. Vaccinium uliginosum	25%	Y	Fac
8. Vaccinium vitis-idaea	10%		Fac
9. Empetrum nigrum	25%	Y	Fac

Total Cover: 156

50% of total cover: 78 20% of total cover: 31.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 7 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 78 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:		X 1 =	
FACW species:	24	X 2 =	48
FAC species	137	X 3 =	411
FACU species	26	X 4 =	104
UPL species		X 5 =	
Column Totals:	187 (A)		563 (B)

PI = B/A = 3.01

Arctous ruber 15% Y FAC
Salix alaxensis T 1'
Betula glandulosa E 4-5'
Salix reticulata 15% Y FAC
Salix richardsonii 1% FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	15	Y	Fac
2. Saussurea angustifolia	2		Fac
3. Equisetum scirpoides	T		FacU
4. Petasites frigidus	2		FacW
5. Geocaulon lividum	T		FacU
6. Mertensia paniculata	T		FacU
7. Festuca altaica	T		—
8. Carex sp small/dry	T		—
9. Calamagrostis canadensis	2%		Fac
10. Pyrola sp	T		—

Total Cover: 21

50% of total cover: 10.5 20% of total cover: 4.2

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

15 % 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 80
Sphagnum sp 15

WETLAND DETERMINATION DATA FORM

8/6/15 W84WTD12 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 0-5							Fibric	feather moss fibers
Oa 5-9	2.5Y 2.5/1	100					Sapric	Some mineral but mostly organics
A 9-12	10YR 2/1						Mucky Sil	saturated
BW 12-14	10YR 4/3	70	7.5YR 4/6	10			VGR Loam	very saturated - free water
12-14	2.5Y 3/1	20						
Bg 14-19	2.5Y 5/1	80	10YR 5/6	20			GR Loam	massive, Saturated, although some ped interiors at field capacity

[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 Y
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) A10

[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: At 14", Slightly plastic, massive GR Loam appears to perch water. Very saturated / free water above the Bg at ~13". Glacial till parent material, No permafrost found in 24 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) 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) N	Shallow Aquitard (D3) N-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: Episaturated. Free water between 11-14 inches	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N):	Depth (in):	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N):	Depth (in): 11 free water	
Saturation Present (Y/N): (includes capillary fringe)	Depth (in): 8	EC: 125 us 25°C pH 6.6 Soil pit

Notes:

HT012

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) 20 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 60 Dwarf shrub (<0.5m) 65 Tall herb (≥1m) 0 Short herb (<1m) 21 Moss-Lichen 95 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) _____ 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. X 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) X Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

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

EC 125mS pH 6.6 Soil pit

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet 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 Glacial till low permeability

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: W84HT012 Field Target: 15095 Date: 8/6/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anders X _____

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

X Brian Strong X _____ 8/6/15

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

HT013

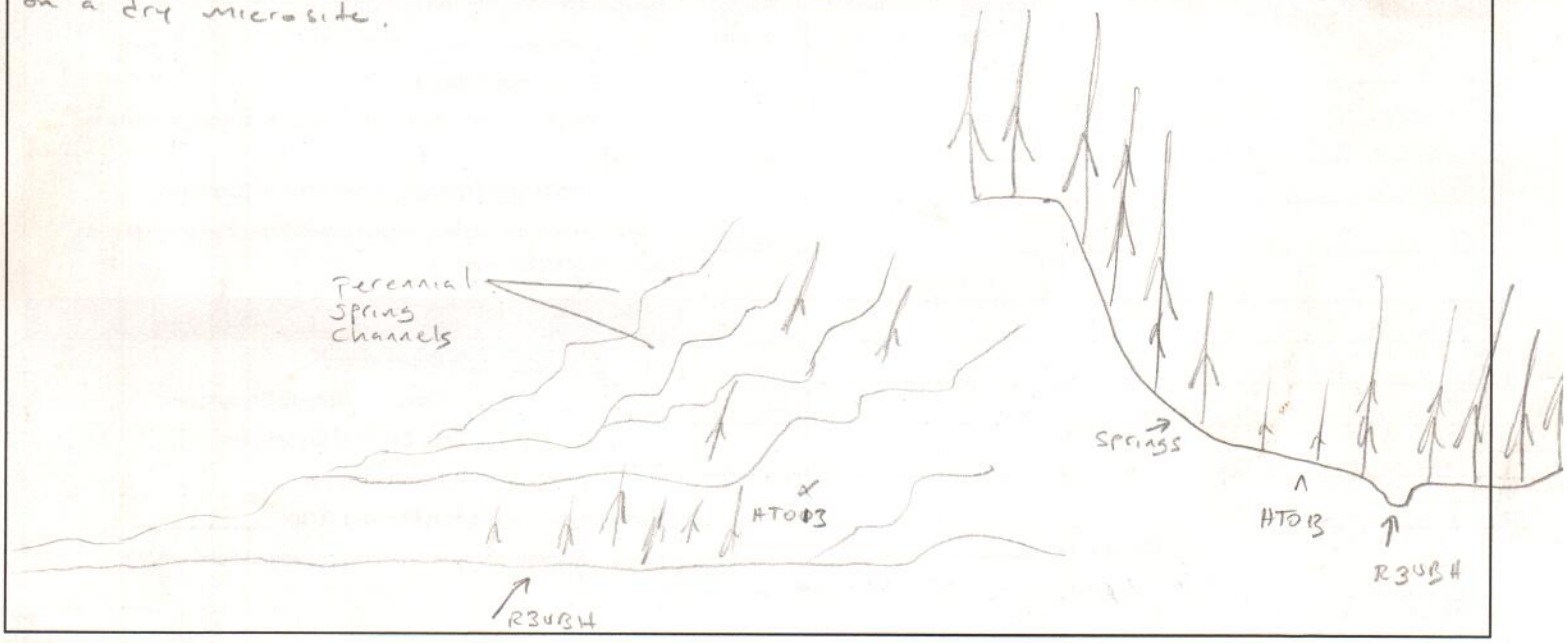
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)__X__ **Other** (explain)_____			**Field Target:** 15294	**Map #:** 150 **Map Date:** 6/18/15
Date: 8/6/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT013	
Investigators: Brian Strong				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 543		
Latitude: 63°41'18.74		**Longitude:** 148°46'27.93		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 24	**Picture No.:** W84HT013_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Stream terrace
Slope (%): 8	Local relief (concave, convex, none): Concave across, hummocky Mod
Pre-mapped Alaska LNG/NWI classification: U, 1A2, 11C2	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: Sheep tracks 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:** PSS1/4C
Wetland Hydrology Present? Yes__Y__ No_____	Alaska Vegetation Classification (Viereck): 11C2, 11A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Small valley with many springs emerging from the escarpment to the north. Point taken on an interfluve between a spring channel and the main drainage on a dry microsite.



HT013

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: linear plot 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 30-45'	5	Y	FacU
2.			
3.			
4.			
Total Cover: 5%			
50% of total cover: 2.5	20% of total cover: 1		
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 3-15'	15%		FacU
2. Salix richardsonii 3-5'	25%	Y	FacW
3. Salix glaxensis 3-5'	1%		Fac
4. Rhododendron groenlandicum	T		Fac
5. Vaccinium uliginosa	3%		Fac
6. Dasphoria fruticosa	4%		Fac
7. Arctous rubra	20%	Y	Fac
8. Salix reticulata	40%	Y	Fac
9. Dryas integrifolia	15%		FacU
Total Cover: 124			
50% of total cover: 62	20% of total cover: 24.8		

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: 93	X 2 =	186
FAC species 75	X 3 =	225
FACU species 48	X 4 =	192
UPL species	X 5 =	
Column Totals: 186 (A)		603 (B)

PI = B/A = 3.2

Empetrum nigrum 1% Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex capillaris	40%	Y	FACW
2. Carex membranacea	25%	Y	FACW
3. Carex media	2%		FACW
4. Carex scirpoidea	13%		FACU
5.			
6. Equisetum arvense	6%		Fac
7. Equisetum scirpoides	T		FacU
8. Mertensia paniculata	T		FacU
9. Parnassia palustris	1		FacW
10. Chamerion latifolia	T		Fac
Total Cover: 87			
50% of total cover: 43.5	20% of total cover: 17.4		
Tofieldia pusilla T			

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.

T % Bare Ground

____ % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

HT013

WETLAND DETERMINATION DATA FORM

8/6/15 WS4HT013

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
OA	0-4							Saprist	
A	4-11	7.5YR 2.5/1	100					XCB mk SiL	Gravels/Stones ~65-70%
BCg	11-14	2.5Y 5/1	60	7.5YR 4/6	10	C	PL	XGR SaL	alpha alpha positive
		N3/0	20	5YR 4/6	10	C	PL		5YR4/6 iron stain at bottom
C	14-17+	NA						Gravel/Cobble	edge of horizon - water table boundary

[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 Y
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) A10

[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: Dry microsite on an interfluve chosen for soil test pit.

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) N
High Water Table (A2) N	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) N	Shallow Aquitard (D3) N
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)
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): 2"	Wetland Hydrology Present (Y/N): Y	
Water Table Present (Y/N): Y	Depth (in): 15		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 10	EC: 573 µs 6.6°C	pH 7.35 Spring channel

Notes: Numerous springs and spring channels. Most all appear to be perennial. Several begin as moss covered cobbles and stones flowing mostly under the moss. Others form channels.

14T013

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)_5_____ Sapling (<5 dbh, <6m tall)_15_____ Tall shrub (2-6m)_0_____ Short shrub (0.5-2m)_33_____ Dwarf shrub (<0.5m) _75_____ Tall herb (≥1m) _0_____ Short herb (<1m) _82_____ Moss-Lichen_90_____ Floating_____ Submerged_____

Number of Wetland Types (M): _1_____ **Evenness of Wetland Type Distribution (M):** Even _X_____Highly Uneven _____Moderately even _____

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

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

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

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

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_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_X_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ 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_____ 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** _7.35_____

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_____ 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)_1_____ 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: WP4HT013 Field Target: 15294 Date: 8/6/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson — X [signature] 8/6/15

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

X Bryan Strong — X [signature] 8/6/15

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

HT014

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 5109	**Map #:** 41 **Map Date:** 6/18/15
Date: 8/7/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84HT014	
Investigators: Brenna Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 528.7	
Latitude: 63°49'49.72	**Longitude:** 149°02'02.51		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 25	**Picture No.:** W84HT014_VEG, VEG_PIT-PLOT	

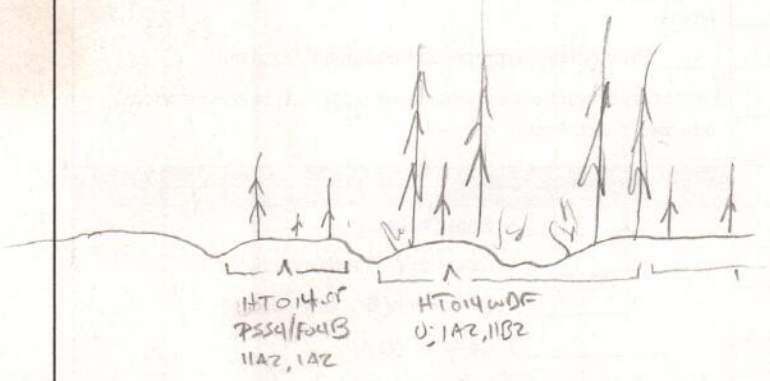
SITE PARAMETERS

Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Interfluve
Slope (%): 7%	Local relief (concave, convex, none): Convex Hummocky small
Pre-mapped Alaska LNG/NWI classification: U; 1A2, 11B2	Evidence of Wildlife Use: Moose browse, midden - squirrel
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____, 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 N
Hydric Soil Present? Yes____ No N	**Wetland Type:** U Open White Spruce Forest
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 1A2, 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Narrow interfluve between two dry swales/run off channels showing little evidence of surface water. Swale bottoms vegetated. Large PICGLA 40-50' tall. Convex across slope. Understory of dwarf SALGLA (6-9'), BETGLAN (6-8'), SALALA (8-10'). Feather moss with needle-litter under larger PICGLA.



HT014

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Linear plot shape Tree Stratum (Plot sizes: 50')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 25-40	27	Y	FacU
2.			
3.			
4.			

Total Cover: 36

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 3-10'	3%		FacU
2. Salix glauca 5-7'	15%	Y	Fac
3. Salix alaxensis 8-10'	3%		Fac
4. Salix pulchra 2-3'	1%		FacW
5. Betula glandulosa 2-7'	4%		Fac
6. Dasiphora fruticosa	4%		Fac
7. Vaccinium uliginosum	4%		Fac
8. Viburnum edule	T		FacU
9. Rosa acicularis	T		FacU
salix bebianna 2%			

Total Cover: 34

50% of total cover: 17 20% of total cover: 6.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3/4 (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: 2 X 2 = 4

FAC species 68 X 3 = 204

FACU species 29 X 4 = 116

UPL species _____ X 5 = _____

Column Totals: 99 (A) 324 (B)

PI = B/A = 3.27

~~Ribes triste~~ T
BSS

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	25%	Y	Fac
2. Equisetum arvense	15%	Y	Fac
3. Chamerion angustifola	1%		FacU
4. Aconitum delphiniafolium	1%		Fac
5. Heracleum maximum	T		FacU
6. Petisities frigida	1%		FacW
7. Artemesia norvegica	T		FacU
8. Polemonium acutifolium	1		Fac
9. Pyrola sp	T		
10. Carex vaginata	T		OBL

Total Cover: 43

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

Cornus canadensis T
Valariana capitata T
Saussurea angustifolia T

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

45 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 45
Litter 55

1HTO14

WETLAND DETERMINATION DATA FORM

8/7/15 W84HTO14

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: 0-2.5								
2.5-7	10YR 6/6	85					GRL Sa	weathering gravels impart
	10YR 5/6	10						matrix colors similar to redox
	7.5YR 4/6	5						
7-13.5	2.5Y 5/2	95	7.5YR 4/6	5	C	PL/M	vfSaL	high in mica, textures like SiL
C: 13.5-21	10YR 5/4	100					VGLCSa	

[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:

HTOI4

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: W541T014 Field Target: 15109 Date: 8/7/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — X — 8/7/15

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

X Bryan Strong — X — 8/7/15

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

HTO15

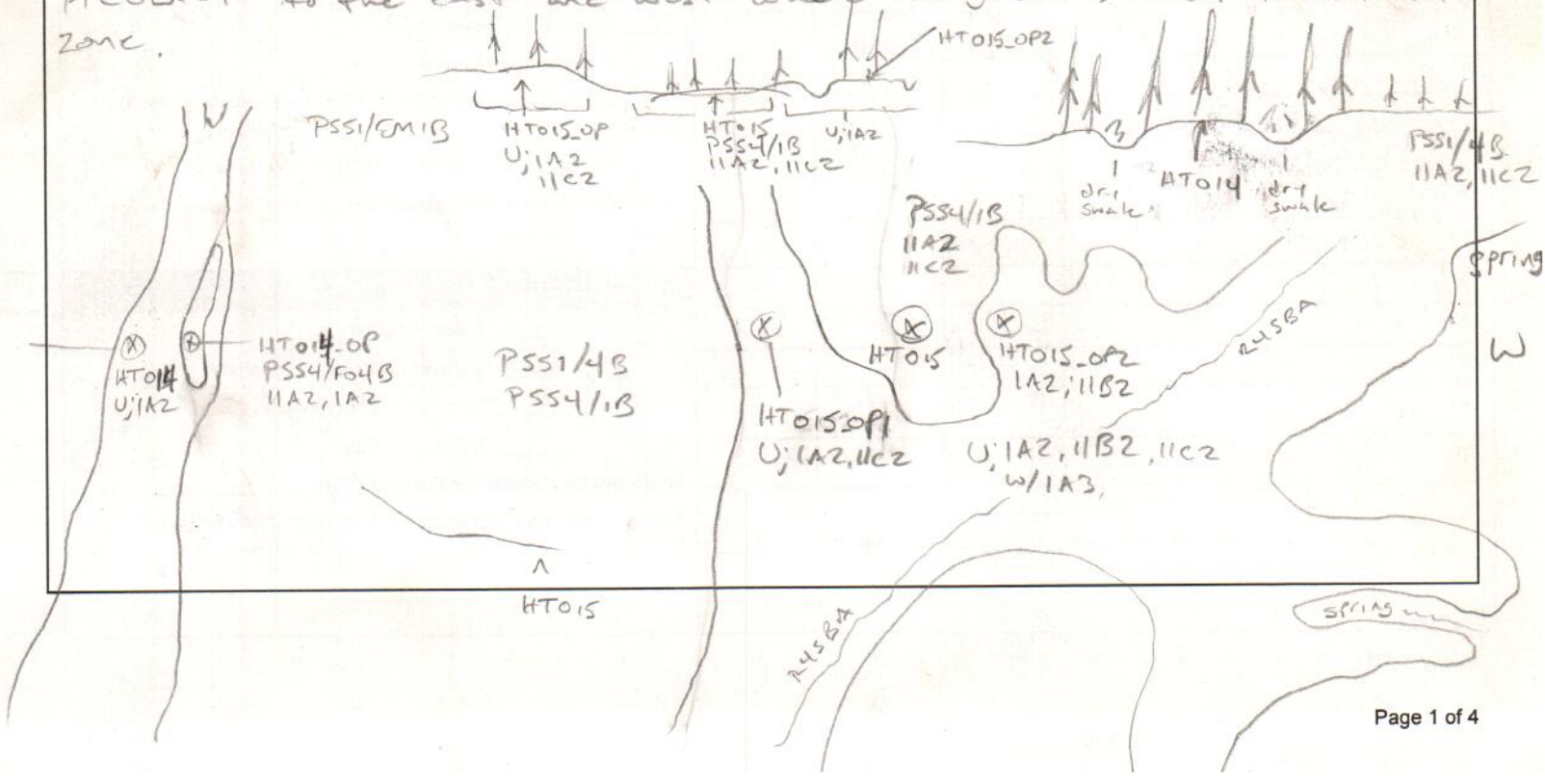
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15108	Map #: 141 Map Date: 6/25/15
Date: 8/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HTO15
Investigators: Ryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 528.8	
Latitude: 63°49'49.34	Longitude: 149°01'40.79		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 25	Picture No.: W84HTO15_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 11%	Local relief (concave, convex, none): Slightly convex across, Moderate Hummocks Slightly concave down
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB 11C2, 11A2	Evidence of Wildlife Use: Moose sign, game trails.
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	Is the Sampled Area within a Wetland? Yes Y No____
Hydric Soil Present? Yes Y No____	Wetland Type: PSS4/1B Stunted White Spruce Forest
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11A2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Slope shape: slightly concave downslope, slightly convex across slope, Moderate Hummocks. Mostly PICGLA-Sap 2-6 feet in the immediate area surrounded by larger PICGLA-T to the east and west where the ground is drier. Transitional zone.



HT015

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	5	Y	FACW
2.			
3.			
4.			

Total Cover: 5

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 2-7	25%	Y	FACW
2. Betula nana 2-3	40%	Y	FAC
3. Salix glauca 2-3	3%		FAC
4. Rhododendron tomentosum	7%		FACW
5. Vaccinium uliginosum	15%		FAC
6. Vaccinium vitis-idaea	7		FAC
7. Empetrum nigrum	3%		FAC
8. Rosa acicularis	T		FACU
9.			

Total Cover: 100

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 11	X 2 =	22
FAC species 78	X 3 =	234
FACU species 32	X 4 =	128
UPL species	X 5 =	
Column Totals: 121 (A)		384 (B)

PI = B/A = 3.17

Salix pulchra T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	10	Y	FAC
2. Arctagrostis latifolia	3%	Y	FACW
3. Bistorta plumosa	2%		FACU
4. Sausserea angustifolia	T		FAC
5. Petasites frigidus	1		FACW
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%

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

95 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 95

14 To 15

WETLAND DETERMINATION DATA FORM

8/7/15 W84HTO15 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
Oa 2-3							Sapric	mica rich - textures like mk Sil
A 3-5							MKvfSaL	marginal organic content for mucky Modifier
B 5-7	5Y5/1	90	7.5YR5/6	10	C	PL/M	vfSaL mica rich	concentrations in bands between
C 7-10	10YR5/3	100					VGRCLSa	Platy surfaces and in PL/dead RC
CB 10-14	5Y5/1		7.5YR5/6	10	C	PL/M	vfSaL	
C 14-19+	10YR 4/3	100					VGRCSaL	below water table

[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) Ponded/Flooded

[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 - Marginal Stratified layers - slope alluvium-colluvium,

Notes: With a water table at 13.5 inches, it is expected that the water table will rise above 12 inches for >2 week consecutive in the growing season given the presence of 25cm/1" Oa-Muck and 2" mucky vfSaL. Reduction may not occur due to coarse substrate here. Marginal site - Transitional

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) 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) 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) 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):** Y
Water Table Present (Y/N): Y	Depth (in): 13.5	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 11	EC: 67.5 4.1°C 5.9=pH Soil Pit

Notes:

HT015

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)__5__ Sapling (<5 dbh, <6m tall)__25__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__58__ Dwarf shrub (<0.5m)__17__ Tall herb (≥1m)__3__ Short herb (<1m)__12__ Moss-Lichen__95__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

EC 67ms Slope - Flat transition

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__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__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_____ 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: W841To15 Field Target: 15108 Date: 8/7/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☐ Soil profile is complete?
- ☒ Appropriate hydric soil indicators 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 8/7/15
Wetland Scientist (print)

Brian Strong 8/7/15

HTO16

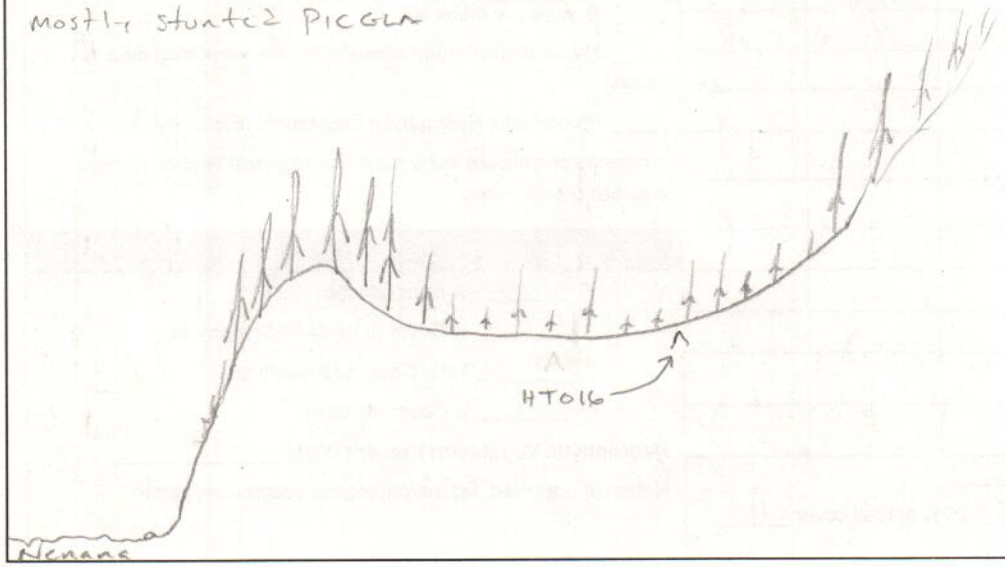
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15094	Map #: 146 Map Date: 6/29/15
Date: 8/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HTO16
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 540.8	
Latitude: 63°42'29.06	Longitude: 148°49'13.49		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 26	Picture No.: W84HTO16	

SITE PARAMETERS	
Subregion: Alaska range	Landform (hillslope, terrace, hummocks, etc.): Bench, trough, saddle
Slope (%): 1.5 - 2	Local relief (concave, convex, none): Concave, Hummocky-moderate
Pre-mapped Alaska LNG/NWI classification: PSS1/4B 11B2, 11C2, 11A2	Evidence of Wildlife Use: Game trails
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes Y No____
Hydric Soil Present? Yes X No____	Wetland Type: PSS4/1B Stunted White Spruce Forest
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11A2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Stunted PICGLA-Sx forest. Benching/swaling/trough. Understory of SALGLA (3-4') BETNAN (3'), SALMYR, RHOGRO, VACULI, ANDPOL, with CAMBIG and a some ERIVAG tussocks. At the toeslope of a glacial trough/swale/bench formed by a lateral moraine at the base of a mountain slope. A few black spruce in the area but mostly stunted PICGLA



HT016

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 10')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 20-25'	3%		FacW
2.			
3.			
4.			

incorporated into shrub strata - <5%

Total Cover: _____

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Picea mariana	5%		FACW
1. Picea glauca 3-15'	27%	Y	FacW
2. Salix glauca 3-5'	4%		Fac
3. Salix myrtilifolia	7%		FacW
4. Vaccinium uliginosum	3%		Fac
5. Rhododendron tomentosum	4%		FacW
6. Vaccinium vitis-idaea	10%	Y	Fac
7. Empetrum nigrum	15%	Y	Fac
8. Rhododendron groenlandicum	7%		Fac
9. Andromeda polifolia	T		FacW

Total Cover: 90

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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: 31	X 2 =	62
FAC species 45	X 3 =	135
FACU species 37	X 4 =	148
UPL species	X 5 =	
Column Totals: 113	(A)	345 (B)

PI = B/A = 3.05

Salix richardsonii	T	FacW
Betula nana	2	Fac
Arctous rubra	1	Fac
Vaccinium oxycoccos	T	obl
Salix reticulata	2	Fac

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	35%	Y	Fac
2. Eriophorum vaginata	10%		FacW
3. Rubus chamaemorus	5		FacW
4. Sausserea angustifolia	1		Fac
5. Equisetum scirpoides	4%		FacW
6. Pyrola sp	T		
7. Calamagrostis canadensis	T		Fac
8.			
9.			
10.			

Total Cover: 55

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

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

60 % 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 30

Sphagnum 30

Aloconium 30

HT016

WETLAND DETERMINATION DATA FORM

8/7/15 W844T016 4

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								Sphagnum fibers
Oe 4-8							Hemic	Near saturation point
Oa 8-12							Sapric	Saturated
A 12-14	2.5Y 2.5/1	100					MK SiL	
Cgj 14-15	5Y 5/1	80	10YR 5/6	20			SiL	
Cgjf 15-18	5Y 5/1	90	10YR 5/6	10			SiL	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) 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): 15

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) 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):** Y
Water Table Present (Y/N): Y	Depth (in): 10	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	EC: 140 mS @ 5.4°C pH 6.09 Soil Pit

Notes:

HTo16

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)__32__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__21__ Dwarf shrub (<0.5m) __29__ Tall herb (≥1m) __0__ Short herb (<1m) __55__ Moss-Lichen__90__ Floating__T__ Submerged__T__

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

EC 140 pH 6.09 Slope/Flat

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** 6.09

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Soil Pit 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__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 Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W844T014 Field Target: 15094 Date: 8/7/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators 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 8/7/15
Wetland Scientist (print)

Brian Strong 8/7/15

HT017

WETLAND DETERMINATION DATA FORM

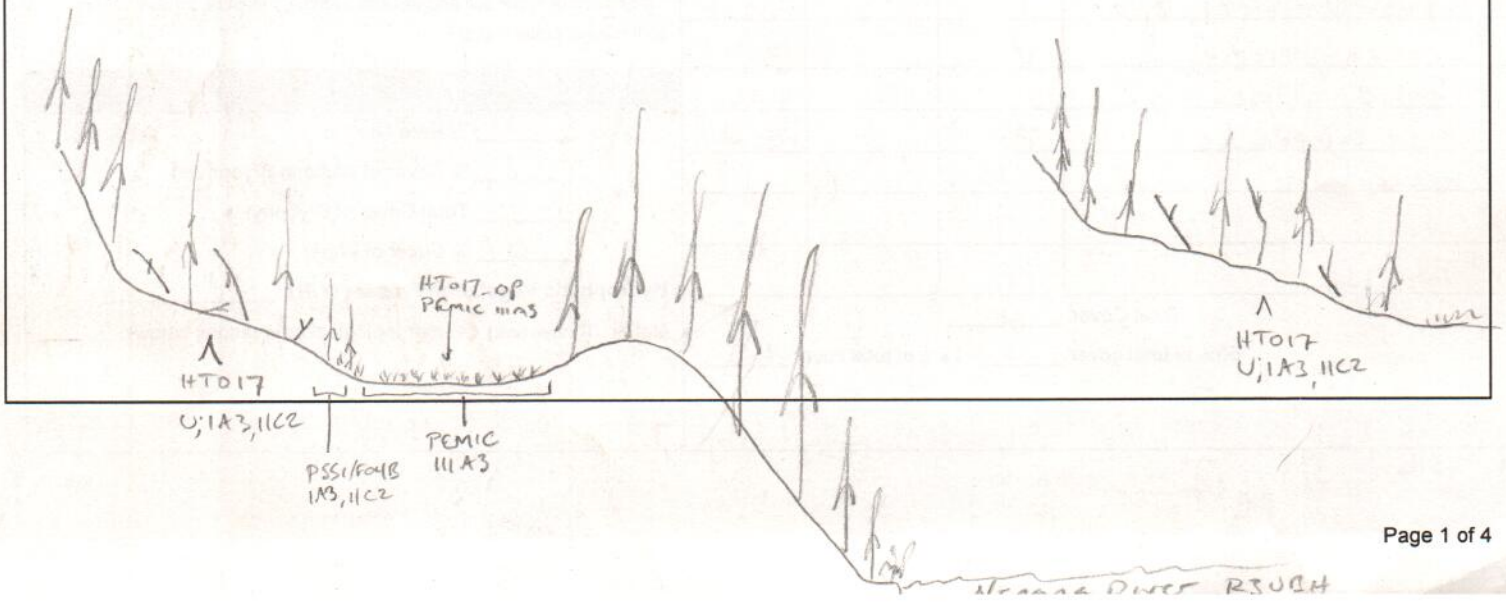
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15100	Map #: 147 Map Date: 6/29/15
Date: 8/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT017
Investigators: Brian Strang Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 541.1	
Latitude: 63° 42' 15.66	Longitude: 148° 48' 59.43		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 27	Picture No.: W84HT017_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 7%	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: Game trails
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No 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 White Spruce Woodland
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A3 11c2

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

Old burn has thinned out the PICGLA-Tree canopy. Standing dead snags and downfall. White spruce woodland at point, Cumulic soils at base of steep slope, likely a calcareous/high pH site based on species assemblage in area.



HT017

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 30-50'	15	Y	FacU
2.			
3.			
4.			

Total Cover: 15

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 2-6'	5		FacU
2. Vaccinium uliginosum	5		Fac
3. Rhododendron groenlandicum	15	Y	Fac
4. Arctous rubra	20	Y	Fac
5. Vaccinium vitis idaea	7		Fac
6. Empetrum nigrum	15	Y	Fac
7. Linnaea borealis	T		FacU
8. Dasiphora fruticosa	2%		Fac
9. Rosa acicularis	T		FacU

Total Cover: 70

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 1	X 2 =	2
FAC species 65	X 3 =	195
FACU species 25	X 4 =	100
UPL species	X 5 =	
Column Totals: 91 (A)		297 (B)

PI = B/A = 3.26

Rhododendron lapponicum P Fac
Salix richardsonii T P FacW
Salix glauca 1 C Fac
Salix pulchra T FacW

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	1		FacW
2. Mertensia paniculata	2%	Y	FacU
3. Geocaulon lividicum	3%	Y	FacU
4. Equisetum scirpoidies	1		FacU
5. Gentiana propinqua	T		FacU
6. Festuca altaica	T		Fac
7. Carex scirpoidies	P		FacU
8. Pedicularis	T		
9. Carex sp (concinna?)	T		
10. Tofieldia	T		

Poa sp. T Total Cover: 6

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

Luzula sp T
Carex bigelowii T
Stellaria sp T
Senecio sp T

Sausserea angustifolia T

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50% N-50%

N Prevalence Index is ≤ 3.0

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

_____ % Cover of Wetland Bryophytes

~60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

HTO17

WETLAND DETERMINATION DATA FORM

8/7/15 WS4HTO17 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 %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Notes
Oi	0-3							fibric	
Oe	3-5							Hemic	
Oa	5-8							Sapric	
A	8-9	10yr 3/1						Sil	
Bw	9-15	10yr 4/3	100					GR Loam	glacial till
BC	15-21	2.5Y 4/3	100					GR Loam	glacial 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: Over thickened organics appear to have accumulated from cumulic processes and may be a function of elevated pH. Well drained glacial till, Granular Gravelly loam soils drain freely, No permafrost or perching layer within 24" 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) 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:

HT017

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: W841TO17 Field Target: 15100 Date: 8/7/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators 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 8/7/15

Wetland Scientist (print)

Brian Strong 8/7/15

HTo18

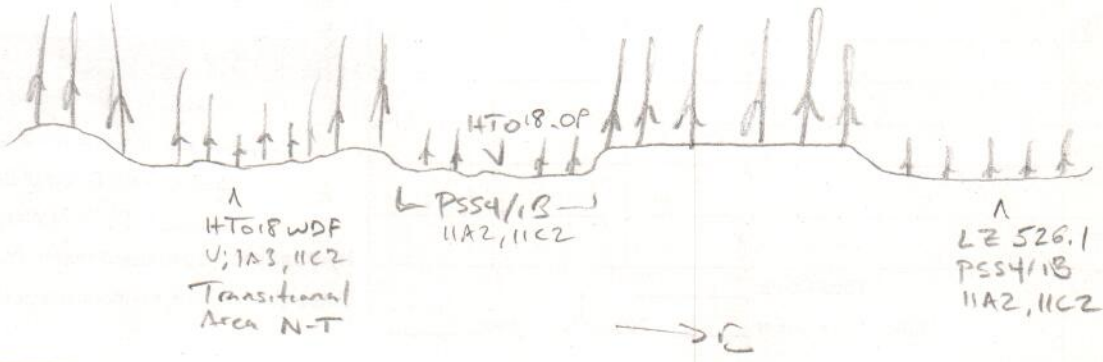
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15113	Map #: 136 Map Date: 6/29/15
Date: 8/9/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HTo18	
Investigators: Bryan Stong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 526.1	
Latitude: 63°51'28.10	Longitude: 149°04'10.03		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 29	Picture No.: W84HTo18_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 3	Local relief (concave, convex, none): Slightly convex across slope
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: Moose sign Hummocks-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: 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): 11C2, 1A3 plot (1A2, 11C2 poly

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Strips of more open white spruce woodland interspersed with white spruce forest. Point taken in the more open area with 11C2, 1A3 character. Other areas nearby are 1A2, 11C2. Transitional area. Water table will fluctuate in the outwash gravels but, not likely to rise higher than 20".



HTO 18

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	7	Y	FacU
2.			
3.			
4.			
Total Cover: 7			
50% of total cover: 3.5	20% of total cover:		

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Betula neoalaskana 2.5'	1		FacU
1. Picea glauca 6-15	12%		FacU
2. Betula nana 3-4'	55%	Y	Fac
3. Salix glauca 3-4'	12%		Fac
4. Rhododendron groenlandicum	25%	Y	Fac
5. Vaccinium uliginosum	4		Fac
6. Vaccinium vitis-idaea	15		Fac
7. Salix pulchra	5		FacW
8. Betula glandulosa 7'	2%		Fac
9. Rosa acicularis	T		FacU
Total Cover: 131			
50% of total cover: 65.5	20% of total cover: 26.2		

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: 5	X 2 =	10
FAC species 128	X 3 =	384
FACU species 20	X 4 =	80
UPL species	X 5 =	
Column Totals: 153 (A)		474 (B)

PI = B/A = 3.09

Empetrum nigrum T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	12	Y	Fac
2. Calamagrostis lapponica	3	Y	Fac
3.			
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%

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

2 % 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 95

Foliose lichen 3

litter 3

HTO18

WETLAND DETERMINATION DATA FORM

8/9/15 W84HTO18 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								feather moss fibers
A/E 4.5-5.5	10-YR 2/1	100					vfSaL	Mica rich
	10-YR 4/1							
Bhs 5.5-10	10YR 5/6	70%					vfSaL	2.5Y 5/1 10% 7.5YR 4/6 10% - Spodic
2BC 10-12	10YR 4/3	100					LSand	alluvium
3BC 12-16	10-YR 5/4						vfSaL	2.5Y 5/2 10YR 5/6
4C 16-21	2.5Y 5/3	100					VGLSanL	Gravels ~55%

[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: Soil is moist, moderately well drained alluvium - glacio-fluvial sediments. Mica rich parent material. Some inception of spodic process appears to be at work here. Many colors but, no redox features. Platy structure from 12-16". Likely short-lived seasonal frost in this zone

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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Water table ~24-30"	
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:

HT018

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: W54HT018 Field Target: 15113 Date: 8/9/15

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?~~ on form

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X _____ X _____ 8/9/15

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

X Bryan Strong X _____ 8/9/15

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

HT019

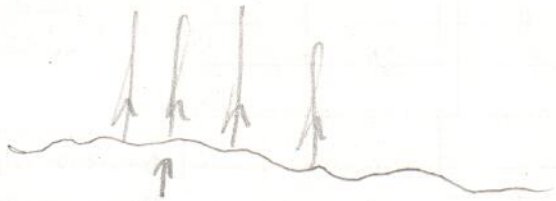
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15114	Map #: 135 Map Date: 6/29/15
Date: 8/9/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT019
Investigators: Breen Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 526.0	
Latitude: 63°51'32.78	Longitude: 149°04'16.72		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 29	Picture No.: W84HT019_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Outwash terrace
Slope (%): 3%	Local relief (concave, convex, none): Undulating, Hummocky, Moderate
Pre-mapped Alaska LNG/NWI classification: U	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 Y No____	**Is the Sampled Area within a Wetland?** Yes____ No N
Hydric Soil Present? Yes____ No N	**Wetland Type:** U Open White Spruce Forest
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 1A2 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. PICGLA forest. Some of the larger trees are in decline, possibly from beetle damage. Outwash terrace. Complicated hydrology in the area. Pockets of wetland in the area interspersed with very dry ground with very subtle changes in topography. Mix of large PICGLA 35-45' and mostly large saplings 12-15' tall with presence of large saplings the site best described/classified as 1A2



HT019
U; 1A2, 11C2

HT019

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 35-45'	20	Y	FacU
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 7-15'	17	Y	FacU
2. Betula glandulosa/kenaica 5-12'	3		Fac
3. Betula nana 3'	25	Y	Fac
4. Salix bebbiana 3'	1		Fac
5. Salix glauca 3-4'	3		Fac
6. Vaccinium uliginosum	15	Y	Fac
7. Vaccinium vitis-idaea	10		Fac
8. Rhododendron groenlandicum	15	Y	Fac
9. Rosa acicularis	1		FacU
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: 3 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 1	X 2 =	2
FAC species 73	X 3 =	219
FACU species 38	X 4 =	152
UPL species	X 5 =	
Column Totals: 112 (A)		373 (B)

PI = B/A = 3.33

Rhododendron groenlandicum

VEGETATION (use scientific names of plants)

Herb Stratum (26) added to shrub stratum <5%	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	1		FacW
2. Mertensia paniculata	T		FacU
3. Calamagrostis lapponica	1		Fac
4. Festuca altaica	T		Fac
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			

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

98 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 98

Ptilium I

Foliose Lichen I

HT019

WETLAND DETERMINATION DATA FORM

8 W84HT019 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								
Oe 6-7.5								
A 7.5-8.5	10yr 2/2	100					fSaL	
BW 8.5-10	7.5yr 4/4	100						
BC 10-13	10yr 4/4	100					VGrSaNd	~35% gravel, cobble
C 13-19	10yr 4/4	100					XGrSaNd	~70% gravel and cobble

[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): N/A

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) Y
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:

HTOL9

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: W84HT019 Field Target: 15114 Date: 8/9/15

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?~~ on form

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — X [signature] 8/9/15

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

X Brian Strong — X [signature] 8/9/15

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

HTO20

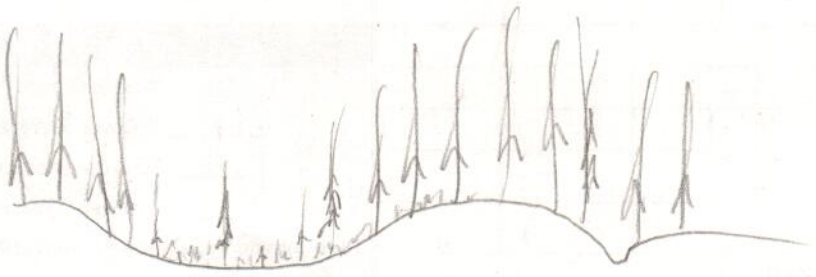
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____		Field Target: 1515	Map #: 135 Map Date: 6/29/15
Date: 8/9/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HTO20	
Investigators: Brian Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 525.1	
Latitude: 63° 52' 11.72	Longitude: 149° 04' 47.93		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 30	Picture No.: W84HTO20_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Outwash terrace
Slope (%): 3	Local relief (concave, convex, none): Rolling, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: Moose sign, Spruce Hens
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No N	**Is the Sampled Area within a Wetland?** Yes____ No N
Hydric Soil Present? Yes____ No ✓ N	**Wetland Type:** U 1A3, 11C2 - Polygon/Plot
Wetland Hydrology Present? Yes____ No ✓	Alaska Vegetation Classification (Viereck): 1A2, 11C2 mapping type

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor: Becomes increasingly drier moving north from HT019. Open White Spruce Forest with openings of BETGLAN 3-5' tall with a more woodland character as seen at the point documented here. Point/plot is a woodland but overall polygon is 1A2, 11C2. Wetter microsite documented. Water table at 18 inches in very gravelly Sand Outwash deposit.



AT020

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10	Y	FACU
2.			
3.			
4.			

Total Cover: 10

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

Sapling/Shrub Stratum (06)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	17	Y	FACU
2. Betula nana / glandulosa	40	Y	FAC
3. Rhododendron groenlandicum	15%		FAC
4. Vaccinium uliginosum	15%		FAC
5. Salix pulchra	3%		FACW
6. Vaccinium vitis-idaea	7%		FAC
7. Salix glauca	T		FAC
8.			
9.			

Total Cover: 97

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	3	X 2 =	6
FAC species	81	X 3 =	243
FACU species	28	X 4 =	112
UPL species		X 5 =	
Column Totals:	113	(A)	362 (B)

PI = B/A = 3.20

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	2	Y	FAC
2. Carex bigelowii	1		FAC
3. Saussurea angustifolia	1		FAC
4. Mertensia paniculata	1		FACU
5. Carex vaginata	1		OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 6

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

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50% = 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

5 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather moss 85
lichen 5
Moss 10

HT020

WETLAND DETERMINATION DATA FORM

8/9/15 W&HT020 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 0-3.5								
A 3.5-6	10yr 3/1	100					vfSaL	narrow discontinuous fc 10yr 4/1
Bw 6-10	10yr 4/4	100					SaL	nearly Loam sand
2Bw 10-13	10yr 5/3	93	7.5yr 4/6	5	C	M	vfSaL	vf/fine SaL
			2.5y 5/1	2	D	PL		
3C 13-22	10yr 4/3	100					VGRLSand	~75% gravel
4C								

[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) Y
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): Y	Depth (in): 18	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 16	EC: 90 µs @ 4.4°C pH 6.6 Soil pit

Notes:

AT620

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: W841+T020 Field Target: 15115 Date: 8/9/15

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~~ on form?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jennifer Anderson — X — 8/7/15

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

X Brian Strong — X — 8/7/15

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

1HT021

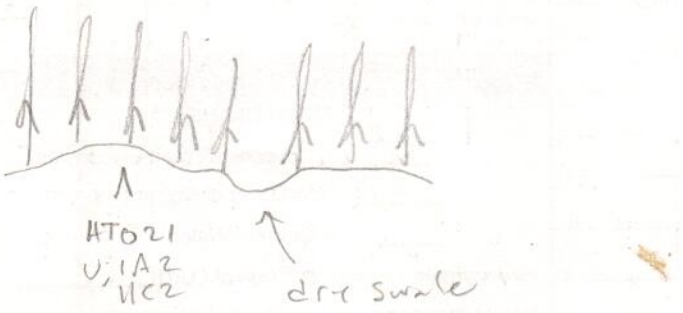
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15116	Map #: 135 Map Date: 6/29/15
Date: 8/9/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT021
Investigators: Breen, Strong, Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 525.1	
Latitude: 63° 52' 13.87	Longitude: 149° 04' 48.70		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 30	Picture No.: W84HT021_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Outwash terrace
Slope (%): 7	Local relief (concave, convex, none): Convex Hummocky - moderate
Pre-mapped Alaska LNG/NWI classification: U; 1A2	Evidence of Wildlife Use: Moose sign
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_____, 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 N	**Wetland Type:** U open white spruce forest
Wetland Hydrology Present? Yes_____ No N	Alaska Vegetation Classification (Viereck): 1A2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Dry swale just east of plot. Terrace. Slightly convex. Small and moderate hummocks. Open White Spruce Forest. Carpet of Feather moss. Very open understory. Pockets of BETNAN where spruce canopy opens up.



HT021

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	42	Y	FacU
2. Populus balsamifera	P/C		
3.			
4.			

Total Cover: 42

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

Sapling/Shrub Stratum (25)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	10		FacU
2. Salix glauca 3	4		Fac
3. Betula nana 3	7		Fac
4. Salix bebbiana 2-3	T		Fac
5. Salix myrtilifolia	T		FacW
6. Rhododendron groenlandicum	5		Fac
7. Rosa acicularis	T		FacU
8. Vaccinium vitis idaea	35	Y	Fac
9. Vaccinium uliginosum	5/		Fac

Total Cover: 66

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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 =	
FACW species: 0	X 2 =	
FAC species 62	X 3 =	186
FACU species 53	X 4 =	212
UPL species	X 5 =	
Column Totals: 115	(A)	398 (B)

PI = B/A = 3.46

Dasiphora fruticosa T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis lapponica	5	Y	Fac
2. Lupinus arcticus	1		FacU
3. Festuca altaica	1		Fac
4. Pyrola sp	P		
5. Grass sp (Elymus sp?)	T		
6. Mertensia paniculata no seed heads	T		FacU
7.			
8.			
9.			
10.			

Total Cover: 7

50% of total cover: 3.5 20% of total cover: 1.4

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

87 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather moss 80

Foliose lichen 7

Litter 10

HTO21

WETLAND DETERMINATION DATA FORM

8/9/15 W84HTO21 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
O 0-5								
A/E 5-6	10YR 2/2	80					fSaL	10YR 4/1 - E material 20%
Bw 6-10	10YR 4/6	100					LSa	10YR 5/4 2nd matrix color 5%
C 10-14	10YR 4/3	100					VGL Sa	
Bw 14-16	2.5Y 5/3	80					fSaL	mica rich: 10YR 4/6 2nd matrix
C 16-21	10YR 4/3	100					VGrL Sa	outwash deposit

[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) 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:	
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:

14T021

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: WS41T021 Field Target: 15/16 Date: 8/9/15

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~~ on form?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Jennifer Anderson — X — 8/9/15

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

X Bryan Strong — X — 8/9/15

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

HTo22

WETLAND DETERMINATION DATA FORM

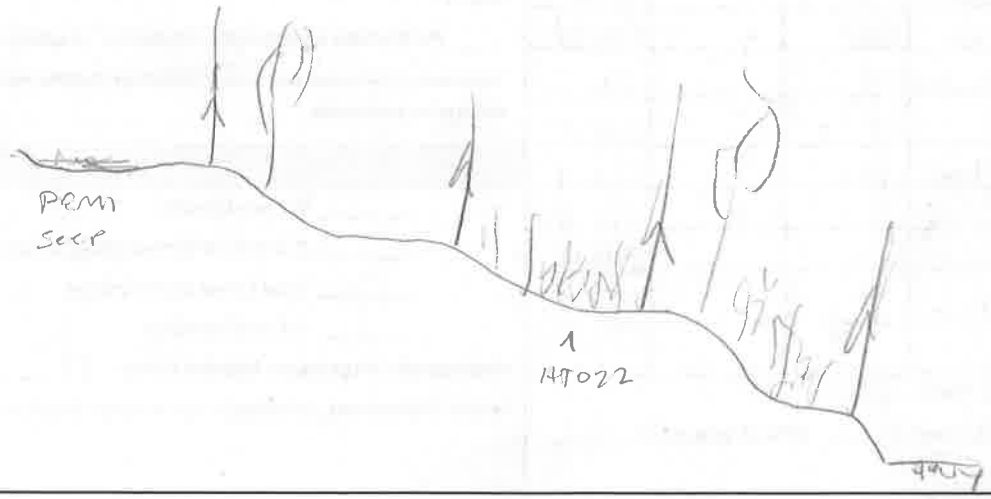
SITE DESCRIPTION			
Survey Type: Centerline___ **Access Road** (explain) X **Other** (explain)_____		**Field Target:** 15280	**Map #:** 193 **Map Date:** 6/29/15
Date: 8/10/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HTO22
Investigators: Brian Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 633.2	
Latitude: 62° 43' 15.90	**Longitude:** 150° 11' 28.12		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 31	**Picture No.:** W84	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 9%	Local relief (concave, convex, none): Slightly concave across undulating
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: Moose browse
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): 1C3, 11B

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

Large PICGLA 70-100' tall interspersed with BETNEO 50-60' tall. Understory of Sorbos, ALNVIR, OPLHOR, VIBEDU and DRYEXP (4-5'). Point taken in a opening in the canopy where a large PICGLA snag has broken off 15' above ground surface. Slightly concave across slope. Very dense understory.



HT 022

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	15	Y	FacU
2. Betula neoalaskana	5		FAC
3.			
4.			

Total Cover: 20

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Sorbus sitchensis	2		FacW
2. Alnus viridis	3		Fac
3. Oplopanax horridus	40	Y	FacU
4. Vaccinium vitis idaea	T		Fac
5. Viburnum edule	1		FacU
6. Ribes triste	T		
7.			
8.			
9.			

Total Cover: 46

50% of total cover: 23 20% of total cover: 9.6

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 12	X 2 =	24
FAC species 17	X 3 =	25
FACU species 108	X 4 =	432
UPL species	X 5 =	
Column Totals: 137	(A)	481 (B)

PI = B/A = 3.5

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	35	Y	FacU
2. Calamagrostis canadensis	5		Fac
3. Equisetum pratense	12	Y	FacW
4. Equisetum sylvaticum	4		Fac
5. Cornus canadensis	5		FacU
6. Gymnocarpium dryopteris	10		FacU
7. Galium boreale ex 28	T		FacU
8. Streptopus amplexifolius	T		FacU
9. Chamerion angustifolium	T		FACU
10.			

Total Cover: 71

50% of total cover: 35.5 20% of total cover: 14.2

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):

AT022

WETLAND DETERMINATION DATA FORM

8/10/15 W841AT022

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 0-2.5							fibric	
E 2.5-6	10YR 4/1	90					SiL	10YR 4/2 - second matrix color
Bh 6-12	5YR 3/4	88					SiL	
	5YR 4/6	12						
Bs 12-15	10YR 5/6	100					SiL	
E 15-16	2.5Y 5/1	100					SiL	
Bw 16-24	2.5Y 5/4	100					SiL	Stones - 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: NA Depth (inches): NA

Hydric Soil Present (Y/N): N

Notes: Spodisol formed in volcanic ash 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)
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:

HT022

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: W84HT022 Field Target: 15280 Date: 8/10/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

15280

8. Photos

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

X Jennifer Anderson — Wetland Scientist (print)

X [signature] 8/10/15 — Signature / Date

X Bryan Strong Jennifer And. (JA) — Field Crew Chief (print)

X Bryan Strong 8/10/15 — Signature / Date

1+T023

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ Access Road (explain) X Other (explain)_____		Field Target: 15281	Map #: 191 Map Date: 6/29/15
Date: 8/10/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT023
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 615.9	
Latitude: 62°52'42.94	Longitude: 149°48'21.85		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 31	Picture No.: W84HT023_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 1	Local relief (concave, convex, none): Concave Flat - small hummock
Pre-mapped Alaska LNG/NWI classification: PEMI/SSIC IIIA2	Evidence of Wildlife Use: Fish, Beaver, etc.
Are climatic/hydrologic conditions on the site typical for this time of year? IIC2 Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No_____	Is the Sampled Area within a Wetland? Yes Y No_____
Hydric Soil Present? Yes Y No_____	Wetland Type: PEMI/SSIEb
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): IIIA2, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor: Beaver pond complex, Emergent wetland grading from CARAQU at pond edge, into CALCAN, COMPAL, SALFUS, Sphagnum into BETNAN, CALCAN, before wet mixed PICMAR/PICGLA forest. Beaver pond hosts mares tail, EQUFL, Bursera and numerous sedge/bluejoint islands. Fish are rising/jumping. Restricted outlet due to beaver activity.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	5		FacU
2. Picea mariana	5	5	FacW
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Betula neoalaskana 3-6'	T	T	FacU
1. Betula nana	5%	Y	Fac
2. Salix fuscescens	6%	Y	FacW
3. Salix pulchra	3%	Y	FacW
4. Vaccinium uliginosum	T		Fac
5. Vaccinium oxycoccus	1		Obl
6. Picea glauca	T/S		FacU
7. Picea mariana	T/S		FacW
8.			
9.			
Total Cover:	15		
50% of total cover:	7.5	20% of total cover:	3

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 21	X 1 =	21
FACW species: 9	X 2 =	18
FAC species 95	X 3 =	285
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 125	(A)	324 (B)

PI = B/A = 2.59

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1 Calamagrostis canadensis	90%	Y	Fac
2. Carex aquatilis	10%		Obl
3. Comarum palustre	10%		Obl
4. Equisetum arvense	T	T	Fac
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover:	110		
50% of total cover:	55	20% of total cover:	22

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

95 % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp

HT023

WETLAND DETERMINATION DATA FORM

8/10/15 W84HT023 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								
Oa 6-12								
ACg 12-20	10YR 2/2		5Y 5/1	20	D		fSaL	alpha alpha positive
			10YR 4/6	10	C			

[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: NA Depth (inches): NA

Hydric Soil Present (Y/N): _____

Notes: Gravels felt at ~28" deep

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) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) Y	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) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	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): Y	Depth (in): 3	**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: 80 mS @ 12°C	pH 6.03

Notes:

85 mS 6.3 pH = Soil pit

HT023

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)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)__5__ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) __100__ Short herb (<1m) __10__ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M)**: Even __X__ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.03

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%)__X__ High Gradient (≥2%)_____

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT023 Field Target: 15281 Date: 8/10/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

15281

8. Photos

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

X Jennifer Anderson — Wetland Scientist (print)

X [signature] 8/10/15 — Signature / Date

X Bryan Strong — Field Crew Chief (print)

X [signature] 8/10/15 — Signature / Date

HT024

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 15102	**Map #:** 144 **Map Date** 6/29/15
Date: 8/11/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT024	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 539.1		
Latitude: 63° 43' 25.07		**Longitude:** 148° 51' 34.68		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 32	**Picture No.:** W84HT024_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Stream Terrace
Slope (%): 3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U; 1A2; 11B2, 1K1	Evidence of Wildlife Use: Moose sign
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_____, 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): 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Stream terrace. No evidence of regular flooding. Approximately 2' above stream. Tall willow and young PICGLA-Sap 6-12' tall. Stones and cobbles on ground surface.



HT024

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

linear shared plot Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	3		FacU
2. Picea glauca	5	Y	FacU
3.			
4.			

Total Cover: 8

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix alaxensis	35	Y	Fac
2. Salix glauca	10		Fac
3. Shepherdia canadensis	4		FacU
4. Dasiphoria fruticosa	6		Fac
5. Salix pseudomonticola	T		—
6. Alnus viridis	T		Fac
7.			
8.			
9.			

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: 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: 2	X 2 =	4
FAC species 61	X 3 =	183
FACU species 18	X 4 =	72
UPL species	X 5 =	
Column Totals: 81	(A)	259 (B)

PI = B/A = 3.19

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	30		Fac
2. Chamerion latifolium	5	Y	Fac
3. Hedysarum alpinum	5	Y	FacU
4. Anemone sp	T		
5. Equisetum variegatum	20		FacW
6. Cornus canadensis	1		FacU
7. Eurybia sibirica	2		Fac
8. Parnassia palustris	T		FacW
9. Mertensia paniculata	T		FacU
10. Artemesia norvegica	T		FacU
Arctous rubra	T		
Chamerion angustifolium	T		FacU
Grass sp	T		
Viola sp	T		
Elymus trachycaulus	T		

Total Cover: 18

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

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.

10 % Bare Ground

0 % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Moss	20
Feather Moss	35
Rock	10
Litter	30
Lichen	5

HT024

WETLAND DETERMINATION DATA FORM

8/11/15 WS4HT024 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 0-3							fibric	feather moss fibers
Bw 3-4	2.5Y 5/3	100					fSaL	
C1 4-7	2.5Y 5/3	100					LfSa	
C2 7-20	2.5Y 5/2	100					VGCSaL	~65% gravel/stones/cobbles

[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) Y
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: GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT024 Field Target: 15102 Date: 8/11/15

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?

15102

8. Photos

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

X Jennifer Anderson — Wetland Scientist (print)

X [signature] 8/11/15 — Signature / Date

X Bryan Strong — Field Crew Chief (print)

X [signature] 8/11/15 — Signature / Date

HT025

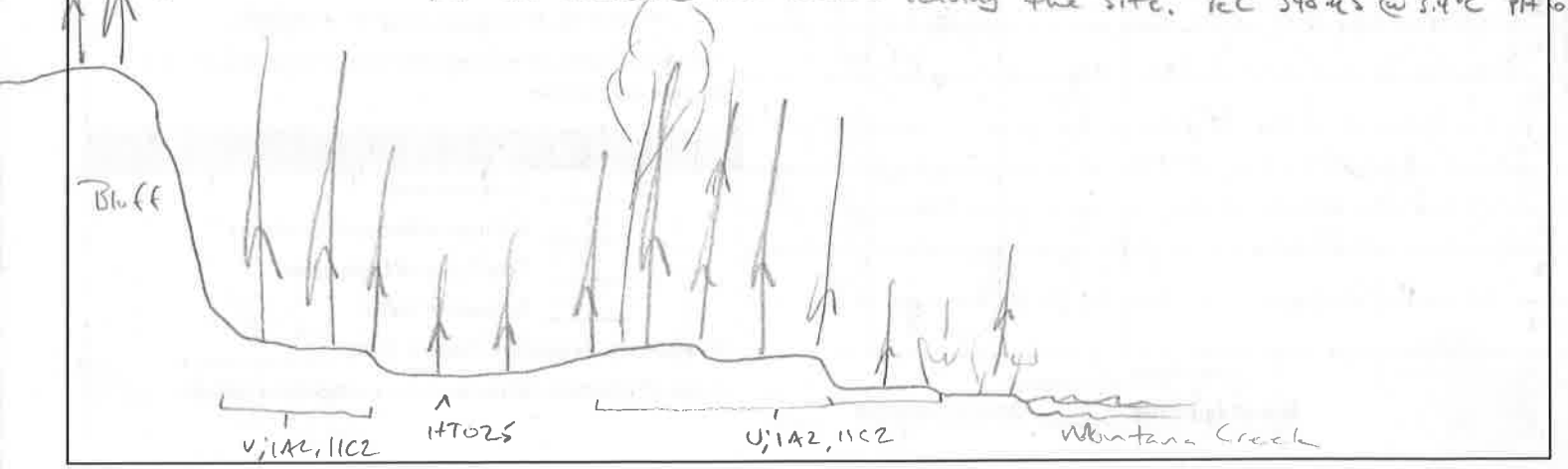
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 1503	Map #: 144 Map Date: 6/29/15
Date: 8/11/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HT025	
Investigators: Brian Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 539.1	
Latitude: 63°43'28.15	Longitude: 148°51'35.90		Datum: WGS84
Logbook No.: 02	Logbook Page No.: 32	Picture No.: W84HT025_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Stream terrace
Slope (%):	Local relief (concave, convex, none): Concave, Concave, hummocky- Moderate
Pre-mapped Alaska LNG/NWI classification: U;1A2, 11B2, 11C1	Evidence of Wildlife Use: Game trails
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 Y No____	Is the Sampled Area within a Wetland? Yes____ No____
Hydric Soil Present? Yes Y marginal No____	Wetland Type: PFO4/SS1B
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 1A2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Wet microsite characterized on a dry terrace. Isolated marginally wet inclusion. Area is surrounded by non-wetland. Frost table at 17 at time of site visit will be frozen at 13" early in the growing season. Saprric organics show evidence of saturation. Alluvial sands from 9-13" convey water freely (high K-Sat). Reduction may not occur here. A site revisit would be helpful to determine in the site meets the technical standard for hydric soils. Smaller slightly stunted PICGLA at site, thicker organics, small amounts of sphagnum. Some PICGLA 35-45' but mostly 15-30' tall. Enough free water collected in the bottom of soil pit to measure EC before leaving the site. EC 348 µS @ 3.4°C pH 6.55



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WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	30	Y	FacW
2. Betula neoalaskana	3		FacU
3. Populus tremuloides	T		FacU
4.			
Total Cover: 33			
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. Salix glauca	8		FacU
3. Salix myrtilifolia	T		FacW
4. Rhododendron groenlandicum	20	Y	Fac
5. Vaccinium uliginosum	20	Y	Fac
6. Vaccinium vitis-idaea	15		Fac
7. Empetrum nigrum	30	Y	Fac
8. Shepherdia canadensis	T		FacU
9. Rosa acicularis	T		FacU
Total Cover: 133			
50% of total cover: 66.5 20% of total cover: 26.6			

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 71 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: ____	X 1 = ____	
FACW species: 5	X 2 = 10	
FAC species 118	X 3 = 354	
FACU species 55	X 4 = 220	
UPL species ____	X 5 = ____	
Column Totals: 178 (A)	584 (B)	

PI = B/A = 3.28

Salix pulchra T
Arctous rubra 30 Y Fac
Vaccinium oxycoccus T
Betula nana T
Betula glandulosa T
Salix bebbiana T
Salix arbusculoides T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	5	Y	FACW
2. Equisetum scirpoidia	3	Y	FacU
3. Saussurea angustifolia	3	Y	Fac
4. Mertensia paniculata	1		FacU
5. Petasites frigidus	T		FacW
6. Calamagrostis canadensis	T		Fac
7. Geocaulon lividum	T		FacU
8. Lupinus arcticus	T		FacU
9. Carex bigelowii	T		
10.			
Total Cover: 12			
50% of total cover: 6 20% of total cover: 2.4			

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.

____ % 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 75
Sphagnum sp T
lichen 5
Foliose lichen
Moss 15

HT025

WETLAND DETERMINATION DATA FORM

8/11/15 W84HT025 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								
Oe 4-7.5								
Oa 7.5-9	N2.5/0						Sapric	near saturation point
C 9-13	2.5Y 4/2						Sand	borderline loamy sand. band of iron at lower boundary
Bw 13-16	10YR 4/2	90	10YR 5/6	10	C	M/PL	SiL	concentrations in bands + PL. Platy
Oab 16-17	N2.5/0	100					Sapric	free water over frost table
Bwf 17-20	10YR 4/2	80	10YR 5/6	20	C	M/PL	SiL	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): 17

Hydric Soil Present (Y/N): Y - marginal

Band of iron staining at 12-13" at interface between Sandy 'C' and seasonally frozen Bw starting at 13".

Notes: Marginal site, evidence of prolonged saturation in the lower part of the organic mat Wet microsite with concave slope shape across and down slope. Site revisit would be a good idea. No positive alpha alpha reaction observed. Most of area much drier. May meet A3 Black histic. On material and C 7.5 - 13 near saturation. Saturation assumed early in the growing season

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) 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: Small amount of free water at 16" above the frost table	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in):	
Water Table Present (Y/N): Y	Depth (in): free water @ 16"	**Wetland Hydrology Present (Y/N):** Y
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 13	EC: ~~N/A~~ BSS ~~not enough water to measure~~ BSS

Notes:

TC 348 ms @ 3.4°C pH 6.55 Soil pit
Enough water collected in pit to measure before leaving the area

1+T025

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__X__ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_33_____ Sapling (<5 dbh, <6m tall)__10___ Tall shrub (2-6m)__8___ Short shrub (0.5-2m)__15___ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) __3___ Short herb (<1m) __7___ Moss-Lichen__95___ 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__X___ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

EC348715

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__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: W84HT025 Field Target: 15103 Date: 8/11/15

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?

15103

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] 8/11/15 — Signature / Date

X Bryan Strong — Field Crew Chief (print)

X [signature] 8/11/15 — Signature / Date

HT026

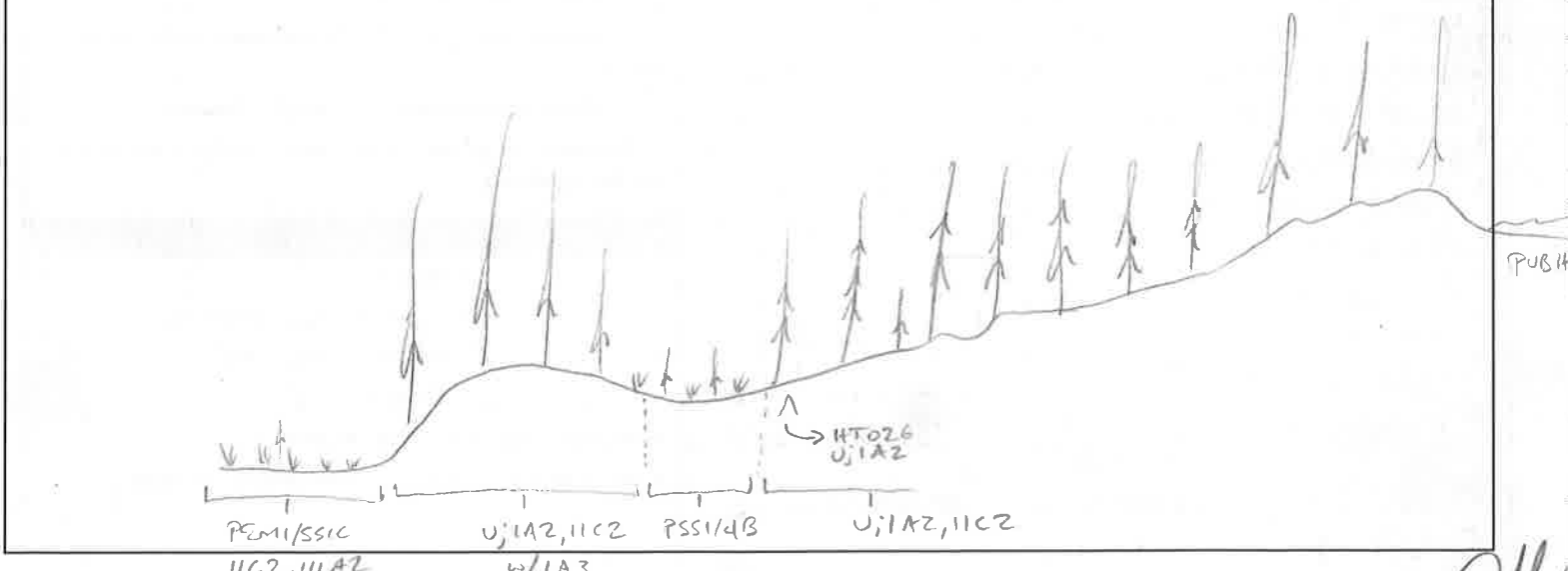
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15101	**Map #:** 145 **Map Date:** 6/29/15
Date: 8/11/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT026
Investigators: Brian Strong, Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 539.6	
Latitude: 63°43'08.38	**Longitude:** 148°51'04.62		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 33	**Picture No.:** W84HT026_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Footslope of a bench
Slope (%): 6	Local relief (concave, convex, none): Slightly concave, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: U;1A2, 11B2, 11C1	Evidence of Wildlife Use: Game trails, Moose sign
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____, 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 N
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1A2, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Transitional area. Mixed PICGLA, PICMAR transitioning wetter downslope toward swale/toeslope. Alluvial deposits. No frost table observed. Open understory with scattered willow, VACCUL, RHOGRO, Feather moss and lichen.



HT025

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Linear Plot Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	14	Y	FacU
2. Picea mariana	18	Y	FacW
3.			
4.			
Total Cover: 32			
50% of total cover: 16	20% of total cover: 6.4		
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	2		FacU
2. Picea mariana	3		FacW
3. Betula glandulosa 3'	3		Fac
4. Salix glauca 4'	4		Fac
5. Betula nana 2'	2		Fac
6. Vaccinium uliginosum	30	Y	Fac
7. Rhododendron groenlandicum	4		Fac
8. Vaccinium vitis idaea	18	Y	Fac
9. Salix myrtilifolia	+		—
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: 8 (B)

% Dominant Species that are OBL, FACW, or FAC: 62.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 22	X 2 =	44
FAC species 70	X 3 =	210
FACU species 21	X 4 =	84
UPL species	X 5 =	
Column Totals: 113 (A)		338 (B)

PI = B/A = 2.9

Salix pulchra T FacW
Arctous rubra 5 Fac
Empetrum nigrum 7 Fac
Salix arbusculoidies T
Dasiphora fruticosa T
Rhododendron tomentosum T FacW
Dryas integrefolia T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	1	Y	Fac
2. Festuca altaica	T		Fac
3. Carex scirpoidea	1	Y	FacU
4. Geocaulon lividicum	2	Y	FacU
5. Saussurea angustifolia	1	Y	Fac
6. Mertensia paniculata	1		FacU
7. Aconogonon alaskanum	1		Fac
8. Lupinus arcticus	1		FacU
9. Petasites frigidus	1		FacW
10. Bistorta plumosa	T		Fac
Total Cover: 9			
50% of total cover: 4.5	20% of total cover: 1.8		
Calamagrostis canadensis T			Fac

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 40
Lichen 25
Litter 25
Moss 10

HT026

WETLAND DETERMINATION DATA FORM

8/11/15 WB41+T026 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 0-4								
Oa 4-6								
A 6-8	10yr 2/1	100					MkSiL	Dry, low moisture content
Bwj 8-12	2.5y 5/3	90	10yr 5/6	7	LM		cSaL	Gravels ~15%. Lithichromic mottles
	10yr 2/1	3						
BCj 12-20	2.5y 5/2	90	10yr 5/6	5	LM		Loamy fine Sand	Gravels ~10%.
	10yr 3/1	5						some Lithochromic 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): NA

Hydric Soil Present (Y/N): N Opposite side of soil pit measured 2" less in organic/A depth

Notes: low chroma sandy parent material. Lithochromic mottling. No frost table in 72". Transition zone. Wetland begins <100' downslope. Moderately well drained site. Cryoturbated. Moderately low moisture content 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) 7
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:

HT026

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: W84HTQ26 Field Target: 15101 Date: 8/11/15

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?

15101

8. Photos

☒ Four photos were taken for each 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] 8/11/15

Wetland Scientist (print) — Signature / Date

X Bryan Strong — X [signature] 8/11/15

Field Crew Chief (print) — Signature / Date

HT027

WETLAND DETERMINATION DATA FORM

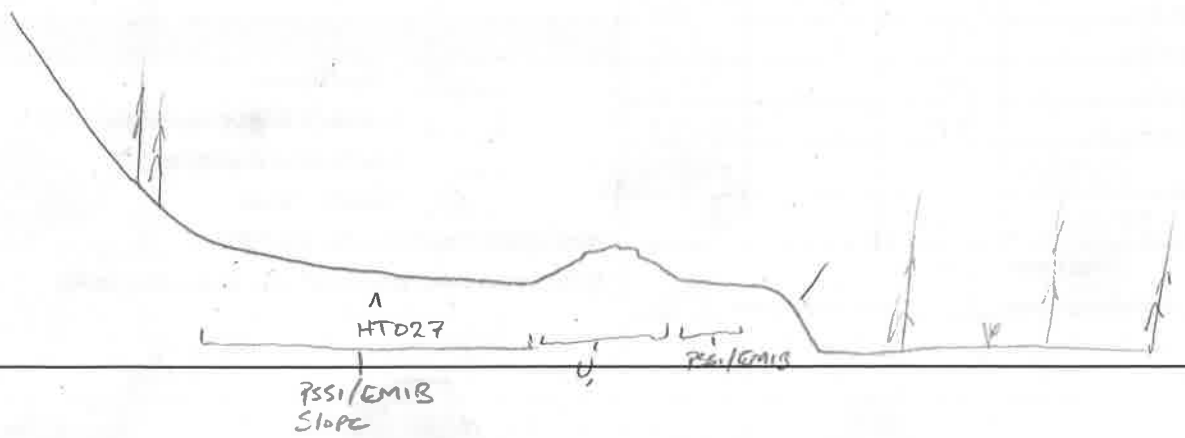
SITE DESCRIPTION				
Survey Type: Centerline ✕ **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 18089	**Map #:** 156 **Map Date:** 6/29/15
Date: 8/20/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT027	
Investigators: Brean Strong Jessie Brownlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 565.8		
Latitude: 63. 23 31.957		**Longitude:** 148 52 53.009		**Datum:** WGS84
Logbook No.: 03	**Logbook Page No.:** 01	**Picture No.:** W84HT027_VEG_Veg-Pit_Plug		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Alluvial Fan
Slope (%): 6 Aspect:	Local relief (concave, convex, none): Slightly concave down Slightly convex across Hummocky. Moderate
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB IIC1, IIIA2	Evidence of Wildlife Use: Wolf Scat
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____, 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:** PSS1/EMIB
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

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

Alluvial fan. A swale just north of the plot has slowly flowing surface water (1-3" deep) with iron flock present. Very old cut spruce stumps observed in the plot/area. Rock outcrop down gradient is partly vegetated with dwarf shubs and dry footed graminoids and forbs. The alluvial fan transitions to a steep bluff formed during an outwash event from the Jack River drainage.



HTo27

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. Salix pulchra ~1'	12		FACW
2. Salix glauca ~1'	1		FAC
3. Betula nana ~1'	6		FAC
4. Vaccinium uliginosum	20	Y	FAC
5. Rhododendron tomentosum	22	Y	FACW
6. Vaccinium vitis-idaea	20	Y	FAC
7. Empetrum nigrum	5		FAC
8. Salix reticulata	3		FAC
9. Arctous rubra	5		FAC
Total Cover: 94			
50% of total cover: 47	20% of total cover: 18.8		

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: 0	X 1 = 0
FACW species: 35	X 2 = 70
FAC species 95	X 3 = 285
FACU species 0	X 4 = 0
UPL species 0	X 5 = 0
Column Totals: 130 (A)	355 (B)

PI = B/A = 2.73

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	35	Y	FAC
2. Rubus chamaemorus	1		FACW
3.			
4. Pedicularis labradorica	T		FACW
5. Carex capillaris	T		FACW
6. Bistorta plumosa	T		FACU
7. Saxifraga nelsoni	T		—
8. Pedicularis capitata	T		FACU
9. Calamagrostis stricta	T		FACW
10. Poa sp (arctica?)	T		—
Total Cover: 36			
50% of total cover: 18	20% of total cover: 7.2		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

____ % Cover of Wetland Bryophytes

____ Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

HT027

WETLAND DETERMINATION DATA FORM

8/20/15 W84HT027 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	
Oe 4-5							Hemic	
Oa 5-6.5							Sapric	
A1 6.5-8.5	10yr 3/1	100					MK SiL	
A2 8.5-11	2.5y 3/1	100					SiL	
B9 11-14	5y 4/1	100					SiL	high in clay content
2Ab/C 14-16	N4/0	100					LSa	1" burned A at 14". 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)

[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:

A 16-21 5y 4/1 7.5yr 4/6 10 SiL high in clay alpha alpha positive

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) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) Y	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 at 9.5 below mineral	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) Y not in Plot			

Surface Water Present (Y/N): Y	Depth (in): 1-3" not in Plot	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 10	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	EC: 146mS@46.8°C 5.5 pH

Notes:

106mS @ 34.6°C pH 5.15 – Soil pit

HT027

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)____ Sapling (<5 dbh, <6m tall)____ Tall shrub (2-6m)____ Short shrub (0.5-2m) 61 Dwarf shrub (<0.5m) 33 Tall herb (≥1m) ____ Short herb (<1m) 36 Moss-Lichen____ Floating____ Submerged____

Number of Wetland Types (M): 1 | **Evenness of Wetland Type Distribution (M)**: Even X Highly Uneven ____ Moderately even ____

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

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

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

Presence of Islands (M): Absent (none) X One or Few____ Several to Many ____ N/A____

Cover Distribution of Dominant Layer (P): No Veg.____ Solitary, Scattered Stems____ 1 or More Large Patches; Parts of Site Open____ Small Scattered Patches____ Continuous Cover X

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

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

HGM Class (P): Slope X Flat____ Lacustrine Fringe____ Depressional ____ Riverine ____ Estaurine Fringe____

SOIL VARIABLES

Soil Factors (P): Soil Lacking____ Histosol:Fibric____ Histosol:Hemic____ Histosol: Sapric____ Mineral: Gravelly____ Mineral: Sandy____ Mineral: Silty X Mineral: Clayey____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet 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** 5.5

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____ Seeps Observed____ Intermittent Spring____ Perennial Spring X

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below____ Only Connected Above____ Connected Upstream & Downstream X Unknown____

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

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

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

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jessie Brownlee

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT027 Field Target: 15089 Date: 8/20/15

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?

2. **Vegetation**

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

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators 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~~ form, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

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

8. Photos

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

X _____

Wetland Scientist (print)

Brian Strong 8/20/15

Jessie Brownlee 8/20/15

HT028
N.T

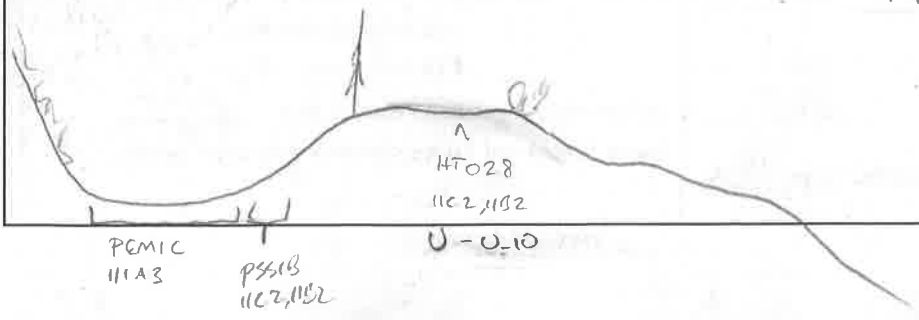
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 5283	Map #: 188 Map Date: 6/29/15
Date: 8/20/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT028
Investigators: Bryan String, Jessie Brownlee			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 603.8	
Latitude: 63° 00' 05.0265	Longitude: -149° 33' 37.5883		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 01	Picture No.: W84HT028_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Moraine - Slight concave
Slope (%): 2	Local relief (concave, convex, none): Hummocky - moderate
Pre-mapped Alaska LNG/NWI classification: U, IIC2, IIB2	Evidence of Wildlife Use: Bear, 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)	Are "Normal Circumstances" present: no sign in plot 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.) Mosaic ~10% wet inclusions

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No_____	Is the Sampled Area within a Wetland? Yes_____ No X
Hydric Soil Present? Yes_____ No N - marginal	Wetland Type: U Transitional/Mosaic site U-10
Wetland Hydrology Present? Yes ~(No_____	Alaska Vegetation Classification (Viereck): IIC2, IIB2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Small concave feature (subtle concavity) with large and moderate hummocks driven by seasonally wet conditions. Microlows between hummocks have standing water in a few places just outside of the plot while others microlows show evidence of standing water and are saturated to the surface. Probably a true mosaic but, 10-15% wetland based on site observations. No positive alpha alpha reaction to 25" Water table at 16.5" Gravelly loam appears to have relatively high hydraulic conductivity. Low EC and slope position does not help to support a wetland call here although small inclusions are apparent. Slightly concave on the flat top of a convex landform (moraine) Very marginal sight. Site revisit early in the growing season may be prudent. Dwarf ericaceous shrub community with moderate and prominent hummocks. A few patches of tall ALNVIR and a few PICGLA trees ~35' tall. Soils formed in andic material over glacial till. Andic material has spodic properties/processes, cryoturbated, Bh material with a water table in glacial till at ~16.5 inches EC: 17 µS @ 48.2°C pH 5.17 Naturally Problematic Site.



Concentrations in lower andic layer above water table has weakly cemented 7.5YR 3/3 concentrations

HT028

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	T		
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. Alnus viridis (one dg.)	2		FAC
2. Betula nana	4		FAC
3. Spirea stevensii	30	Y	FACU
4. Vaccinium uliginosum	30	Y	FAC
5. Empetrum nigrum	20	Y	FAC
6. Rhododendron fomentosum	5		FACW
7. Andromeda polifolia	1		OBL
8. Salix fuscescens	T		—
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: 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:	5	X 2 =	10
FAC species	95	X 3 =	285
FACU species	36	X 4 =	144
UPL species	0	X 5 =	0
Column Totals:	137	(A)	440 (B)

PI = B/A = 3.21

Luzula sp	H	T	—
Cornus canadensis	H	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. Dryopteris expansa	2		FACU
3. Equisetum sylvaticum	4		FAC
4. Spinulum annotinum	2		FACU
5. Aconitum delphinifolium	T		—
6. Veratrum viride	1		FAC
7. Carex bigelowii	12	Y	FAC
8. Carex sp	T		—
9. Artemesia	T		—
10. Viola sp	1		—

Total Cover: 46

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

Rubus cham T

Sanguisorba menz T

Trientalis europea T

Rubus pedatus 2 FAC

Gymnocarpium dryopteris 2 FACU

Streptopus amplexifolia T

Equisetum arvense T

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.

1 % Bare Ground

20 % 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 sp 20

Feather Moss 40

Moss 25

Lichen 10

WT028

WETLAND DETERMINATION DATA FORM

8/20/15 W84WT028 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
O 0-4								
Bw/C1 4-12	7.5YR 3/2	85					SiL	Andic material, 10YR 3/2 matrix color
	7.5YR 4/1	15						
C 12-14	7.5YR 4/1	100					SiL	
Bw 14-17	10YR 3/3	92	7.5 3/3	8	C	M	GrLoam	saturated, Concentrations weakly cemented
2C 17-24	5Y 5/2	100					GrLoam	Glacial till. Free water,
								No alpha alpha rxn but possibly a depleted matrix

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC 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: Andic material. Spodic properties. Site may be seasonally wet and certainly a mosaic. Bw material may indicate seasonal wetness. Intermediate site chosen between wet microlows and Microhighs of medium to large hummocks. 12-17" tall hummocks. Gravels from 14-17 ~20%

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) 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) Y	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 Hummocky moderate and large
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 in microlows at the edge of the plot. Water stained moss saturated to the surface in other microlows nearby	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 1	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 16.5		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 14	EC: NA 5.17 48.2°C CC 17ms	

Notes: Soil pit CC/pit

HT028

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT028 Field Target: 15283 Date: 8/20/15

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?

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X _____

Wetland Scientist (print)

Bryan Strong 8/20/15

Jessie Brownlee 8/20/15

HT029

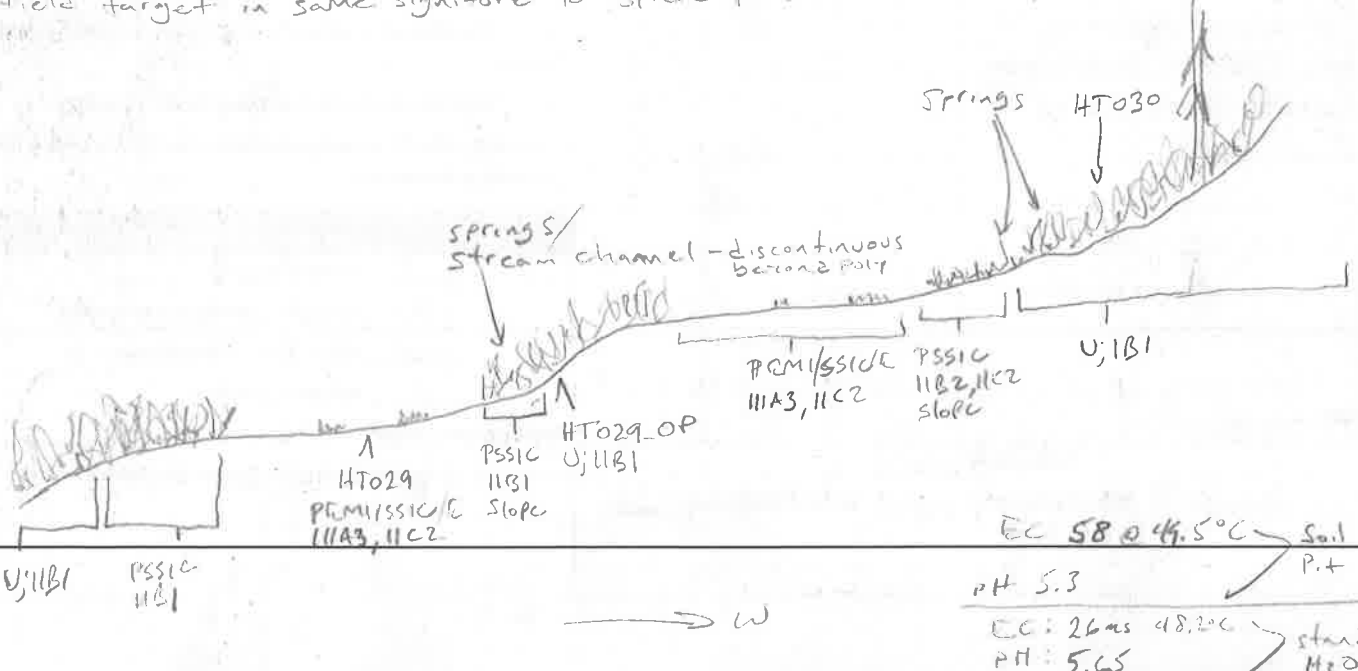
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain) X **Other** (explain)_____			**Field Target:** 15288	**Map #:** 184 **Map Date:** 6/19/15
Date: 8/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT029	
Investigators: Bryan Strong Jessie Brownlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 601.5 /NM		
Latitude: 63°01'53.253	**Longitude:** 149° 33' 06.999			**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 02	**Picture No.:** W84HT Pit Plug-Veg-Veg		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench
Slope (%): 3-4%	Local relief (concave, convex, none): Slightly concave, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: PSS1/PEMIB	Evidence of Wildlife Use: Game trails
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes) Power Line overhead
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No_____	**Is the Sampled Area within a Wetland?** Yes Y No_____
Hydric Soil Present? Yes Y No_____	**Wetland Type:** PEMI/SSIC
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): IIIA3, IIC2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Series of benches with numerous small channels connecting PEMI/SSIC and closed tall willow PSS1B wetlands. Slope HeaM. At point, linear strings (microhighs) support low shrubs SALPUL, VACULI, DASFRU, BETNAN, white flarks; microlows host a variety of sedges, cottongrass and small amounts of bluejoint. All wet between the EZ to the NE and point. Point moved downslope from field target in same signature to spread points out and characterize a larger polygon



HT029

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	15		FACW
2.			
3.			
4.			

Total Cover: ____

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix pulchra	4		FACW
2. Dasiphora fruticosa	7		FAC
3. Betula nana	12	Y	FAC
4. Spirea stevensii	3		FACW
5. Vaccinium uliginosum	20	Y	FAC
6. Salix fuscescens	1		FACW
7. Andromeda polifolia	T		—
8. Vaccinium oxycoccus	1		OBL
9. Empetrum nigrum	T/E		—

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: 4 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	43	X 1 =	43
FACW species:	15	X 2 =	30
FAC species	48	X 3 =	144
FACU species	3	X 4 =	12
UPL species		X 5 =	
Column Totals:	109	(A)	229 (B)

PI = B/A = 2.10

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	5		FAC
2. Eriophorum russeolum	5		FACW
3. Carex canescens	10	Y	OBL
4. Carex pauciflora	10	Y	OBL
5. Comarum palustre	2		OBL
6. Rubus chamaemorus	3		FACW
7. Sanguisorba menziesii	4		FAC
8. Rubus arcticus	T		—
9. Dodecatheon ?	T		—
10. Carex aquatilis	20	Y	OBL

Total Cover: 59

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

Parnassia palustris T

Viola sp T

Spiranthes ro T

Trientalis europaea T

Equisetum arvense T/E

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

95 % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp 95

Water 5

HT029

WETLAND DETERMINATION DATA FORM

8/21/15 W84HT029 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 0-5							Fibric	
Oe 5-12							Hemic	
Oa 12-20							Sapric	

[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) Y		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): Y

Notes: Likely mineral material ~28" based on shovel probe.

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) N
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) 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) Y	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): 12"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 10	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 5	EC: 26ms 48.2°F 5.65 = pH – small discontinuous 12" deep channel

Notes:

EC 58ms 49.5°C > Soil Pit
pH 5.3

HT029

AQUATIC SITE ASSESSMENT DATA FORM

W84HT029 8.21.15

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__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_48_ Dwarf shrub (<0.5m) _2_ Tall herb (≥1m) _____ Short herb (<1m) _59_ Moss-Lichen_95_ Floating_____ Submerged_____

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

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

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

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

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

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

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

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

HGM Class (P): Slope__X__ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ 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_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet__X__ 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** 5.65

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_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream__X__ Unknown_____

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

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

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

Crew Chief QA/QC check: BrSh

GPS Technician QA/QC check: Jessie Brownlee

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W844T029 Field Target: 15288 Date: 8/21/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Jessie Brownlee 8.21.15

Wetland Scientist (print)

Bryan Stong 8/21/15

HT030

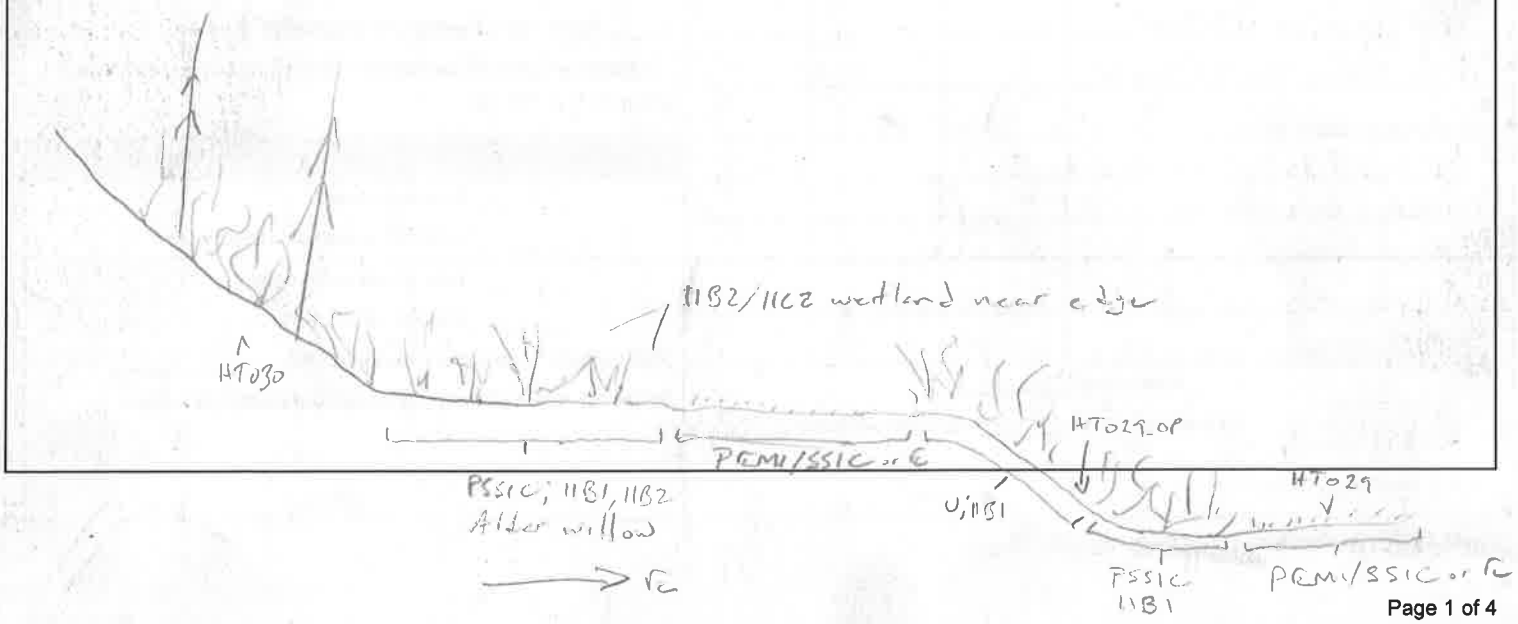
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15289	**Map #:** 184 **Map Date:** 6/29/15
Date: 8/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT030
Investigators: Bryan Strong, Jessie Brownlee			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 601.5	
Latitude: 63°10'51.964"	**Longitude:** -149°32'54.327		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 02	**Picture No.:** W84HT030_VEG, VEG_PIT, PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 29% measured	Local relief (concave, convex, none): Flat to undulating
Pre-mapped Alaska LNG/NWI classification: U ; 1B1	Evidence of Wildlife Use:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No N	**Is the Sampled Area within a Wetland?** Yes____ No N
Hydric Soil Present? Yes____ No N	**Wetland Type:** U Tall Closed Alder Shrub
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 1181

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Tall closed alder canopy 8-10' tall with sparse to scattered PICGLA on a 30% slope. At slope break below point is a wet edge of PSS1C; 1181 closed alder willow with springs and seeps.



HT030

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.			

Added to shrub stratum <5%

Total Cover: —

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus virdis	90	Y	FAC
2. Ribies glandulosum	3		FACU
3. Spirea stevensii	5		FACU
4. Vaccinium ovalifolium	2		FAC
5. Ribies triste	T		FAC
6.			
7.			
8.			
9.			

Total Cover: 103

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species:	0	X 1 = 0
FACW species:	0	X 2 = 0
FAC species	93	X 3 = 279
FACU species	62	X 4 = 248
UPL species	0	X 5 = 0
Column Totals:	155 (A)	527 (B)

PI = B/A = 3.4

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	50	Y	FACU
2. Trientalis eropea	T		FACU
3. Boschniakia rossica	T		
4. Streptopsis amplexifolia	T		
5. Sanguisorba sp	T		
6. Calamagrostis canadensis	1		FAC
7. Cornus canadensis	T		
8. Spinolum annotinum	1		FACU
9. Equisetum arvense	T		
10. Phegopteris connectilis	T/C		

Total Cover: 52

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

Rubus arcticus T

Gymnocarpum dryopteris T

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):

WETLAND DETERMINATION DATA FORM

8/21/15 W84HT030

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 0-7								dry
A/Bh 7-11	10YR 2/1	75					SiL	Anzic material
	7.5YR 2.5/3	25						
Bw 11-18	10YR 3/1	95					SiL	Gravels/cobbles ~5%
	10YR 3/4	5						
BC 18-24	2.5Y 5/3	100					GrLoam	till. Gravels ~30%

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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)		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:

HT030

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: BT

GPS Technician QA/QC check: Jessie Brownell

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT030 Field Target: 15289 Date: 8/21/15

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?

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 Jessie Brownlee F.21.15
Wetland Scientist (print)

Brian Strong 8/21/15

HTO31

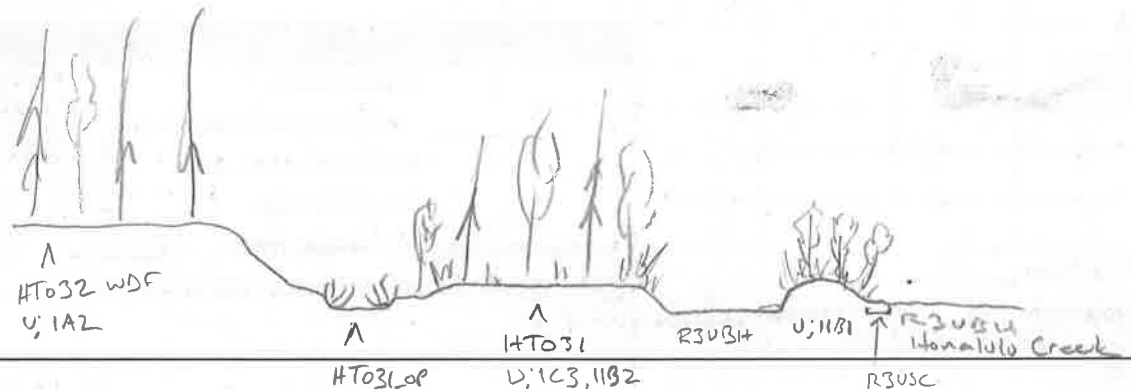
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15067	**Map #:** 183 **Map Date:** 6/19/15
Date: 8/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HTO31	
Investigators: Bryan Strong Jessie Brownlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 158.1		
Latitude: 63°04'16.057"	**Longitude:** -149°28'55.6030"		**Datum:** WGS84	
Logbook No.: 03	**Logbook Page No.:** 03	**Picture No.:** W84HTO31_VEG_VEG_PIT_PLOT		

SITE PARAMETERS			
Subregion: Alaska Range		Landform (hillslope, terrace, hummocks, etc.): Stream Terrace	
Slope (%): ~3		Local relief (concave, convex, none): Undulating	
Pre-mapped Alaska LNG/NWI classification: PSS1/FO1C; 11B2, 1B2		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 Y No____ (If no, explain in Notes.)	
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)		
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes____ No N		**Is the Sampled Area within a Wetland?** Yes____ No N	
Hydric Soil Present? Yes____ No N		**Wetland Type:** U Woodland mixed Forest	
Wetland Hydrology Present? Yes____ No N		Alaska Vegetation Classification (Viereck): 1C3, 11B2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Honalulu Creek just south of point. No evidence of regular overbank flooding at point (>5yr interval). Point in woodland mixed forest - some areas have more tree cover and may be >30% cover. Quite a few of the POPBAL-T (~65' tall) are in steep decline. PICGLA trees are large (80-100' tall). Birch are mostly smaller - co-dominant in the canopy 20-30' tall. The terrace is 3-4 feet above the water level.



HTO31

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	5	Y	FACU
2. Picea glauca	5	Y	FACU
3. Betula neoalaskana	3	Y	FACU
4.			
Total Cover: 13			
50% of total cover: 6.5 20% of total cover: 2.6			
Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus viridis	50	Y	FAC
2. Salix richardsonii	2		FACW
3. Viburnum edule	5		FACU
4. Ribes triste	3		FAC
5. Spirea stevensii	1		FACU
6.			
7.			
8.			
9.			
Total Cover: 61			
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: 2 (A)

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

% Dominant Species that are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	2	X 2 =	4
FAC species	138	X 3 =	414
FACU species	30	X 4 =	120
UPL species	0	X 5 =	0
Column Totals:	170 (A)		538 (B)

PI = B/A = 3.16

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	85	Y	FAC
2. Dryopteris expansa	8		FACU
3. Chamerion angustifolium	1		FACU
4. Rubus arcticus	T		FAC
5. Trientalis europea	2		FACU
6. Mertensia paniculata	T		—
7. Cornus canadensis	T		—
8.			
9.			
10.			
Total Cover: 96			
50% of total cover: 48 20% of total cover: 19.2			

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):

HTO31

WETLAND DETERMINATION DATA FORM

8/21/15 W84HTO31 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								
AC 4-11	10YR 3/2	100					LSa	
C 11-24	5Y 3/1	100					VGRSa	Cobble/Gravel ~37%

[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): 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) 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:

HT031

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W841HT031 Field Target: 15067 Date: 8/21/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X _____

Wetland Scientist (print)

Brian Strong 8/21/15

Jessie Brownlee 8/21/15

HT032

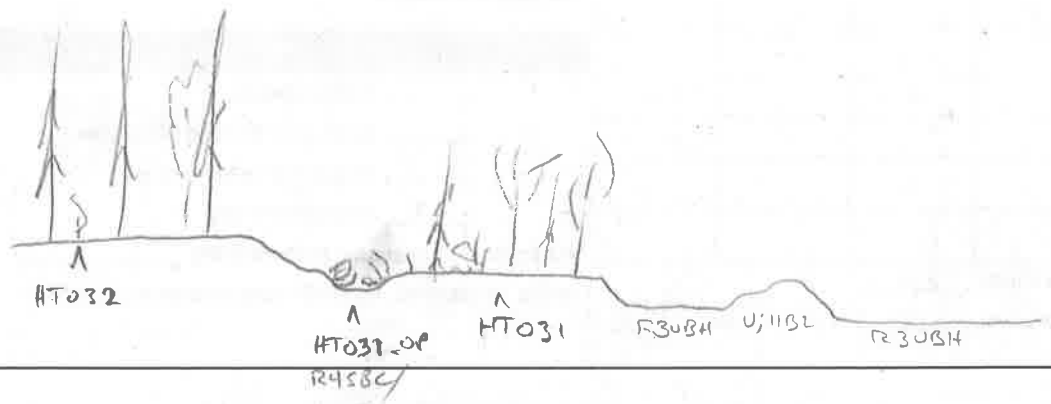
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15068	**Map #:** 183 **Map Date:** 6/19/15
Date: 8/21/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT032	
Investigators: Bryan Strong Jessie Brownlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 598		
Latitude: 63 04 19.943		**Longitude:** 149 28 53.710		**Datum:** WGS84
Logbook No.: 03	**Logbook Page No.:** 03	**Picture No.:** W84HT032-VEG.VEG-PIT-PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 3-5%	Local relief (concave, convex, none): Flat to undulating
Pre-mapped Alaska LNG/NWI classification: U; 1C2	Evidence of Wildlife Use: Moose sign
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No N	**Is the Sampled Area within a Wetland?** Yes____ No N
Hydric Soil Present? Yes____ No N	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No N	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. Upper terrace. Mostly PICGLA-T and PICGLA-SAPS with scattered, BETNEO-T (20-25') and saplings. Not enough BETNEO to call mixed forest in vicinity of the plot. Open understory with sparce scattered willow and low shrub cover. Fairly even but not dense cover of CALCAN. Soils have a thin mantle of silt over cobbly and gravelly alluvium.



N

HT032

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	25	Y	FACU
2. Betula neoalaskana	3		FACU
3. Populus balsamifera	3		FACU
4.			
Total Cover: 31			
50% of total cover: 15.5 20% of total cover: 6.2			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Picea glauca	5		FACU
2. Betula neoalaskana	2		FACU
3. Salix richardsonii	5		FACW
4. Spirea stevensii	15	Y	FACU
5. Rosa acicularis	2		FACU
6. Linnea borealis	T		—
7. Viburnum edule	1		FACU
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: 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: 0	X 1 = 0
FACW species: 5	X 2 = 10
FAC species 50	X 3 = 150
FACU species 130	X 4 = 520
UPL species 0	X 5 = 0
Column Totals: 185 (A)	680 (B)

PI = B/A = 3.67

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	45	Y	FAC
2. Gymnocarpium dryopteris	30	Y	FACU
3. Chamerion angustifolium	2		FACU
4. Spinulum annotinum	T		—
5. Grass sp.	T		—
6. Pyrola minor	T		—
7. Cornus canadensis	40	Y	FACU
8. Rubus pedatus	5		FAC
9. Rubus arcticus	2		FACU
10. Carex sp.	T		—
Total Cover: 124			
50% of total cover: 62 20% of total cover: 24.8			
Equisetum pratense	T		
Luzula sp.	T		
Dryopteris expansa	T		

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):

Feather Moss 90

1T032

WETLAND DETERMINATION DATA FORM

8/21/15 W841T032 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 0-1								
A 1-2	10YR 3/2	100					SiL	
Bw 2-4.5	2.5-Y 4/3						SiL	
BG 4.5-5.5	N4/0	87	7.5YR 3/4	13	C	PL	SiL	saturates long enough to reduce before draining freely through
2C1 5.5-8	5-Y 3/1						Sand	Sands
2C2 8-24	5Y 3/1						VCB Sand	Cobbles gravels ~35%

[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: The strongly contrasting textural change at 5.5" will saturate the inch above long enough to allow for reduction before draining freely through Sandy/gravelly 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):** N
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	EC: NA

Notes:

14T032

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: Jessica Brouillard

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT032 Field Target: 15068 Date: 15068

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Jessie Brownlee — X [signature] 8.21.15

Wetland Scientist (print) — Signature / Date

X Brian Strong — X [signature] 8/21/15

Field Crew Chief (print) — Signature / Date

HTO33

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 5073	Map #: 176 Map Date: 6/19/15
Date: 8/22/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HTO33
Investigators: Bryan Strong, Jessie Brownlee			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 593.9	
Latitude: 63°07'26.086"	Longitude: -149°25'59.172"		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 64	Picture No.: W84HTO33_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Stream terrace
Slope (%): 5-6%	Local relief (concave, convex, none): Concave, Undulating
Pre-mapped Alaska LNG/NWI classification: U; 1A2, 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 Y No_____	Is the Sampled Area within a Wetland? Yes_____ No N
Hydric Soil Present? Yes_____ No N	Wetland Type: U Close 2 Tall Willow Shrub w/ white spruce woodland
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11B1, 1A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Stream terrace. Close 2 willow-tall shrub. Fairly sparse understory of EQUARV, Sanguisorba, CORCAN, Anemone sp, CHAMNT with mostly feather moss. No sphagnum observed. Soil pit was dug in a concave microlow on the terrace. Wet microsite on a dry terrace. Water table at 16". If this site is dry, little chance of finding wet inclusions on the stream terrace.



HT033

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Linear Plot - Stream terrace Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	5	Y	FACU
2.			
3.			
4.			
Total Cover: 5			
50% of total cover: 2.5	20% of total cover: 1		

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)

Sapling/Shrub Stratum (26) Linear Plot - Stream Terrace	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix richardsonii * 7'	30	Y	FACW
2. Salix pulchra 7'	50	Y	FACW
3. Salix alaxsensis 8-10'	3		FAC
4. Vaccinium ovalifolium	1		FAC
5. Picea glauca	2		FACU
6. Empetrum nigrum	4		FAC
7. Spirea stevensii	3		FACU
8. Vaccinium vitis-idaea	1		FAC
9. Vaccinium uliginosum	7		FAC
Total Cover: 101			
50% of total cover: 50.5	20% of total cover: 20.2		

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: 0	X 1 = 0
FACW species: 80	X 2 = 160
FAC species 31	X 3 = 93
FACU species 25	X 4 = 100
UPL species	X 5 =
Column Totals: 136 (A)	353 (B)

PI = B/A = 2.59

~~Vaccinium ovalifolium~~ 35 1

Salix richardsonii shows evidence of hybridization with S. barclayii? Most specimens lack hairy coarse stem but have large persistant sca 2

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	15	Y	FAC
2. Cornus canadensis	10	Y	FACU
3. Sanguisorba sp	2		—
4. Moneses uniflora	T		FACU
5. Orthelia secunda	2		FACU
6. Streptopsis amplexifolia	T		FACU
7. Petasites frigidus	T		FACW
8. Valarian capitata	T		FAC
9. Chamerion angustifolium	2		FACU
10. Spiraea annotinum	T		FACU
Total Cover: 32			
50% of total cover: 16	20% of total cover: 6.4		
Aconitum delphinifolium	T		
Rubus arcticos	1		FACU

Hydrophytic Vegetation Indicators: leaf-like strokes

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 90

Calamagrostis canadensis T

Luzula sp T

Polemonium acutifolia T

Viola sp T

Anemone sp

Pedicularis sp T

Rhodiola rosea (sedum) T

Martensia paniculata T

Geranium erianthum T

Moss 10 T

Chamerion latifolium T

Lupinus arcticus T

Linnaea borealis T

AT033

WETLAND DETERMINATION DATA FORM

8/22/15 W841AT033 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 3-5	10YR 2/1	100					SiL	Appears to have andic properties greasy feel - borderline Mucky SiL
C 5-18	10YR 3/2	100					VGSand	Alluvium, Variegated sand 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: Water table may come up within/above 12" for short periods, particularly in the early part of the growing season. Reduction is highly unlikely through the coarse alluvium. High hydraulic conductivity substrate. Concave microsite (wettest microsite in the immediate area. Water table at 16"

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) 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: *Stream channel adjacent Riparian corridor	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA (stream nearby)	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 16	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 14.5	EC: 217 µS pH 5.31 41.8°C >Soil pit water

Notes:

14T033

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: Bryan [illegible] GPS Technician QA/QC check: Jessie Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT033 Field Target: 15073 Date: 8/22/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brownlee — Wetland Scientist (print)

X — Signature / Date 8-22-15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date

HT034

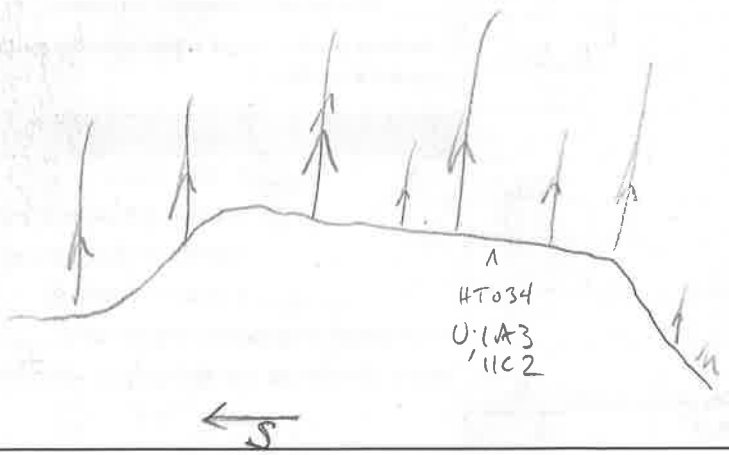
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15074	**Map #:** 176 **Map Date:** 6/19/15
Date: 8/22/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT034
Investigators: Bryan Strong, Jessica Brownlee			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 593.7	
Latitude: 63° 07' 33.794"	**Longitude:** 149° 25' 50.0605"		**Datum:** WGS84
Logbook No.: 03	**Logbook Page No.:** 05	**Picture No.:** W84HT034_VEG_VEG-PIT-PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Glacial terrace
Slope (%): 5% measured	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: U; 1A2, 1132	Evidence of Wildlife Use: Moose sign, hummocky - small some moderate in size
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 N
Hydric Soil Present? Yes____ No N	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 1A3 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. White spruce woodland on a dissected outwash deposit. Iron cementation at 7.5" (ortstein). To the west southwest a subtle swale develops supporting a narrow slope wetland documented at W84HT034_OP2.



HT034

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.			
3.			
4.			

Total Cover: 20

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	3		FACU
2. Betula nana	6		FAC
3. Vaccinium uliginosum	17		FAC
4. Spirea stevensii	3		FACU
5. Vaccinium vitis-idaea	2		FAC
6. Empetrum nigrum	70	Y	FAC
7. Linnaea borealis	T		—
8.			
9.			

Total Cover: 101

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	100	X 3 =	300
FACU species	29	X 4 =	116
UPL species	0	X 5 =	0
Column Totals:	129	(A)	416 (B)

PI = B/A = 3.22

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Festuca altaica	3	Y	FAC
2. Anthoxanthum monticola	T		—
3. Cornus canadensis	2	Y	FACU
4. Spiraea angustinum	1		FACU
5. Rubus pedatus	2	Y	FAC
6. Calamagrostis canadensis	T		FAC
7. Trientalis europaea	T		FACU
8. Carex sp (brunnescens?)	T		—
9. Lycopodium alpinum	T		—
10. Lycopodium complanatum	T		—

Total Cover: 8

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

Lupinus arcticus	T		—
Aconitum delphinifolium	T		—
Pasque flower?	T		—

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.

_____ % 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):

Foliose lichen	20
Feather Moss	30
Cladina sp	10
Lichen	3

HT034

WETLAND DETERMINATION DATA FORM

8/22/15 WS4HT034 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 0-2								
A 2-3.5	10YR 3/1	100					SiL	loess mantle
BhA 3.5-5	7.5YR 2.5/1	100					SiL	
Bw/E 5-7.5	10YR 5/4	60					SiL	loess mantle - some weak cementation in places
	2.5Y 6/2	40						
7.5-13	7.5R 2.5/1	100					VGLSa	iron cemented ortstein
Bc 13-20	5YR 3/2	100					VGLSa	weak cementation

[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: Spodosol. Better expression of E horizon expected in other pedons based on the presence of ortstein - cemented layer

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 - small and moderate hummocks
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: Marginal shallow aquitard with iron cemented VGRLSand at 7.5 inches. Strongly cemented, however.	
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:

HT034

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_____ Pluvaquent Soils Sediment Created_____

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT024 Field Target: 15074 Date: 8/22/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brownlee — X — 8.22.15

Wetland Scientist (print) — Signature / Date

X Bryan Strong — X — 8/22/15

Field Crew Chief (print) — Signature / Date

HTO35

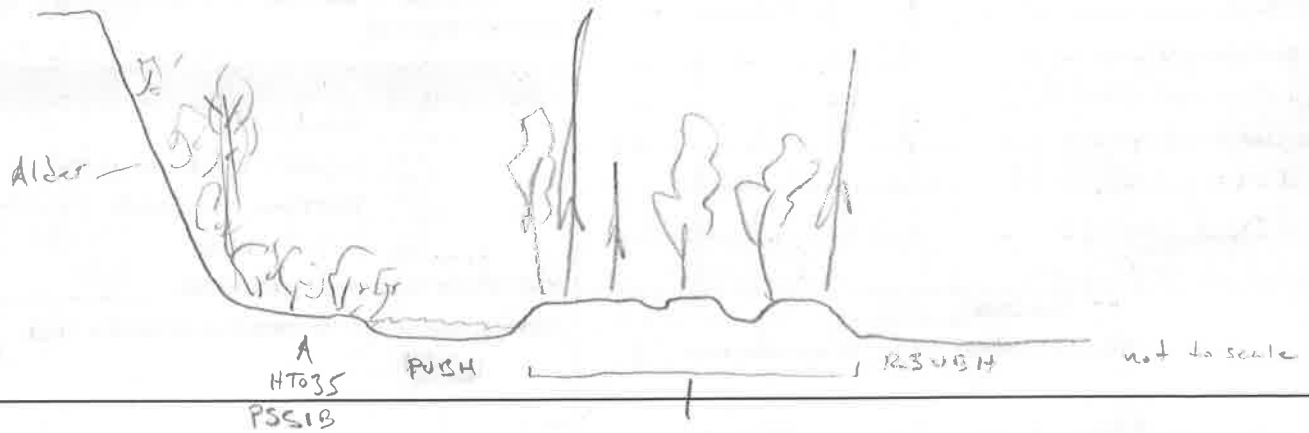
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 15075	Map #: 175 Map Date: 6/19/15
Date: 8/22/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HTO35	
Investigators: Bryan Strong, Jessie Brownlee				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 593.5		
Latitude: 63°07'43.1073"		Longitude: -149°25'43.065"		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 06	Picture No.: W84HTO35_VEG_VEG-PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Toeslope of Ravine
Slope (%): 2	Local relief (concave, convex, none): Concave, hummocks small to small undulations
Pre-mapped Alaska LNG/NWI classification: U; 1A2, 1B2	Evidence of Wildlife Use: Moose sign
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation_____, Soil Y, or Hydrology_____ Naturally Problematic?	No Y (If yes, explain in Notes.) AK Gleyed w/out Sy or redder Obvious wetland.

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: PSS1B Tall Closed Willow
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11 B1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Toeslope of a deep ravine. Most of the surrounding terrace is non-wetland. Perennial springs discharging at the base of the steep slope forming a small algal laden pond with an island of willow or two. Tall Closed Willow wetland surrounds/borders pond on all sides. Perrennial outlet - small. Wetland extends east upgradient along the base of the ravine slope for ~150 narrowing down before transitioning to non-wetland. No evidence of overbank flooding on terrace. May be small wet inclusion but <10%. Soil pit EC 67ms pH 5.26. Spring EC:25ms pH 5.28



HT035

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

linear plot shape Tree Stratum (Plot sizes: 50)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca 50'	Edge/trace		—
2. Populus balsamifera 70'	Edge/trace		—
3.			
4.			
Total Cover:			
50% of total cover: r 20% of total cover:			
Sapling/Shrub Stratum (26) linear plot shape	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix alaxensis 8-10'	40	Y	FAC
2. Salix richardsonii 9'	15		FACW
3. Salix pulchra 8'	30	Y	FACW
4. Picea glauca 3'	1		FACU
5. Spiraea Stevenii	T		—
6. Viburnum edule	T		—
7.			
8.			
9.			
Total Cover: 86			
50% of total cover: 43 20% of total cover: 17.2			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 0	X 1 =	0
FACW species: 50	X 2 =	100
FAC species 104	X 3 =	192
FACU species 1	X 4 =	4
UPL species	X 5 =	
Column Totals: 115 (A)		296 (B)

PI = B/A = 2.57

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	20	Y	FAC
2. Calamagrostis canadensis	4		FAC
3. Rubus arcticus	T		FAC
4. Viola sp	T		—
5. Anemone sp	1		—
6. Polemonium acutifolia	T		
7. Equisetum pratense	5		FACW
8. Chamerion angustifolia	T		
9. Dryopteris expansa	T		
10. Mertensia paniculata	T		
Total Cover: 30			
50% of total cover: 15 20% of total cover: 6			
Equisetum fluviatile	Edge/T		
Trientalis europaea	T		
Orthilia secunda	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.

T % Bare Ground

70 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

1HT035

WETLAND DETERMINATION DATA FORM

8/22/15 W041HT035

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

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

Depth (inches)	Matrix		Redox Features				Texture	Notes
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3								
3-4	10YR 2/1	100					MIC SIL	
4-17	N4/0	100					VCBL Sand	between N4/0 and N3/0

[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 Y
Thick Dark Surface (A12)		Other (Explain in Notes) - High water table

[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: Depleted matrix. No reaction to alpha alpha at time of site visit

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) N
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) 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): Y	Depth (in): 12" - Pond	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 12	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	**EC:** 25 ms @ 40.1 pH 5.28 - spring feeding pond

Notes:

EC 67 ms @ 42.5°C pH 5.26 } Soil Pit

W84 HTO35 8/22/15

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__1__ Tall shrub (2-6m)__85__ Short shrub (0.5-2m)__0__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __0__ Short herb (<1m) __29__ Moss-Lichen__80__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __2__ | **Evenness of Wetland Type Distribution (M)**: Even __X__ Highly Uneven _____ Moderately even _____

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

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

Presence of Islands (M): Absent (none) _____ One or Few__X__ 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__X__ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.28

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%)__X__ High Gradient (≥2%)_____

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT035 Field Target: 15075 Date: 8/22/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brandau — X [signature] 8-22-15

Wetland Scientist (print) — Signature / Date

X Brian Strang — X [signature] 8/22/15

Field Crew Chief (print) — Signature / Date

HT036

WETLAND DETERMINATION DATA FORM

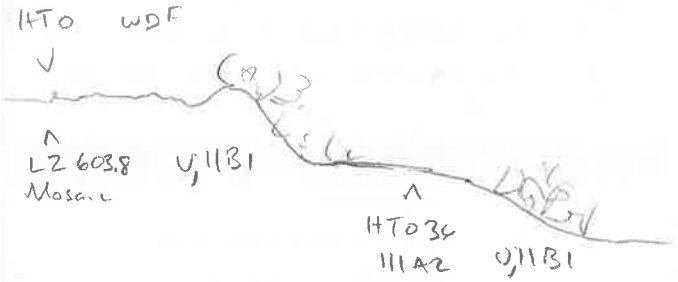
SITE DESCRIPTION			
Survey Type: Centerline___ Access Road (explain) X Other (explain)_____		Field Target: 15284	Map #: 188 Map Date: 6/19/15
Date: 8/22/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT036
Investigators: Bryan Strong			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 603.8	
Latitude: 63°00'05.662"	Longitude: -149° 33' 42.5025"		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 06	Picture No.: W84HT036-VEG, VEG, PIT, PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench - Flat to Slightly concave
Slope (%): 7	Local relief (concave, convex, none): Hummocky - Moderate
Pre-mapped Alaska LNG/NWI classification: U; IIIA1; IIB2	Evidence of Wildlife Use: Moose beds
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No N	Is the Sampled Area within a Wetland? Yes_____ No N
Hydric Soil Present? Yes_____ No N	Wetland Type: U
Wetland Hydrology Present? Yes_____ No N	Alaska Vegetation Classification (Viereck): IIIA2, Plot / IIB1, IIIA2 Poly

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor: Pocket of Mesic Herb - mixed graminoid/forb surrounded by Tall Closed Alder Shrub. Site is dominated by CALCAN, CIHAAN, VERVIR, Plot is IIIA2 but Polygon is IIB1, IIIA2.

Polygon modified



HT036

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	T		—
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. Alnus viridis	5		—
2. Spirea stevensii	12	Y	FACU
3. Vaccinium uliginosum	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 22

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

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	2	X 2 =	4
FAC species	120	X 3 =	360
FACU species	66	X 4 =	264
UPL species	0	X 5 =	0
Column Totals:	188 (A)		628 (B)

PI = B/A = 3.34

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	90	Y	FAC
2. Chamerion angustifolia	20	Y	FACU
3. Veratrum viride	7		FAC
4. Dryopteris expansa	2		FACU
5. Equisetum arvense	5		FAC
6. Equisetum sylvaticum	3		FAC
7. Cornus canadensis	2		FACU
8. Gymnocarpium dryopteris	30	Y	FACU
9. Rubus chamaemorus	2		FACW
10. Poa sp	T		—

Total Cover: 166

50% of total cover: 83 20% of total cover: 33.2

Trientalis europea T

Carex sp (brunescens?) T

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

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Feather Moss 20

Viola sp T

Polemonium acutiflora T

Grass sp T

Sanguisorba menziesii 3 FAC

Rubus pedatus 2 FAC

sp Artemesia tilesii T

Luzula multiflora T

HT036

WETLAND DETERMINATION DATA FORM

8/22/15 WS4HT036 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	0-2								
A	2-4	10YR 3/2	100					SiL	granular
Bw	4-16	7.5YR 3/2	100					SiL	Andic material gravels ~3% fluffy, granular
2BC	16-20	2.5Y 5/2	99	10YR 5/6	1	C	PL	GR Loamy	glacial 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:

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

Notes:

HT036

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: Jessie Brownell

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT036 Field Target: 1503 Date: 8/22/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brownlee — Wetland Scientist (print)

X — Signature / Date 8.22.15

X Brian Strong — Field Crew Chief (print)

X — Signature / Date 8/22/15

H T037

WETLAND DETERMINATION DATA FORM

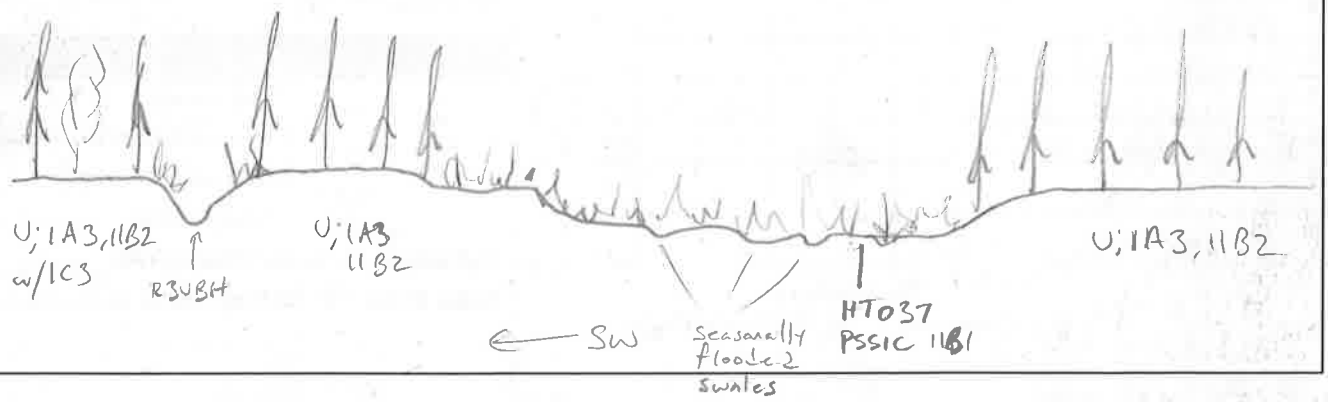
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15084	**Map #:** 169 **Map Date:** 8/19/15
Date: 8/23/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT037	
Investigators: Bryan Strong Jessie Brawlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 586.6		
Latitude: 63 12 24.689		**Longitude:** -149 19 59.112		**Datum:** WGS84
Logbook No.: 07	**Logbook Page No.:** 07	**Picture No.:** W84H037_VEG-VEG_PIT-PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Alluvial terrace
Slope (%): ~3	Local relief (concave, convex, none): Undulating
Pre-mapped Alaska LNG/NWI classification: PF04/SSIC 1A2, 11B1	Evidence of Wildlife Use: None
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 Y, 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:** PSSIC or A
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11B1

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

Alluvial terrace with quite a few swales that appear to convey water early in the growing season. These swales have water stained leaves and marsh five finger growing along the edges with sparcely vegetated swale bottoms. Soil pit dug between small swales in an area typical of the majority of the area. Still, COMPAL growing directly adjacent to soil pit (1 plant). Nearby, just north of plot standing water with iron floc observed. Soil pit dug on an interfuve - moderately high microsite



HT037

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	E		FACU
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 richardsonii 7-8'	55	Y	FACW
2. Salix pulchra 7-8'	35	Y	FACW
3. Ribes triste	2		FAC
4. Picea glauca	T		
5.			
6.			
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: 3 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	2 X 1 =	2
FACW species:	92 X 2 =	184
FAC species	30 X 3 =	90
FACU species	2 X 4 =	8
UPL species	0 X 5 =	0
Column Totals:	126 (A)	284 (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 canadensis	25	Y	FAC
2. Equisetum arvense	3		FAC
3. Rubus arcticus	2		FACU
4. Comarum palustre	2		OBL
5. Viola sp	T		
6. Anemone sp	T		
7. Thalictrum sp	T/E		
8. Equisetum pratense	2		FACW
9. Sanguisorba	T		
10. Chamerion angustifolia	T		

Total Cover: 34

50% of total cover: 17 20% of total cover: 6.8

Polemonium acutiflora T

Trientalis europaea 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.

_____ % 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):

Bryophytes not recorded
Site primarily covered in litter

HT037

WETLAND DETERMINATION DATA FORM

8/23/15 W84HT037 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
Oa	0-3								
A	3-6	7.5yr 2.5/1	100					MK SiL	
Bg	6-9	7.5yr 5/1	70	5yr 3/4	30	C	PL	SiL	
Ab	9-9.5	10yr 3/1	100					SiL	
Bg	9.5-20	7.5yr 4/1	67	7.5yr 4/6	30	C	PL	ST SiL	Platy Stones ~25%
				7.5yr 5/1	3	D	PL		some Mg concentrations below 12" some depletions in Bg
Bw	20-24	2.5y 5/3	92	5y 5/1	3	D	M/RC/N	STSiL	Stones >35%

[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) Y

[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

Bw 20-24	2.5y 5/3	92%	5y 5/1	3%	D	M	SiL	granular/lenticular
			10yr 5/4	5%	C	M		

Hydric Soil Present (Y/N): Y

Notes: 0.5" buried surface at 9". 3" saprie material over 3" Mucky SiL with very high percentage of concentrations & platy structure indicative of seasonal frost perching a water table early in the growing season. No saturation but, there is enough evidence to support a conclusion that this is a hydric soil and a wetland.

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) Y	Geomorphic Position (D2) Y
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) ~Y	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):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): NA	EC: NA

Notes:

HTo37 8/23/15

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_____ Sapling (<5 dbh, <6m tall)_0_____ Tall shrub (2-6m)_90_____ Short shrub (0.5-2m)_2_____ Dwarf shrub (<0.5m) _0_____ Tall herb (≥1m) _0_____ Short herb (<1m) _3_____ Moss-Lichen_____ Floating_0_____ Submerged_0_____

Number of Wetland Types (M): _1_____ **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

Surficial 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_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_____ Unknown_____

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

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

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

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jessie Brownell

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W841HT037 Field Target: 15084 Date: 8/23/15

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?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brownlee
Wetland Scientist (print)

Jessie Brownlee 8-23-15

Brian Strong

Brian Strong 8/23/15

HTO38

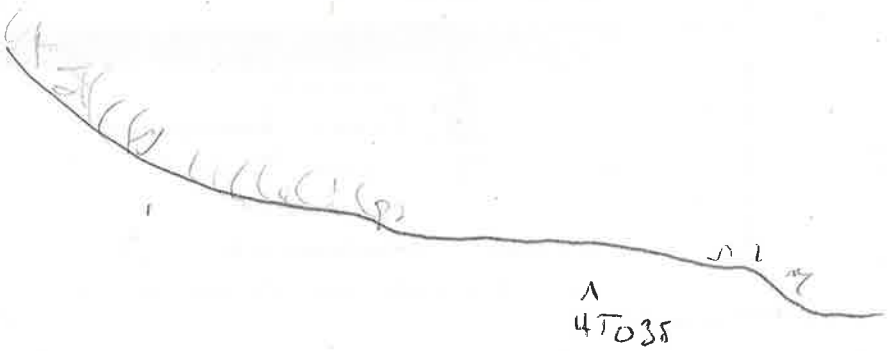
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline____ Access Road (explain) X Other (explain)_____		Field Target: 15286	Map #: 187 Map Date: 6/19/15
Date: 8/23/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HTO38	
Investigators: Brian Strong Jessie Brownlee			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 603.8	
Latitude: 63 00 27.739	Longitude: 149 35 08.330		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 07	Picture No.: W84 HTO38 VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench
Slope (%): 2.5-3.5% measured	Local relief (concave, convex, none): Slightly concave, Hummocky small
Pre-mapped Alaska LNG/NWI classification: U; HC2, IIIA2	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 Y No_____	Is the Sampled Area within a Wetland? Yes Y No_____
Hydric Soil Present? Yes Y No_____	Wetland Type: PEMI/SS1B E
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): III A3, II D2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. String bog. Mostly CARRAR, SCICES, CARAQU with dwarf shrubs (BETNAN, NUPOL, VACUL, SALFUS, VACOXY - all <1' tall) scattered evenly throughout the wetter PEMIB signature. Small microlows host CARAQU and standing water that are likely flooded semi-permanently. Around the edge and occuring as islands are zones of PSS1B with slightly taller BETNAN, VACULI, EMPNIG, RUBCH, RHOTOM, Sphagnum etc... An island of PICMAR-Sar and ALNVIR occurs just west of the point.



HT038

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	T		
2.			
3.			
4.			

Total Cover:

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	E		FACW
2. Betula nana ~1'	5	Y	FAC
3. Vaccinium uliginosum	5	Y	FAC
4. Andromeda polifolia	12	Y	OBL
5. Salix fuscescens	4		FACW
6. Vaccinium oxycoccus	2		FAC
7.			
8.			
9.			

Total Cover: 28

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 86	X 1 =	86
FACW species: 8	X 2 =	16
FAC species 12	X 3 =	36
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 106 (A)		138 (B)

PI = B/A = 1.30

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex rariflora	40	Y	OBL
2. Carex aquatilis	30	Y	OBL
3. Trichophorum cespitosum	4		OBL
4. Equisetum palustre	4		FACW
5. Drosera rotundifolia	T		OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 78

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

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

93 % Cover of Wetland Bryophytes

97 Total Cover of Bryophytes

3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp

Water

3

HT038

WETLAND DETERMINATION DATA FORM

8/23/15 W841HT038 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 0-3								
Oe 3-8								
Oa 8-20+								

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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)

[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):

Notes: Mineral soil ~32" Gravels felt by shovel prob at ~42"

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) N
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) 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): Y	Depth (in): 3"	**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: 27 ms 49.9°C pH 4.64

Notes:

EC: 2.7 ms 49.9°C > soil pit
pH 4.64

W941HT038 8/23/15

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) 28 Tall herb (≥1m) _____ Short herb (<1m) 78 Moss-Lichen 97 Floating_____ Submerged_____

Number of Wetland Types (M): 3 **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even X

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_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_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 X Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

or depressional

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_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_X_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

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

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

Frequency of Overbank Flooding (P): No Overbank Flooding_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)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_____ **pH Reading** 4.64

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_X_____ till - probably low permeability silt over till?

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_X_____ 2.5 - 3.5

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT038 Field Target: 15286 Date: 8/23/15

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?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jessie Brownlee Jessie Brownlee 8.23.15
Wetland Scientist (print)

Brian Strong 8/23/15

1HT039

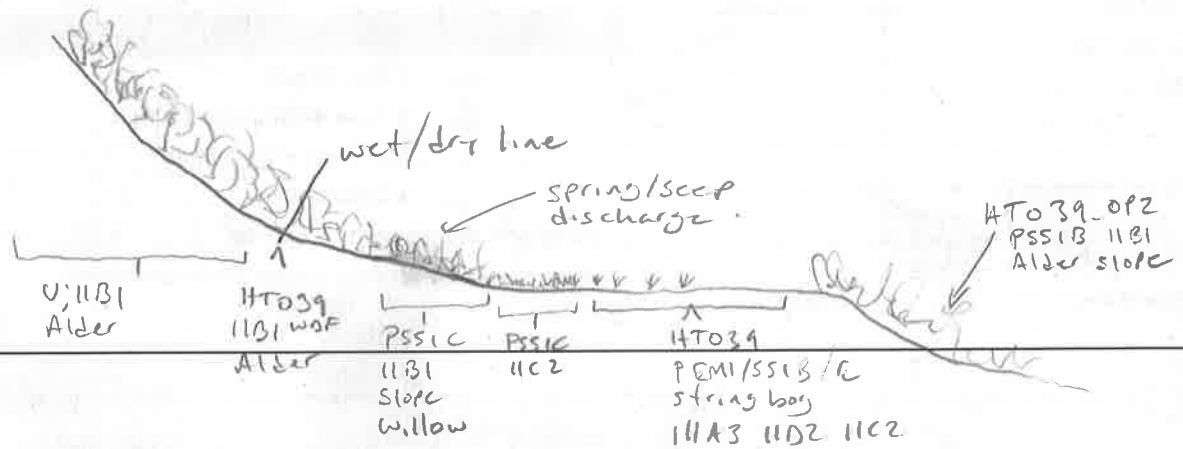
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ Access Road (explain) X Other (explain)_____		Field Target: 15287	Map #: 186 Map Date: 6/19/15
Date: 8/23/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT039
Investigators: Bryan Strong Jessie			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 603.8	
Latitude: 63 00 26.485	Longitude: 149 35 01.461		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 07	Picture No.: W84HT039_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 11% measured - steepens to 20% in 25' upslope	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: U; 11B2	Evidence of Wildlife Use: None
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation Y, Soil Y, or Hydrology_____ Naturally Problematic?	No_____ (If yes, explain in Notes.) Naturally problematic soils Andic Material

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y problematic No_____	Is the Sampled Area within a Wetland? Yes on the line No_____
Hydric Soil Present? Yes Y marginal No_____	Wetland Type: PSS1B below point/upland above for ~80'
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11B1 Closed Tall Alder

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Near the toe of a long steep slope. Slope break steepens just above point and flattens just below. The point is very close to the wet/upland boundary. Soils do not meet a hydric soil indicator. Vegetation does not meet hydrophytic criteria. The plot represents the wet/dry line. PSS1B, 11B1 downslope for ~80' before closed alder transitions to closed willow tall shrub with seep/spring discharge - PSS1C 11B1 below point on the fringe of the PEMI/SS1B/E wetland on bench.



1+T038

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. Alnus viridis 8-12'	95	Y	FAC
2. Spirea stevensii	2		FACU
3. Ribes glandulosa	2		FACU.
4. Vaccinium ovalifolium	3		FAC
5. Oplopanax horridus	2		FACU.
6.			
7.			
8.			
9.			
Total Cover: 104			
50% of total cover: 52	20% of total cover: 20.8		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 115	X 3 =	345
FACU species 83	X 4 =	332
UPL species	X 5 =	
Column Totals: 198 (A)		677 (B)

PI = B/A = 3.42

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	70	Y	FACU.
2. Calamagrostis canadensis	T		
3. Gymnocarpium dryopteris	7		FACU.
4. Trientalis europea	T		
5. Equisetum sylvaticum	12		FAC
6. Equisetum arvense	3		FAC
7. Athyrium cyclosporum	2		FAC
8.			
9.			
10.			
Total Cover: 94			
50% of total cover: 47	20% of total cover: 18.8		

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

Y Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N - Problematic

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

litter ~ 100%

HT039

WETLAND DETERMINATION DATA FORM

8/23/15 W84HT039 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 0-4.5								
Oa 4.5-6								
BhA 6-11	7.5R 2.5/1	100					SiL mucky	Andic material, weakly cemented, massive
Bw1 11-13	7.5YR 3/2	100					SiL	Andic material
Bw2 13-17	10YR 4/4	100					GrSiL	Gravels 15% andic material
2BC 17-22	2.5Y 5/2	95	10YR 4/4	2	C	PL	GrLoam	Depletions 2.5Y 5/1 3% PL

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix. Gravels 25

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) A 10

[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-T

Notes: Naturally problematic soil. Andic material. Site likely has a water table at or slightly above 12" for 2-3 weeks in most years. Reduction is unlikely due to the recalcitrant nature of andic material. Further investigation would be needed to determine hydric status of the soil. The point represents the wetland boundary

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: Evidence of saturation and water table above 12".	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): NA	
Water Table Present (Y/N): Y	Depth (in): 15 some free water at 15.5"	**Wetland Hydrology Present (Y/N):** Y
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 13	EC: 26mS 47.3°C pH 4.6

Notes:

W84HT039
8/28/15

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_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)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_95_____ Short shrub (0.5-2m)_9_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _94_____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _2_ | **Evenness of Wetland Type Distribution (M)**: Even _X_ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

Surficial 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_____ 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: Jessie Brunelle

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W844T039 Field Target: 15287 Date: 8/23/15

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?

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Jessie Brownlee 8.23.15

Wetland Scientist (print)

Brian Strong 8/23/15

HT040

WETLAND DETERMINATION DATA FORM

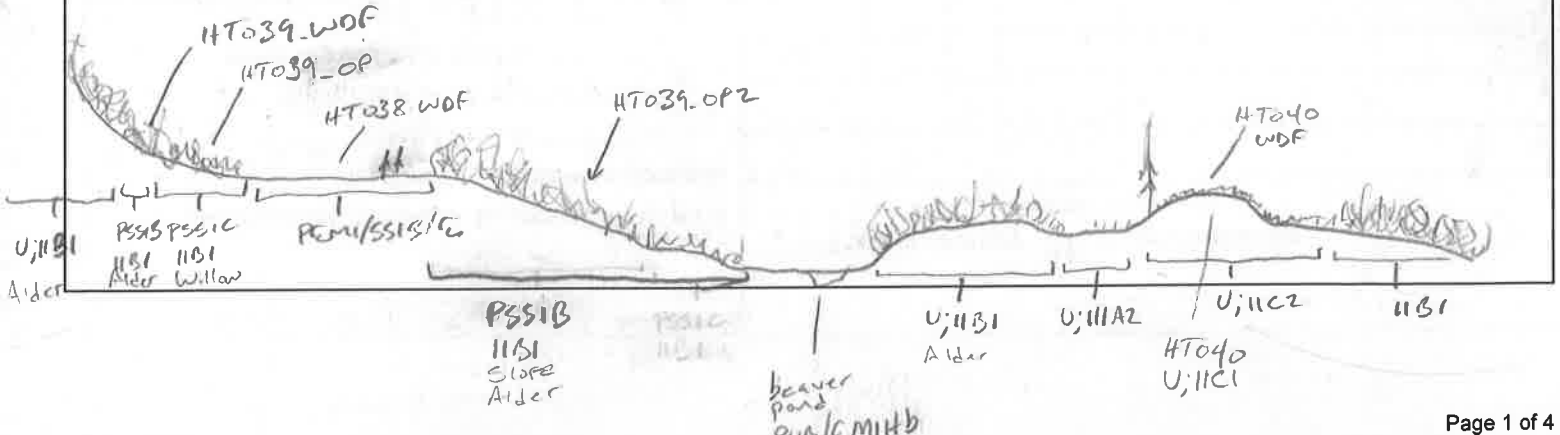
SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain) X **Other** (explain)_____			**Field Target:** 15285	**Map #:** 186 **Map Date:** 6/19/15
Date: 8/23/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84HT040	
Investigators: Brian Strong Jessie Brownlee				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 603.8		
Latitude: 63° 00' 31.60068"		**Longitude:** 149° 35' 19.9859"		**Datum:** WGS84
Logbook No.: 03	**Logbook Page No.:** 08	**Picture No.:** W84HT040_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Mound / Knoll
Slope (%): 15% variable direction - mound	Local relief (concave, convex, none): Convex - hummocky - Moderate
Pre-mapped Alaska LNG/NWI classification: U; 1C2	Evidence of Wildlife Use: None observed. Beaver nearby
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 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 N
Hydric Soil Present? Yes_____ No N	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No N	Alaska Vegetation Classification (Viereck): II C1

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

Mound. Closed Low Ericaceous shrub, surrounded by alder on all sides. A couple PICGLA-T and saplings in the area.



HT040

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 6'	E		—
2. Betula glandulosa 5-6'	E		—
3. Alnus viridis	3		FAC
4. Betula nana	20	Y	FAC
5. Vaccinium uliginosum	80	Y	FAC
6. Rhododendron tomentosum	17		FACW
7. Empetrum nigrum	20	Y	FAC
8. Arctous rubra	5		FAC
9. Vaccinium vitis-idaea	3		FAC
Total Cover: 148			
50% of total cover: 74	20% of total cover: 29.6		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	0 X 1 =	0
FACW species:	17 X 2 =	34
FAC species	133 X 3 =	399
FACU species	0 X 4 =	0
UPL species	0 X 5 =	0
Column Totals:	150 (A)	433 (B)

PI = B/A = 2.88

Spirea stevensii 2 FACU

Linnaea borealis T —

VEGETATION (use scientific names of plants)

Herb Stratum (16)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex bigelowii	2	Y	FAC
2. Cornus canadensis	T		FACU
3. Calamagrostis canadensis	E		FAC
4. Rubus chamaemorus	T		FACW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 2			
50% of total cover: 1	20% of total cover: .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

85 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Feather Moss 85

Ptilium T

Foliose lichen 1

4T040

WETLAND DETERMINATION DATA FORM

8/23/15 1N84T040 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 %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Notes
Oi 0-3							fibric	
A 3-4	7.5YR 3/2	100					SiL	granular
C 4-6	2.5Y 5/1	100					SiL	
6-9	10R 2.5/1						Sandy Loam	10YR 4/4 - 1" Bw horizon 6-7"
Bhm 9-12	2.5YR 2.5/2	100					Sandy Loam	strongly cemented - ortstein
Bh 12-20	10YR 3/2	100					Sandy Loam	moderate to weakly cemented

[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: Bh material textures as Sandy loam but breaks down to SiL as it is textured

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: Fac Neutral expanded to include all species Not just dominants.	
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:

HT040

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: Jessie Brownlee

Wetland Determination Data Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT040 Field Target: 15285 Date: 8/23/15

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?

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Jessie Brownlee Jessie Brownlee 8.23.15
Wetland Scientist (print)

Brian Strong 8/23/15

HTO41

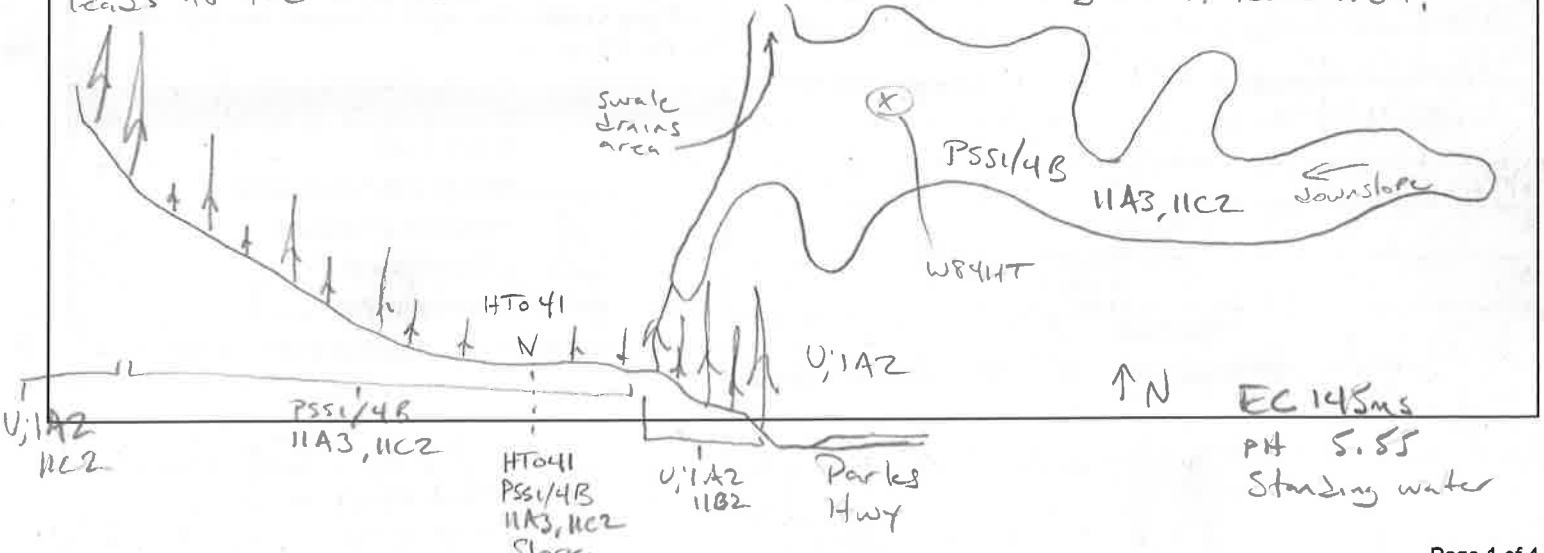
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 15104	Map #: 143 Map Date: 6/19/15
Date: 8/24/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84HTO41	
Investigators: Bryan Strong Jessie Brawner			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 535.05	
Latitude: 63 46 21.2926	Longitude: 148 54 28.870		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 08	Picture No.: W84HTO41_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench
Slope (%): 6% measured	Local relief (concave, convex, none): Concave, Tussocky-moderate
Pre-mapped Alaska LNG/NWI classification: PSS1/4B 11B2, 11C2, 11A2	Evidence of Wildlife Use: Game Trails concave across and downslope
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No 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: PSS1/4B
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 11A3, 11C2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Small bench. Stunted PICGLA-Sap. Tussocky-moderate. Mix of BETNNW/BETGLAN 2-4' tall with SALGLA, SALPUL, SALMYR and a few ALNVIR (4-7') with ERIVAG and CARBIG tussocks. Slope shape focuses water here. EC of 96ms suggests this site is best characterized as a slope wetland. Small trickle of water running along a game trail near the plot. The wetland is not connected downslope. Steep hill slope above and the Parks highway below leaves this site isolated. A swale with evidence of sediment discharge and surface water (well vegetated) leads to the dry ditch on the east side of the highway. No culvert.



HT041

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'	2		FACU
2. included w/ Shrub Stratum			
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 4-15'	20	Y	FACU
2. Betula neoalaskana	2		FACU
3. Betula nana	30	Y	FAC
4. Salix glauca	6		FAC
5. Salix pulchra	3		FACW
6. Salix arbusculoides	1		FACW
7. Salix myrtillifolia	4		FACW
8. Rhododendron groenlandicum	15	Y	FAC
9. Vaccinium uliginosum	2		FAC

Total Cover: 104

50% of total cover: 52 20% of total cover: 20.8

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:	0	X 1 =	0
FACW species:	77	X 2 =	154
FAC species	84	X 3 =	252
FACU species	24	X 4 =	96
UPL species	0	X 5 =	0
Column Totals:	185	(A)	502 (B)

PI = B/A = 2.71

		%	
Vaccinium vitis-idaea	S	7%	FAC
Dasiphora fruticosa	S	17.	FAC
Empetrum nigrum	S	5%	FAC
Alnus viridis	S	4%	FAC
Arctous ruber	S	2%	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	65	Y	FACW
2. Carex bigelowii	12		FAC
3. Rubus chamaemorus	4		FACU
4. Carex scirpoidea	T		
5. Calamagrostis canadensis	T		
6. Arctagrostis latifolia	5		
7.			
8.			
9.			
10.			

Total Cover: 81

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

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.

3 % Bare Ground

3 % 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):

Feather Moss 90
Sphagnum 3 3
Foliose lichen 5
Bare 3
Moss T

HT041

WETLAND DETERMINATION DATA FORM

8/24/15 W84HT041 Y

SOIL Date 8/24/15 Feature ID W84HT041 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 0-4								
A 4-9							MK SiL	Saturated
Bw 9-10	5YR 3/3	100					SiL	band of weakly cemented iron concent
Bw 10-13	10YR 5/6	95	2.5Y 5/1	5	D	PL	SiL	saturated/free water
BCf 13-16	N5/0	95	7.5YR 4/6	5	C	PL	Loam	high mica content, Parts of upper horizon are not frozen, 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) 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 Y
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): 16.5

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N* surface water at edge of plot	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) N	Microtopographic Relief (D4) Y
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 trickling down a game trail in the polygon but not in the plot Surface water also observed between tussocks just outside of the plot	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): N/A* Present in polygon not plot	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 8	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 4	EC: 145 µs pH 5.5 - Standing water just out of plot

Notes:

EC 91 µs @ 36°C > soil pit
pH 5.15

W84HT041 8/24/15

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_2_ Sapling (<5 dbh, <6m tall)_22_ Tall shrub (2-6m)_4_ Short shrub (0.5-2m)_58_ Dwarf shrub (<0.5m)_18_ Tall herb (≥1m)_0_ Short herb (<1m)_81_ Moss-Lichen_98_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _1_

Evenness of Wetland Type Distribution (M): Even _X_ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_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** 5.55

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_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: [signature]

GPS Technician QA/QC check: Jessie Brownlee

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT041 Field Target: 15104 Date: 8/24/15

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?~~ on form

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Jessie Brownlee — X [signature] 8.24.15

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

X Brian Strong — X [signature] 8/24/15

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

HT042

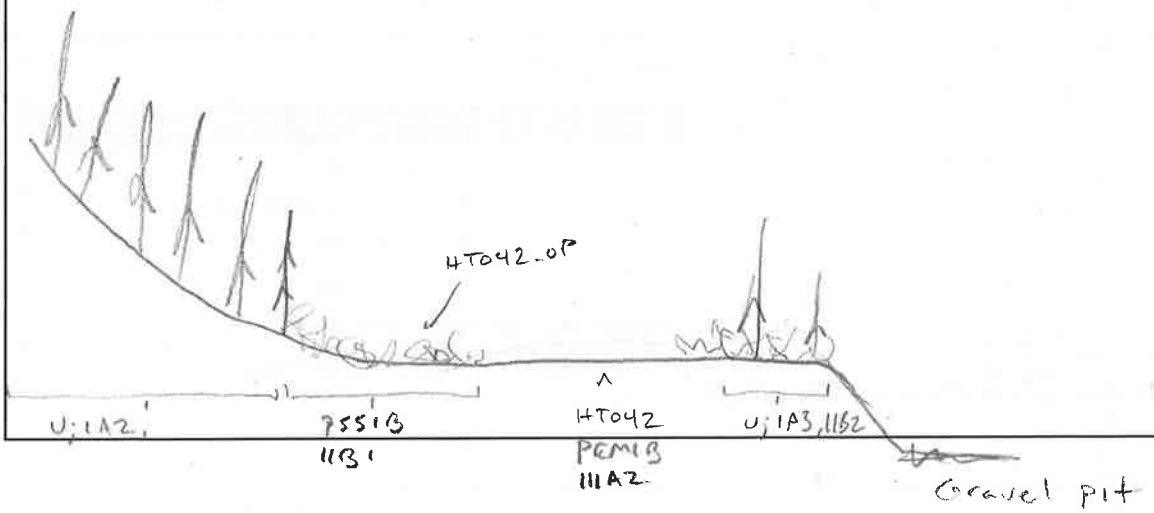
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline___ Access Road (explain) X Other (explain)_____		Field Target: 1529	Map #: 177 Map Date: 6/19/15
Date: 8/24/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84HT042
Investigators: Bryan Strong, Jessie Brousalee			Team No. W84
State: Alaska	Region: Alaska	Milepost: 594.7	
Latitude: 63° 07' 06.5394"	Longitude: -149° 27' 33.8988"		Datum: WGS84
Logbook No.: 03	Logbook Page No.: 05	Picture No.: W84HT042_VEG_VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Toeslope
Slope (%): 1.5	Local relief (concave, convex, none): Slightly concave Hummocky / moderate
Pre-mapped Alaska LNG/NWI classification: PEMiB UA2	Evidence of Wildlife Use: Moose beds
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 Y No_____
Hydric Soil Present? Yes Y No_____	Wetland Type: PEMiB
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): III A2 ~~TSTG~~

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor: Bluejoint field with tussocking/hummocky microtopography. Hummocks/tussocks become increasingly prominent at the edge of the closed willow/tall shrub SE of point. Adjacent tall willow is wet, water table obs. in willow



HT042

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	5		—
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 pulchra	5		—
2. Salix richardsonii	5		—
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: _____

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	95	X 3 =	285
FACU species	4	X 4 =	16
UPL species	0	X 5 =	0
Column Totals:	99 (A)		301 (B)

PI = B/A = 3.04

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	95	Y	FAC
2. Chamerion angustifolium	2		FACU
3. Mertensia paniculata	2		FACU
4. Equisetum arvense	2		FAC
5. Aconitum delphinifolium	T		
6. Trientalis europea	T		
7. Polemonium acutiflora	T		
8. Sanguisorba sp	T		
9. Thalictrum sp	T		
10. Comarum palustre	5		OBL

Total Cover: 101

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

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.

_____ % 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):

HT042

WETLAND DETERMINATION DATA FORM

8/24/15 WB4HT042 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 0-1.5								
A 1.5-5	10YR 4/2	95	7.5YR 4/6 7.5Y 5/1	C D	3 2	PL PL	S.L	granular
Bg1 5-9	5Y 5/1	65	7.5YR 4/6	25	C	PL/M	S.L/S.CL	Probably ~23-27% clay just shy of S.CL but very close to S.CL, Granular structure
			N5/0	10	D	RC/PL		
Bg2 9-24	5Y 5/1	60	7.5YR 4/6	30	C	PL/M	S.CL	Platy - seasonal frost affected 27-35% clay
			N5/0	5	D	RC/PL		
			7.5YR 3/4	5	C	PL		

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) Y	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): Y

Notes: Possible lacustrine (glacial) deposit with clay rich silty material. Platy structure parts to granular. Profile is not too 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) Y
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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Sheared root channels	
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:

W84HT042 8/24/15

AQUATIC SITE ASSESSMENT DATA FORM

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

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

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

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_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_____ Mineral: Clayey_X_____

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

Surficial 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_____ Only Connected Below_____ Only Connected Above_X_____ Connected Upstream & Downstream_____ Unknown_____

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84HT042 Field Target: 15291 Date: 8/24/15

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~~ on form?

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jessie Brownlee — X — 8.24.15

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

X Brian Strong — X — 8/24/15

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

1HT043

WETLAND DETERMINATION DATA FORM

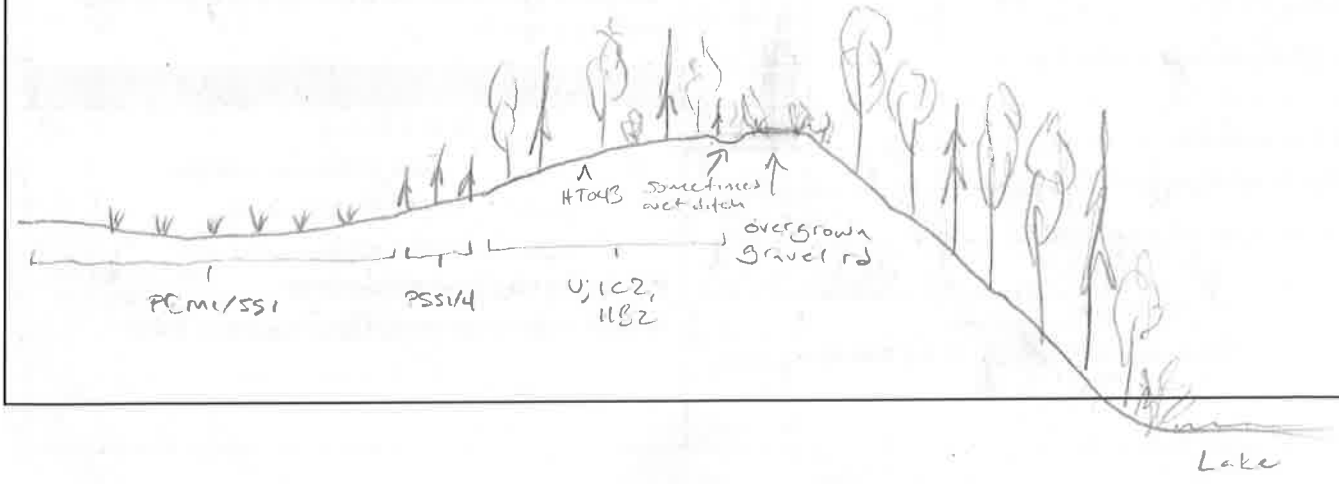
SITE DESCRIPTION			
Survey Type: Centerline____ Access Road (explain) X Other (explain)_____		Field Target: 1528 2	Map #: 192 Map Date: 6/19/15
Date: 8/24/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W841HT043
Investigators: Bryan Strong Jessie Brownlee			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 624.8	
Latitude: 62 47 35.871	Longitude: -149 59 21.673		Datum: WGS84
Logbook No.: 04	Logbook Page No.: 10	Picture No.: W841HT042_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Glacial Kame Terrace
Slope (%): 5	Local relief (concave, convex, none): Rolling/Undulating, Flat micro
Pre-mapped Alaska LNG/NWI classification: ( )', 1C2, 11B2	Evidence of Wildlife Use: Downer Woodpecker
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes Y No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No N (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No N (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ 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): 1C2, 11B2

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

Dry glacial terrace with a mantle of well drained andic material. Rolling/Undulating topography. Tall BETNEO (~70') PICGLA (~80') with an open understory. Scattered ALNVIR. Thick cover of DRYEXP. Some VACCNA, STRAMP, CORCAN, RUBPED.



HT043

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 (70')	20	Y	FACU
2. Picea glauca (80')	15	Y	FACU
3.			
4.			

Total Cover: 35

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	3		FACU
2. Betula neoalaskana	3		FACU
3. Alnus viridis	5	Y	FAC
4. Vaccinium ovalifolium	5	Y	FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 16

50% of total cover: 8 20% of total cover: 3.2

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	28	X 3 =	84
FACU species	128	X 4 =	512
UPL species	0	X 5 =	0
Column Totals:	156 (A)		596 (B)

PI = B/A = 3.82

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	85	Y	FACU
2. Calamagrostis canadensis	3		FAC
3. Veratrum viride	3		FAC
4. Rubus pedatus	12		FAC
5. Streptopsis amplexifolia	T		
6. Cornus canadensis	2		FACU
7. Trientalis europea	T		
8. Equisetum sylvaticum	T		
9.			
10.			

Total Cover: 105

50% of total cover: 52.5 20% of total cover: 21

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):

HT043

WETLAND DETERMINATION DATA FORM

8/24/15 W24HT043 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: 0-3							fibric	
A 3-4	7.5YR 3/2	100					SiL	
E 4-7	10YR 5/1	100					SiL	
Bh 7-8.5	7.5YR 2.5/1	100					SiL	
Bhs/E 8.5-14	5YR 4/6	90					SiL	floraturbation. 2.5Y 6/2 = 10% E mtrx
Bw 14-18	2.5Y 4/4	100					GrSiL	some Bw at bottom
2BC 18-23	5Y 5/1	90	10YR 5/4	10	PL/RC		GrLoam	Glacial till. 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) 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: Spodisol. Andic 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):		
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:

4T043

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: W84HT043 Field Target: 15282 Date: 8/24/15

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 Jessie [illegible]
Wetland Scientist (print)

8.24.15

Brian Strong

8/24/15

LH001

WETLAND DETERMINATION DATA FORM

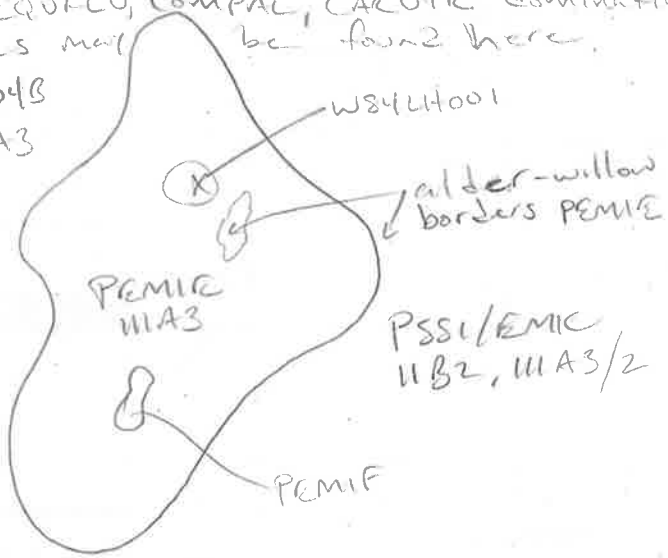
SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15148	**Map #:** 106 **Map Date:** June 18 2015
Date: 7/18/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84 LH001
Investigators: Brian Strong, Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 483.1	
Latitude: 64 26 24.82	**Longitude:** -149 13 48.099		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 51	**Picture No.:** P001-004 north, south	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): .5%	Local relief (concave, convex, none): Slightly concave, Flat
Pre-mapped Alaska LNG/NWI classification: PEMIC, IIIA2, IIIA3	Evidence of Wildlife Use: Moose bed 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 X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEMIC
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIIA3

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

Rain 60° F. To the northwest, the area is PSS1/FO4B/C, IIB2, IA3. Most of area is tall alder-willow-birch scrub PSS1/EMIC. Site is a subtle depression with CARAQU, EQUFLU, COMPAL, CARUTR dominating area. a few small ACNIAC islands may be found here.



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. Alnus incana	T		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover:_____

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 85	X 1 =	85
FACW species:	X 2 =	
FAC species	X 3 =	
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals:	(A)	(B)

PI = B/A = 1

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex aquatilis	35	Y	OBL
2. Equisetum fluviatile	45	Y	OBL
3. Carex utriculata	3		OBL
4. Carex sp	7		
5. Galium trifidum	T		FACW
6. Petasites sagitatus	P		
7. Comarum palustre	2		OBL
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%

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

5 % Cover of Wetland Bryophytes

5 Total Cover of Bryophytes

15 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Water 20
Bare 10
Litter 60
Moss 10

LH001

WETLAND DETERMINATION DATA FORM

7/18/15 WB4LH001 Y

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

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-20							fibric	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) Ponded flooded

[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): N/A

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	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) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) NR	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: No permafrost in 30" Mineral soil not found in 30"	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
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): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: Not collected in the field

Notes:

4100)

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)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 90 Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M)**: Even ✓ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ 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_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits__X__ Low Permeability Stratified Deposits Not collected in the field Glacial Till/Not Permeable_____

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

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

LANDSCAPE VARIABLES (M)

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

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)__2__

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

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

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH001 Field Target: 15148 Date: 7/18/2015

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 Jennifer Anderson — **Wetland Scientist (print)**

X Jennifer Anderson 7/18/15 — **Signature / Date**

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

X [signature] 7/18/15 — **Signature / Date**

LH002

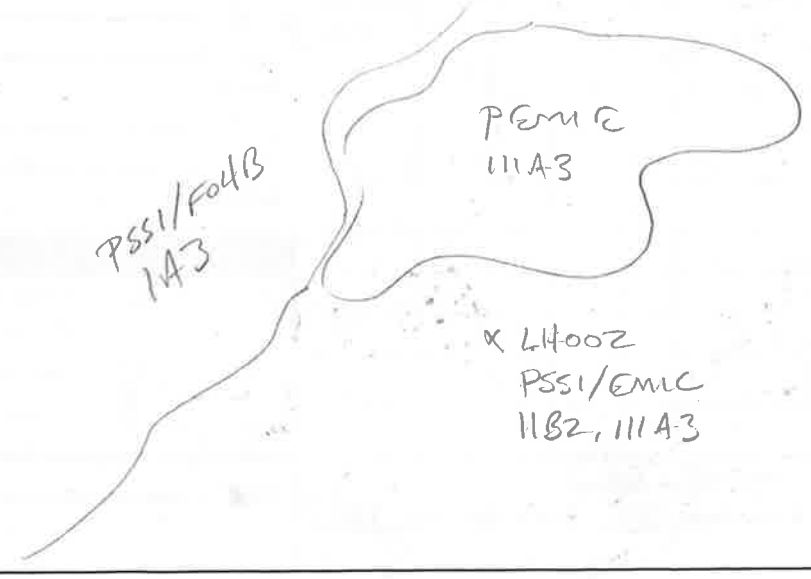
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15947	**Map #:** 107 **Map Date:** 6/18/15
Date: 7/18/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH002
Investigators: Bryan Strong Jennifer Anderson			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 483.2	
Latitude: 64 26 21.67	**Longitude:** 149 13 49.96		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 51	**Picture No.:** W84LH002_VEG_VEG_PIT_PLUG_N,S	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Lowland - Flat
Slope (%): 1	Local relief (concave, convex, none): 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____ 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 Y No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PSS1/EMIC
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 1132, 111A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Rain 60°F Standing water between hummocks with COMPAL, CALCAN associated. Very wet site. Scattered PICGLA, LARLAR, PICMAR trees. Alder, Scrub birch willow community with COMPAL, EQUPAL, CALCAN etc...



LH002

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Combine 2 w/ Shrub strata — Total Cover: _____ 50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana 5-7'	35	Y	Fac
2. Betula glandulosa 4-7'	15	Y	Fac
3. Salix pulchra	10		FacW
4. Salix arbusculoides	T		FacW
5. Picea mariana	1		FacW
6. Vaccinium vitis idaea	T		Fac
7. Salix barclayi	3		Fac
8. Larix laricina	T		FacW
9. Dasiphora fruticosa	T		
Betula neoalaskana T	Total Cover: 66		

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 40	X 1 =	40
FACW species: 18	X 2 =	36
FAC species 68	X 3 =	204 (JA)
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 126 (A)		280 (B)

PI = B/A = 2.22 (JA)

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
Equisetum palustre	5		FacW
1. Calamagrostis canadensis	5		FAC
2. Carex aquatilis	25	Y	OBL
3. Comarum palustre	15	Y	OBL
4. Petasites sagitatus	T		FacW
5. Rubus arcticus	10		Fac
6. Parnassia palustris	T		FacW
7. Anemone sp	T		
8. Equisetum fluviatile	T		
9. Carex disticulata	T		
10. Asteraceae sp	T		
Solidago sp T	Total Cover: 60		

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

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
- 88 Total Cover of Bryophytes
- 2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Moss 88
Water 2
Litter 10

LH002

WETLAND DETERMINATION DATA FORM

7/18/15 W84LH002 -1

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

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10								
10-16	N 4/0	100					SiCL	sticky plastic
16-	N 4/0	100						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) X		Alaska Gleyed without 5Y Hue or Redder Underlying Layer Y 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): 16

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	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) Y	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): 0	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 167 µS

Notes:

4H09L

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)__2__ Sapling (<5 dbh, <6m tall)__1__ Tall shrub (2-6m)__35__ Short shrub (0.5-2m)__28__ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) __5__ Short herb (<1m) __55__ Moss-Lichen__88__ 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.)_____ 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** __5.8__

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

Ec. 16.7 mS 5.7°C

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: W84LH002 Field Target: 1514 7 Date: 7/18/15

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

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ 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 Jennifer Anderson — **Wetland Scientist (print)**

X — **Signature / Date** 7/18/15

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

X — **Signature / Date** 7/18/15

LH003

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15146	Map #: 107 Map Date: 6/18/15
Date: 7/18/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH003
Investigators: Bryan Strong, Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 483.4	
Latitude: 64 26 14.0	Longitude: 149 13 53.7		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 51	Picture No.: W84LH003_Veg-Veg-Pit, Plug	

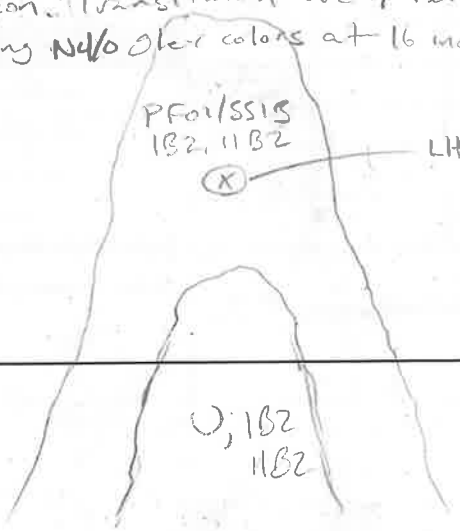
SITE PARAMETERS	
Subregion: Interior - lowlands	Landform (hillslope, terrace, hummocks, etc.): lowland
Slope (%): ~2%	Local relief (concave, convex, none): Flat, Hummocky - small
Pre-mapped Alaska LNG/NWI classification: U; 1C2, 11B2	Evidence of Wildlife Use: Ground varmints - hummocks likely
Are climatic/hydrologic 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 Problematic veg No_____	Is the Sampled Area within a Wetland? Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: ~~1B2~~ SSS PF01/SS1B
Wetland Hydrology Present? Yes X No_____	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.

Rain 60°F Garmin Rhino 64.26 14.0 35' accuracy 3D
149 13 53.7.

Tablet failed. Unresponsive. Young Poplar forest. Slowly transitioning to drier ground to the south. Just north of plot, microlows in the same veg signature show evidence of standing water with water stained leaves etc...
Open canopy of POPBAL-T with a good number of sizable saplings. Successional forest on a abandoned floodplain. Vegetation is Problematic, lowland successional forest. Dry summer yet water table was observed at 12 inches. Soils show ample evidence of saturation and reduction. Transitional area, Very low slope gradient. Slowly permeable massive silt (strongly reducing N4/0 olive colors at 16 inches)



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 32

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana	10%	Y	FAC
2. Salix bebbiana	T		
3. Salix barclayi (tall blueberry)	3%	N	FAC
4. Viburnum edule	T		
5. Rosa acicularis	2%	N	FACU
6. Picea glauca	2%	N	FACU
7. Vaccinium vitis-idaea	3%	N	FAC
8. Populus balsamifera	10%	Y	FACU
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: 2 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 54	X 3 =	162
FACU species 49	X 4 =	196
UPL species	X 5 =	
Column Totals: 103	(A)	358 (B)

PI = B/A = 3.47

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	35%	Y	FAC
2. Calamagrostis canadensis	2%	N	FAC
3. Chamerion angustifolia	2%	N	FACU
4. Orthilia secunda	1	N	FACU
5. Rubus arcticus	1%	N	FAC
6. Pyrola spp	T		
7. Linnaea borealis	T		
8. Carex sp	T		
9.			
10.			

Total Cover: 41

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

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50% = 50%

N Prevalence Index is ≤ 3.0

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

Y 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

3 Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Moss

Litter

LH003

WETLAND DETERMINATION DATA FORM

7/18/15 WSALH003 Y

SOIL Date 7/18/15 Feature ID WSALH003 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 0-5.5								
Bw 5.5-16	2.5Y 5/3	70	5Y 5/1	15	D	M	fSaL	evidence of seasonal reducing
		15	10YR 5/6	15	C	PL/lac		conditions
Cg 16-22	N4/0	80	7.5YR 4/6	20	C	PL	SiCL	Massive. 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 Y
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 SiCL Depth (inches): 16

Hydric Soil Present (Y/N): Y

Notes: 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) 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) Y	Shallow Aquitard (D3)
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): 8 RSI N/A	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 12	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	EC: Some water collecting in bottom of pit but no

Notes:

LH003

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_X_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_32_____ Sapling (<5 dbh, <6m tall)_12_____ Tall shrub (2-6m)_13_____ Short shrub (0.5-2m)_2_____ Dwarf shrub (<0.5m) _3_____ Tall herb (≥1m) _____ Short herb (<1m) _41_____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): 2 | **Evenness of Wetland Type Distribution (M):** Even _X_____ Highly Uneven _____ Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_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** _____

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_____ 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)_Less_____ Medium (10-100 acres)_X_____ Large (>100 acres)_____

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: Jennifer Anderson

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH003 Field Target: 15146 Date: 7/18/15

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

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ 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 Jennifer Anderson — X [signature] 7/18/2015

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

X Brian Strong — X [signature] 7/18/15

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

LH004

WETLAND DETERMINATION DATA FORM

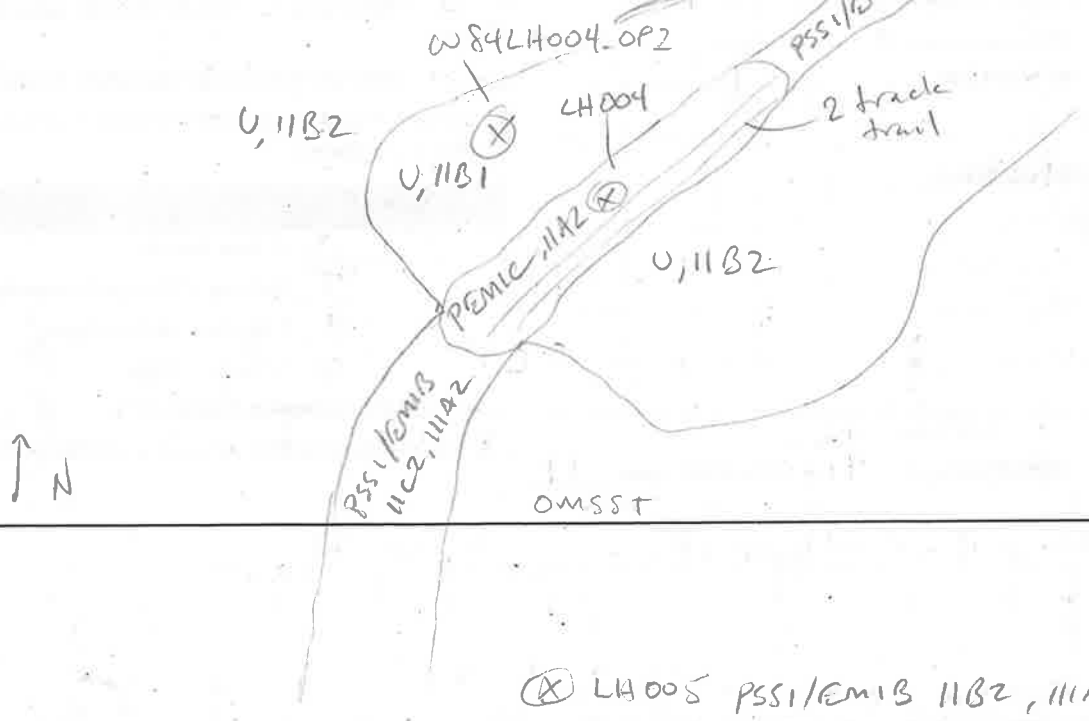
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15131	Map #: 120 Map Date: 6/18/15
Date: 7/19/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH004
Investigators: Bryan Strong, Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 496.6	
Latitude: 64 15 11.54	Longitude: 149 18 11.21		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 53	Picture No.: W84004_veg_veg-pit-Plug N, S	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): .5	Local relief (concave, convex, none): Concave, Flat, Tussocks moderate
Pre-mapped Alaska LNG/NWI classification: PSS1B, IIC2 IIB2	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 Y No____	Is the Sampled Area within a Wetland? Yes Y No____
Hydric Soil Present? Yes Y No____	Wetland Type: PEMIC
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): III A2

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

Rain, 60°F Plot linear shaped to capture swale, Water stained leaves between CALCAN tussocks. A 2 track trail runs through the swale, Upland surrounds swale - burned deciduous forest w/ IIB2 and 2 IB2 regen (saplings POPTRE) Rain for the past 2 days Dry summer till yesterday.



(X) LH005 PSS1/EMIB IIB2, IIIA2

44004

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. Salix pulchra	2	Y	FAC
2. Betula neoalaskana 5'	T		
3.			
4.			
5.		add	
6.		to	
7.		veg	
8.			
9.			

Total Cover:_____

50% of total cover:_____ 20% of total cover: 0.1

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: 6	X 1 =	6
FACW species:	X 2 =	
FAC species 89	X 3 =	267
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 95	(A)	273 (B)

PI = B/A = 2.87

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	87	Y	FAC
2. Carex aquatilis	6		OBL
3. Equisetum arvense	T		
4. Agrostis sp	T		
5. Comarum palustre	T		
6. Carex utriculata	T		
7.			
8.			
9.			
10.			

Total Cover: 95

50% of total cover: 47.5 20% of total cover: 19

Salix pulchra combined w/ herb strata

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

T % Cover of Wetland Bryophytes

T Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

litter 95

LH004

WETLAND DETERMINATION DATA FORM

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

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-10+							Fibric	
4-5 Bw	2.5Y 4/3	100						
5-9 Bg	N 5/0	80	7.5YR 5/6	20	C	PL,M	SiCL	Alpha, Alpha positive
9-22	N 5/0	65	7.5YR 5/6	15	C or	PL,RC	SiCL	Alpha, alpha positive
"	2.5Y 4/3	20						

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) X	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: Massive SiCL Depth (inches): 5

Hydric Soil Present (Y/N): Y

Notes: Free water @ 5" seeping over massive SiCL aquitard, No permafrost within 25"

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) X 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) X
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	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) X 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:	
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): 5"	EC: NA

Notes:

LH004

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

LH004

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

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_2_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _87_____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _1_____ **Evenness of Wetland Type Distribution (M):** Even _X_____ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

Surficial 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_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_____ Unknown_____

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH004 Field Target: 15131 Date: 7/19/15

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

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in ~~logbook~~ 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 Jennifer Anderson — **Wetland Scientist (print)**

X — **Signature / Date** 7/19/15

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

X — **Signature / Date** 7/19/15

LH005

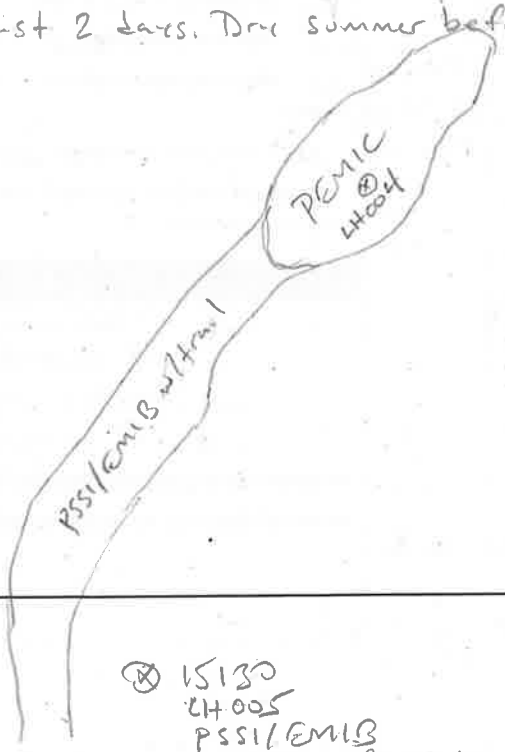
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 15130	Map #: V20 Map Date: 6/18/15
Date: 7/19/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH005
Investigators: Ryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 496.8	
Latitude: 64 15 05.68		Longitude: 149 18 13.05	Datum: WGS84
Logbook No.: 01	Logbook Page No.: 53	Picture No.: W84005_VEG_VEG-PIT-PLOT N,S	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1	Local relief (concave, convex, none): Flat tussocky - moderate
Pre-mapped Alaska LNG/NWI classification: PSS1B IIC2, IIB2	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 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: PSS1/EM1B
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): IIC2, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Rain, 60°F Stunted burned PICMAR-SAR forest. PICMAR SN mostly stunted dead 8-15' tall. Now mixed shrub-sedge tussock BETNEO SAP regen 3-7' tall. Moderate tussocks 8-20" tall SALPUL 1-3' Good cover of ARCLAT throughout area. Rain for the past 2 days. Dry summer before rains started 2 days ago.



⊗ 15130
LH005
PSS1/EM1B
OMSST IIB2, IIIA2

L11005

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 (24)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana (3-7')	15%	Y	FACU
2. Salix pulchra (1-3')	9%		FAC
3. Rhododendron groenlandicum	25%	Y	FAC
4. Chamaedaphn calyculata	7%		FACW
5. Vaccinium vitis-idaea	7%		FAC
6. Larix laricina	T		
7. Picea mariana .5'	T		
8. Arctous ruber	T		
9. Vaccinium uliginosum	1%		FAC

Total Cover: 65

50% of total cover: 32.5 20% of total cover: 13

9
25
7
1
1
5
48

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A) 7 (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: 83 X 2 = 166

FAC species 48 X 3 = 144

FACU species 15 X 4 = 60

UPL species _____ X 5 = _____

Column Totals: 146 (A) 370 (B)

PI = B/A = 2.53

Salix bebbiana 1% FAC
Picea glauca .5' T
Alnus viridis 2-3' T
Picea mariana snag 10%
Populus tremuloides T Facu
Betula glandulosa T

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctogrostis latifolia	30	Y	FACW
2. Rubus chamaemorus	3%		FACW
3. Eriophorum vaginatum	43	Y	FACW
4. Equisetum arvense	T		
5. Calamagrostis canadensis	5		FAC
6.			
7.			
8.			
9. Carex bigelowii	T		
10. Carex aquatalis	T		

Total Cover: 81

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

30
43
3
7
83

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

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

LH005

WETLAND DETERMINATION DATA FORM

7/19/15 WP4 LH005

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
0-5								
5-8	5YR 4/4	100						iron stained from high WT
8-12	2.5Y 4/1	80					SiCL	
	2.5Y 2.5/1	20						
12-16	N 4/0	92	7.5YR 4/4	8	C	PL/M	SiCL	massive
16-18	N 4/0	93	7.5YR 4/6	7		M	SiCL	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 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): 14

Hydric Soil Present (Y/N): Y

Notes: Rain water filling up hole.

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) _____	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) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Water table depth unclear. Too much rain to identify clearly. Water table above frost table	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): N/A	
Water Table Present (Y/N): Y*	Depth (in): too much rain to identify depth	**Wetland Hydrology Present (Y/N):** Y
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6	EC: N/A

Notes:

CH005

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) 0 Sapling (<5 dbh, <6m tall) 3 Tall shrub (2-6m) 5 Short shrub (0.5-2m) 6 Dwarf shrub (<0.5m) 55 Tall herb (≥1m) 17 Short herb (<1m) 2 Moss-Lichen 70 Floating____ Submerged____

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even X Highly Uneven ____ Moderately even ____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water 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____ Mineral: Clayey X

HYDROLOGIC VARIABLES

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

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

Evidence of Sedimentation (P): No Evidence Observed X Sediment Observed on Wetland Substrate____ Fluvaquent Soils Sediment Created____

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

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

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

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

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

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

Evidence of Seeps and Springs (P): No Seeps or Springs X Seeps Observed____ Intermittent Spring____ Perennial Spring____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below____ Only Connected Above____ Connected Upstream & Downstream X Unknown____

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

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

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

Crew Chief QA/QC check: [signature] GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84LH005 Field Target: 15130 Date: 7/19/15

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

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in ~~logbook~~ 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 Jennifer Anderson — **Wetland Scientist (print)**

X — **Signature / Date** 7/19/15

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

X — **Signature / Date** 7/19/15

LH006
4-T

WETLAND DETERMINATION DATA FORM

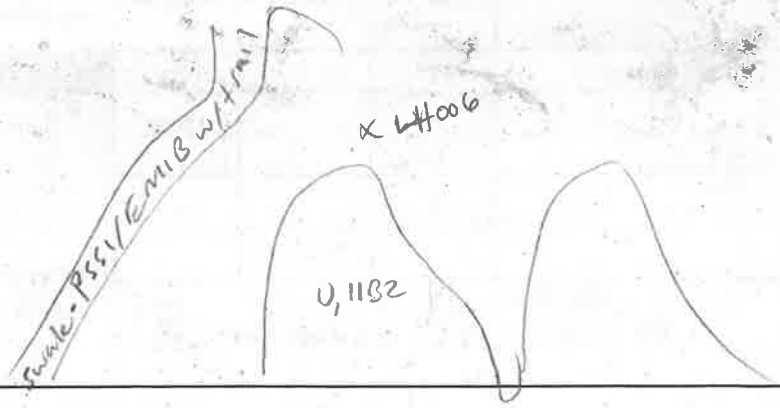
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15129	Map #: 121 Map Date: 6/18/15
Date: 7/19/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84LH006
Investigators: Bryan Strong Jennifer Anderson			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 496.8	
Latitude: 64°15'01.98	Longitude: 149°18'15.85		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 54	Picture No.: W84LH006_VEG_VEG_PIT_PLOT N,S,	

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1% measured	Local relief (concave, convex, none): Flat, Hummocky - small
Pre-mapped Alaska LNG/NWI classification: U; 11C2, 11B2	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, 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_✓_ (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: PSS3/1B
Wetland Hydrology Present? Yes_Y_ No____	Alaska Vegetation Classification (Viereck): 11D2, 11C2

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

Rain, 56° Rain let up during point. Burned PICMAR-T Forest. Standing dead mostly 15-25' tall. Regen is sparse scattered PICTNEO - sap 8-10' tall and scattered Bebb willow. Thick cover of VACVIT and Polytrichum moss. Transitional site. Appears to be seasonally wet. Permafrost at 15. Alluvial sandy loams, Depleted matrix in w/Sat. over coarser sandy layer with many coarse, prominent concentrations. No positive reaction to alpha alpha at time of site visit. Small amount of free water seeping over the frost table at 15". Saturation directly above frost table.



LH006

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. Betula neoalaskana 4.1'	3%		FACU
2. Salix bebbiana	2%		FAC
3. Rhododendron groenlandicum	15%		FAC
4. Vaccinium vitis idaea	30% SSS 55	Y	FAC
5. Picea glauca	3%		FACU
6. Rosa acicularis	T		
7. Vaccinium uliginosa	1%		
8.			
9.			

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: 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: 8	X 2 =	16
FAC species 83 (JB)	X 3 =	249 (JB)
FACU species 6	X 4 =	24
UPL species	X 5 =	
Column Totals: 97 42 (A)		129 289 (B)

PI = B/A = ~~2.95~~ 2.97

Picea mariana snag 10%

Betula neoalaskana snag T

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Arctagrostis latifolia	7	Y	FACW
2. Calamagrostis canadensis	10	Y	FAC
3. Calamagrostis lapponica	T		
4. Orthilia secunda	T		
5. Equisetum arvense	T		
6. Asteraceae sp	T		
7. Petasites frigida	1		FACW
8. Carex bigelowii	1		FAC
9. Chamerion angustifolium	T		
10.			

Total Cover: 19

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

~ Morphological 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

70 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Polytrichum sp 70

LH006

WETLAND DETERMINATION DATA FORM

7/19/15 WB4LH006 Y

SOIL Date 7/19/15 Feature ID WB4LH006 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 0-4								
A 4-8	2.5Y 3/1	97	5YR 3/4	3	C	M	vfSaL	Plant. pockets of mk vfSaL
Bg 8-12	5Y 5/1	80	7.5YR 4/6	6	C	PL	vfSaL	
	2.5Y 3/1	10	7.5YR 4/4	4	C	PL		
BC 12-15	2.5Y 4/3	70	7.5YR 5/6	30	C	M	SaL	No positive alpha alpha
BCg,f 15-17	2.5Y 4/3	90	7.5YR 5/6	10	C	M	SaL	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) 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: Permafrost Depth (inches): 15

Hydric Soil Present (Y/N): Y transitional area. Marginal soils. No positive alpha alpha reaction at time of site visit. Small amount of water seeping over the frost table. Likely seasonally wet early in the growing season. Dry summer

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) 13" 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: Saturation assumed 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) Y	Depth (in): 13"	EC: NA

Notes:

CLH006

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) 3 Tall shrub (2-6m) 5 Short shrub (0.5-2m) 16 Dwarf shrub (<0.5m) 55 Tall herb (≥1m) 17 Short herb (<1m) 2 Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even X Highly Uneven _____ Moderately even _____

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water 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 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.) 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: [signature] GPS Technician QA/QC check: [signature] 7/20/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WB4LH0016 Field Target: 15129 Date: 7/19/15

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 Jennifer Anderson — **Signature / Date** 7/19/15

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

X Brian Strong — **Signature / Date** 7/19/15

LH007

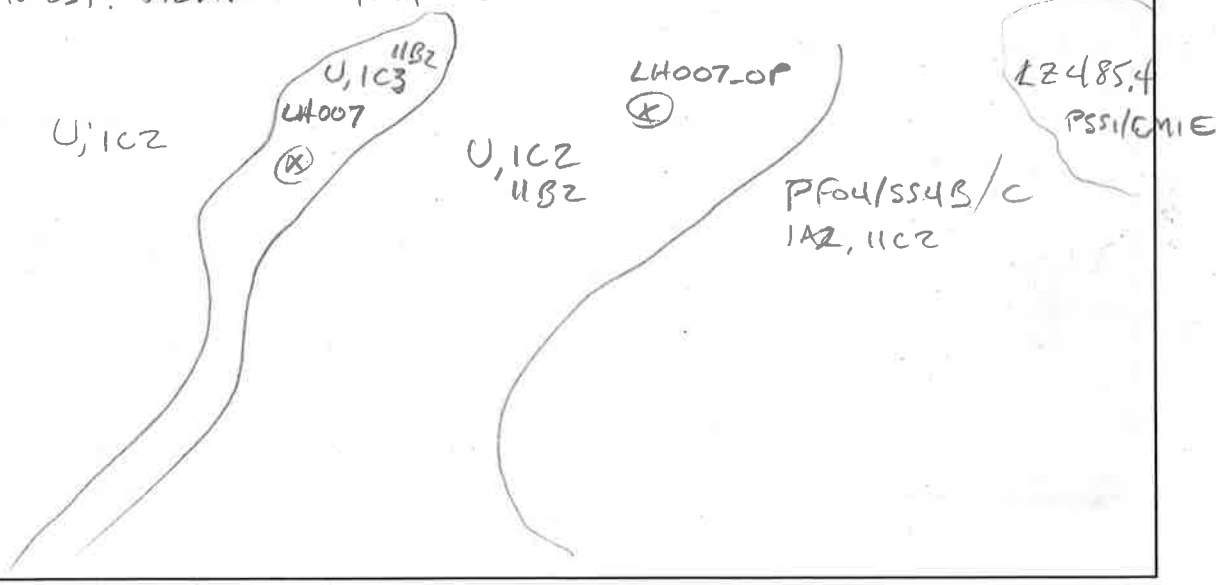
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline ✓ **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15143	**Map #:** 110 **Map Date:** 6/18/15
Date: 7/20/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84LH007	
Investigators: Brian Strong Jennifer Anderson				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 485.5		
Latitude: 64° 24' 31.16		**Longitude:** 149° 15' 24.95		**Datum:** WGS84
Logbook No.: 02	**Logbook Page No.:** 01	**Picture No.:** W84LH007_VEG_VEG_PIT_PLUG		

SITE PARAMETERS			
Subregion: Interior		Landform (hillslope, terrace, hummocks, etc.): Terrace	
Slope (%): 1		Local relief (concave, convex, none): Flat, Flat	
Pre-mapped Alaska LNG/NWI classification: U; 1C2		Evidence of Wildlife Use: Moose scat	
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): 1C3, 11B2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Sunny - Partly cloudy 62°F. Dry summer. 2 days of rain prior to today. Open canopy of PICGLA, POPBAL with a few POPTRE. Tall PICGLA 45-60'; POPBAL 25-30' with dead tops. At point, more of a woodland character but, most of area is more of a mixed forest. ASAP trail just out of plot to the west.



LH007

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	14%	Y	Fac. U
2. Populus balsamifera	12%	Y	Fac U
3. Populus tremuloidies	2		Fac U
4.			

Total Cover: 28

50% of total cover: 14 20% of total cover: 5.6

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	~~Indicator Status~~ Dom
1. Salix bebbiana 6-15'	Fac.	15%	Y
2. Salix pseudomonticola	T	T	
3. Shepherdia canadensis	Fac U	1%	
4. Viburnum edule	Fac U	1%	
5. Rosa acicularis	Fac U	3%	
6. Linnaea borialis	Fac U	1	
7. Arctostaphylos uva ursi	UPL	1%	
8. Salix sp	T	T	
9. Salix glauca	T	T	
Populus tremuloides			

Total Cover: 24 2% Fac U

50% of total cover: 12 20% of total cover: 4.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 41	X 3 =	120
FACU species 60	X 4 =	232
UPL species 1%	X 5 =	5
Column Totals: 102 (A)		357 (B)

PI = B/A = 3.5

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	~~Indicator Status~~ Dom
1. Equisetum arvense	Fac	25%	Y
2. Cornus canadensis	Fac U	15%	Y
3. Hedysarum alpina	Fac U	1%	
4. Geocaulon lividicum	Fac U	3%	
5. Pyrola asarifolia	Fac U	2%	
6. Elymus innovata	Fac U	1%	
7. Chamerion angustifolium	Fac U	2%	
8. Oxytropis sp	T	T	
9. Mertensia paniculata	Fac U	T	
10. Calamagrostis canadensis	Fac	1%	
Brinulum annotinum	T		
Pyrola sp	T		

Total Cover: 50

50% of total cover: 25.5 20% of total cover: 10.2

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

____ % Cover of Wetland Bryophytes

____ Total Cover of Bryophytes

____ % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

Feather Moss 35
litter 50
lichen 3
Moss 10