Part 9 of 19 of Appendix G of Resource Report No. 2

PA011

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	—	—	—
2.			
3.			
4.			
Total Cover: —			
50% of total cover: —	20% of total cover: —		

Sapling/Shrub Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	12	Y	Fac
2. Rhododendron tomentosum	20	Y	FacW
3. Vaccinium vitis-idaea	17	Y	Fac
4. Empetrum nigrum	1		Fac
5. Salix pulchra	4		FacW
6. Salix reticulata	T		Fac
7. Andromeda polifolia	T		FacW
8.			
9.			
Total Cover: 54			
50% of total cover: 27	20% of total cover: 10.8		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: 96	X 2 = 192
FAC species 34	X 3 = 102
FACU species 2	X 4 = 8
UPL species —	X 5 = —
Column Totals: 132 (A)	302 (B)

PI = B/A = 2.29

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites frigidus	1		FacW
2. Eriophorum vaginatum	67	Y	FacW
3. Rubus chamaemorus	2		FacW
4. Carex bigelowii	4		Fac
5. Bistorta plumosa	2		FacU
6. Arctagrostis latifolia	2		FacW
7. Pedicularis sp.	T		—
8.			
9.			
10.			
Total Cover: 78			
50% of total cover: 39	20% of total cover: 15.6		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

1 % 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):

Sphagnum 5
Bare T
Moss 25
Lichen 10

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WETLAND DETERMINATION DATA FORM

7/10/15 W84PA011 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							fibric	
A 4.5-5.5	10YR 3/2	100					S.L	
Bw1 5.5-8	2.5Y 5/3	100					S.L	2.5Y 6/1 1% - cryoturbated from below
Bw2 8-12	2.5Y 5/3	65	10YR 5/6	5	C	M	S.L	~1% alpha alpha positive
	10YR 4/4	20	2.5Y 6/1	10	D	M		
BCgf 12-15	same colors and percentages as above						S.L	~30% alpha alpha positive
AKgf 15-19	10YR 2/1	40					S.L	2.5Y 4/1 2nd matrix color ~60% ~70% alpha alpha positive

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

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

[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 - marginal fine textured S.L. More clay content. Possibly alluvium - not glacial till. Marginal site. Marginal reduced matrix

Notes: From 8-15" 10YR 4/4 colors appear to be weathered parent material and not redox. Depletions appear to be related to saturated conditions seasonally. Alpha alpha positive starting at ~11 inches below the mineral surface in frozen mineral material. ~30% alpha alpha positive. Below 11 inches of the mineral surface alpha alpha reaction becomes more consistent ~70%. Borderline site. Dry conditions. Saturation and reduction assumed in normal years

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

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

Notes:

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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) 0 Short shrub (0.5-2m) 36 Dwarf shrub (<0.5m) 18 Tall herb (≥1m) 0 Short herb (<1m) 78 Moss-Lichen 40 Floating 0 Submerged 6

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ 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: W84PA01 Field Target: 15304 Date: 7/10/11

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Abigayle Fisher — X — 7/10/15

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

X Brian Strong — X — 7/10/15

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

PA012

WETLAND DETERMINATION DATA FORM

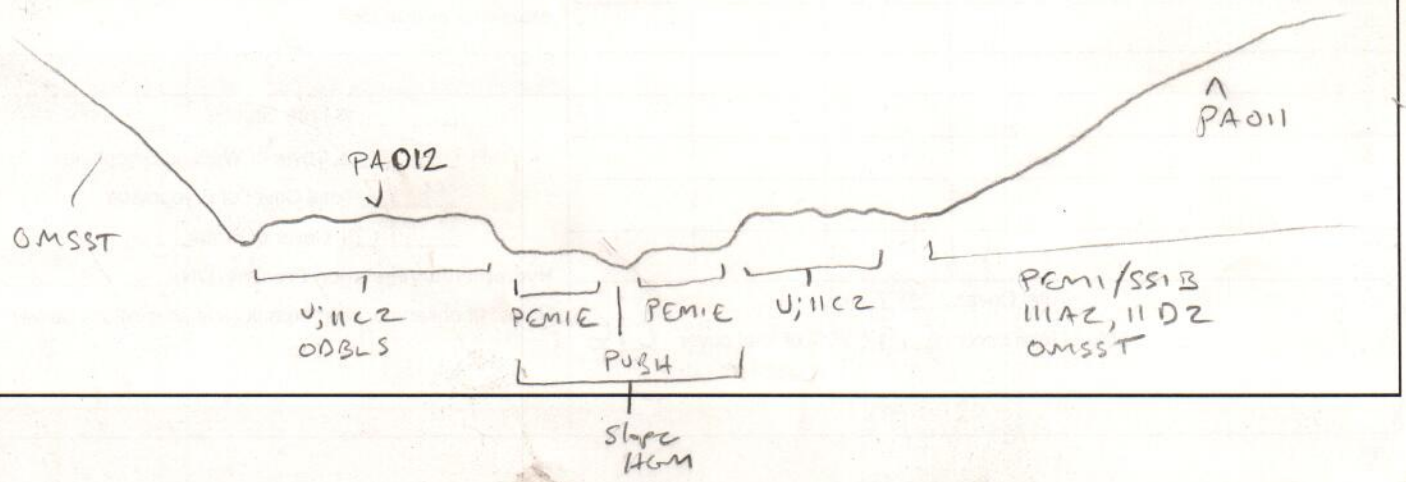
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 5305	Map #: 2 Map Date: 6/29
Date: 7/6/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84PA012	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 87.2		
Latitude: 69°08'20.29" N		Longitude: 148°52'22.65" W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 42	Picture No.: P_W84PA012_VEG_VEG_PT_PLOT		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2	Local relief (concave, convex, none): Undulating - Slightly convex w/moderate hummocks
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIE, 11C2, 11A3	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry Conditions	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No N	**Wetland Type:** U - Mosaic 10-15% wetland
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): 11C2, 11D2

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

High centered polygonal tundra. Melted ice wedges form wet troughs forming a network of emergent persistant wetlands (slope/depressional), 11A3 with CAC AQU; ERI ANG, COMPAR. Troughs are 1.5-3' deep. Soil pit dug on top of a high centered polygon where non-wetland conditions dominate. Mosaic area with ~10-15% wet inclusions.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.	—	—	—
2.			
3.			
4.			
Total Cover: —			
50% of total cover: — 20% of total cover: —			
Sapling/Shrub Stratum (26ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	35	Y	Fac
2. Rhododendrum tomentosum	70	Y	FacW
3. Vaccinium vitis-idaea	38	Y	Fac
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 143			
50% of total cover: 71.5 20% of total cover: 28.6			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	103	X 2 =	206
FAC species	73	X 3 =	219
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	176 (A)		425 (B)

PI = B/A = 2.41

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	25	Y	FacW
2. Eriophorum vaginatum	8	Y	FacW
3. Carex bigelowii	1		Fac
4. Arctagrostis latifolia	1		FacW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 35			
50% of total cover: 16.5 20% of total cover: 6.6			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

1 % Bare Ground

— % Cover of Wetland Bryophytes

94 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

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WETLAND DETERMINATION DATA FORM

7/10/15 WB4PA012 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 2-6	7.5YR 3/2	100					SiL	organic fibers incorperated in A
Bw,, 6-11.5	10YR 3/2	70					SiL	granular structure
	10YR 4/3	30						
Oe,, 11.5-14							hemic	cryoturbated organics
AC,f 14-17	10YR 3/2	60					SiL	'alpha alpha positive

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix. 10YR 4/1 matrix

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

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

Restrictive Layer (if present): Type: Permafrost Depth (inches): 14

Hydric Soil Present (Y/N): N — No redox features observed. Alpha alpha positive reaction observed more than 12 inches from mineral surface.

Notes: Due to thawing of ice wedges, the site will drain to the swales keeping the site well drained. High centered polygons.

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) 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: High centered polygon. Site will drain efficiently to thawed ice wedge swales.	
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:

PA012

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: W84PA012 Field Target: S305 Date: 7/10/15

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

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [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)?
- N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/10/15

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

X — **Signature / Date** 7/10/15

PA013
Y-T

WETLAND DETERMINATION DATA FORM

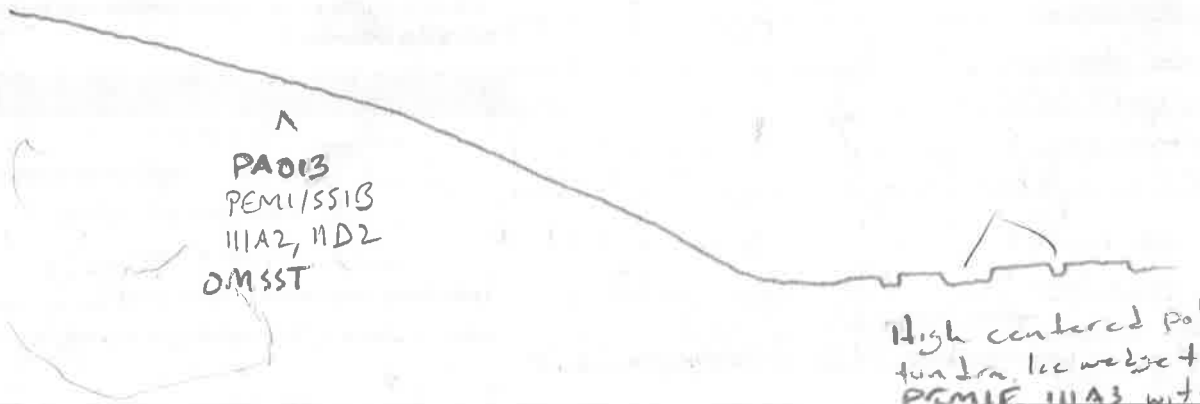
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15306	**Map #:** 3 **Map Date:** 6/29
Date: 7/11/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA013	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 87.4		
Latitude: 69°08'12.20"N	**Longitude:** 148°52'29.77"W			**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 43	**Picture No.:** P_W84PA013_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Arctic Foothills	**Landform** (hillslope, terrace, hummocks, etc.): Backslope
Slope (%): 12 measured **Aspect** N 340°	**Local relief** (concave, convex, none): Flat to slightly convex tussocks moderate to small
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B, III A2, II C2	**Evidence of Wildlife Use:** No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry conditions	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes Y No____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes Y No____	Alaska Vegetation Classification (Viereck): III A2, II D2

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

Dry conditions. Saturation assumed in normal years and early in the growing season. Mixed shrub sedge tussock tundra. Dominated by FERIVAC. Saturation and reduction assumed early in the growing season and during periods of normal rainfall.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100Ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. —	—	—	—
2.			
3.			
4.			
Total Cover: —			
50% of total cover: —	20% of total cover: —		

Sapling/Shrub Stratum (26Ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	7	Y	Fac
2. Salix pulchra	4		FacW
3. Rhododendron tomentosum	10	Y	FacW
4. Salix reticulata	2		Fac
5. Empetrum nigrum	1		Fac
6. Vaccinium vitis-idaea	3		Fac
7. Vaccinium uliginosum	1		Fac
8. Arctous rubra	T		Fac
9. Andromeda polifolia	T		FacW
Total Cover: 28			
50% of total cover: 14	20% of total cover: 5.6		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	17	X 2 =	34
FAC species	91	X 3 =	273
FACU species	6	X 4 =	24
UPL species	—	X 5 =	—
Column Totals:	114	(A)	331 (B)

PI = B/A = 2.90

VEGETATION (use scientific names of plants)

Herb Stratum (26Ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cassiope tetragona	3		FacW
2. Bistorta plumosa	2		FacW
3. Pedicularis frigidus	T		FacW
4. Carex bigelowii	12		Fac
5. Eriophorum vaginatum	65	Y	Fac
6. Arctagrostis latifolia	3		FacW
7. Saussurea angustifolium	T		Fac
8. Pedicularis labradorica	T		FacW
9. Pyrola asarifolia	1		FacW
10. Pedicularis lanata	T		Fac
Saxafraga nelsonii T	Total Cover: 86		
50% of total cover: 43	20% of total cover: 17.2		

Hydrophytic Vegetation Indicators:

- X Dominance Test is > 50%
- X Prevalence Index is ≤ 3.0
- — Morphological Adaptations[1] (Provide supporting data in Notes)
- — Problematic Hydrophytic Vegetation[1] (Explain)

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

- 0 % Bare Ground
- — % Cover of Wetland Bryophytes
- 42 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum 10
Feather moss 10
Moss 10
Lichen 12

PA013

WETLAND DETERMINATION DATA FORM

7/11/15 W84PA013

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	
Bw 4-7	2.5Y 5/3	100					SiL	
Bg 7-10	5Y 5/1	89	7.5YR 4/6	8	C	PL/RC	SiCL	massive structure, Slightly plastic
			10YR 4/4	3	C	M		
Bg 10-15	5Y 5/1	80	10YR 4/6	20	C	M	SiCL	granular structure.
Bwjj 15-17	2.5Y 4/1	90	10YR 4/6	10	C	PL	SiCL	5% gravel, Granular structure
CAjjf 17-20	2.5Y 4/2	97	10YR 4/6	3	C	M	SiCL	2.5Y 3/1 2nd matrix color

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

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): 17 (15-17 variable)

Hydric Soil Present (Y/N): Y

Notes: Organic mat, diagnostic horizons and frost table are all highly variable with wavy boundaries. Organic mat 3-6" in depth. SiCL on the lower end of clay content (borderline SiL) Alpha alpha positive in frozen mineral starting 12.5-13" Saturation and reduction assumed early in the growing season and during periods of normal rainfall. Dry conditions

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) Y	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N at 13"	Microtopographic Relief (D4) Y 5-7" moderate to small tussocks
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Saturation assumed in normal years	
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: Saturation assumed early in the growing season and during normal periods of rainfall.

PA013

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__22__ Dwarf shrub (<0.5m) __6__ Tall herb (≥1m) __0__ Short herb (<1m) __86__ Moss-Lichen__42__ Floating__9__ Submerged__8__

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ 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: IN84PA013 Field Target: 15506 Date: 7/11/15

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)?

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

X Abigayle Fisher — X — 7/11/15

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

X Bryan Strong — X — 7/11/15

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

PA014
Y-T

WETLAND DETERMINATION DATA FORM

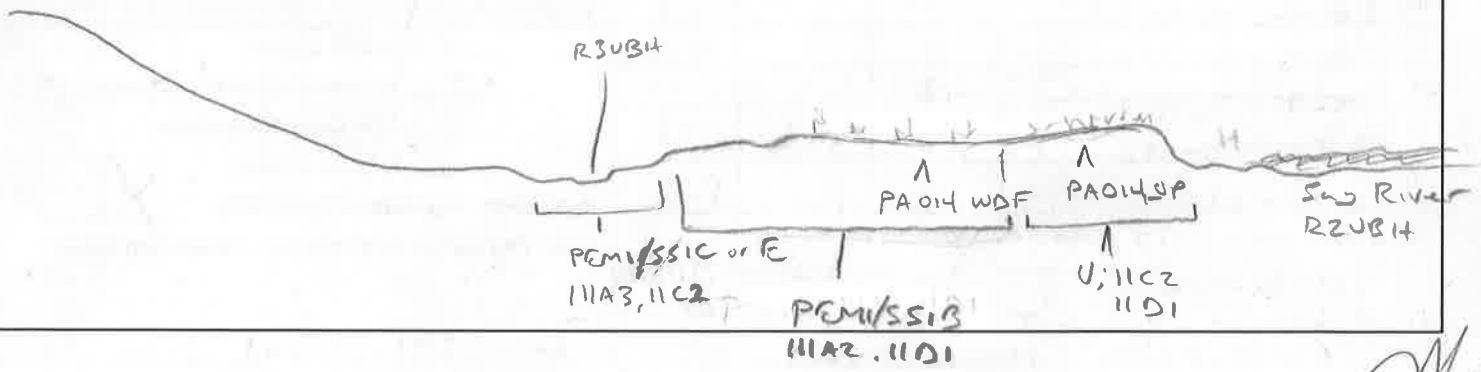
SITE DESCRIPTION			
Survey Type: Centerline___ **Access Road** (explain)__X__ **Other** (explain)_____		**Field Target:** 15303	**Map #:** 4 **Map Date:** 6/29
Date: 7/11/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84PA014	
Investigators: Bryan Strong, Abigayle Fisher			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** N/A Access Road	
Latitude: 69° 05' 44.43" N	**Longitude:** 148° 48' 33.53" W		**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 43	**Picture No.:** P_W84PA014_VEG_VEG_PIT_PLOT	

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): River terrace
Slope (%): 2	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: PEMI/SSIB IIIA2 IIC2	Evidence of Wildlife Use: Muskox footprints nearby, Seagull
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No__X__ (if no explain in Notes) Dry Conditions	Are "Normal Circumstances" present: Yes__X__ No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No__X__ (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No__X__ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes__X__ No_____	**Is the Sampled Area within a Wetland?** Yes__Y__ No_____
Hydric Soil Present? Yes__X__ No_____	**Wetland Type:** PEMI/SSIB
Wetland Hydrology Present? Yes__X__ No_____	Alaska Vegetation Classification (Viereck): IIIA2, IID1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Very marginal site. Dry conditions. Unusual mix of OBL species (Carex aquatilis) and upland species (Hedysarum mackenzii). Alpha alpha positive from 7-12.5 inches. Soil at field capacity but not saturated at time of site visit. Seasonal frost expected to perch water early in the growing season. Redox features and positive alpha alpha indicate this is a hydric soil. Low chroma parent material.

Herbaceous (emergent) component of vegetation community dominates the vertical structure slightly more than the shrubs. Borderline PSSI/EMIB but, overall, looking beyond the 26' diameter plot, the emergent character of the site is slightly more dominant here.



PA014

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: —

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

Sapling/Shrub Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix richardsonii	7	Y	FacW
2. Salix reticulata	2		Fac
3. Arctous rubra	7	Y	Fac
4. Dryas integrifolia	10	Y	FacU
5. Pasiphora fruticosa	T		Fac
6. Vaccinium uliginosum	3		Fac
7. Empetrum nigrum	T		Fac
8. Rhododendron lapponicum	T		Fac
9.			

Total Cover: 29

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

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	5 X 1 =	5
FACW species:	19 X 2 =	38
FAC species	17 X 3 =	51
FACU species	10 X 4 =	40
UPL species	— X 5 =	—
Column Totals:	51 (A)	134 (B)

PI = B/A = 2.63

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum variegatum	12	Y	FacW
2. Parnassia palustris	T		FacW
3. Carex aquatilis	5	Y	OBL
4. Equisetum arvense	5	Y	Fac
5. Anemone parviflora	T		FacU
6. Leymus innovatus	T		UPL
7. Carex vaginata	T		OBL
8. ~~Equisetum variegata~~ BSS	~~12~~		
9. Pedicularis sp.	T		UPL
10. Festuca altaica	T		Fac
Poa sp T			
Bistorta viviparum T			
Hedysarum alpinum T			
Tofieldia pusilla T			
Carex membranacea T			
Pedicularis sudetica T			
Carex bigelowii T			
Gentianella propenqua T			
Grass sp T			
Carex scirpoidea T			
Carex sp T			

Total Cover: 22

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

25 % Bare Ground

— % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Bare 25% - sand deposits

PA014

WETLAND DETERMINATION DATA FORM

7/11/15 W84PA014 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
C	0-1							fine sand	overbank deposit 3-10 years ago
Oe	1-4							hemic	
Bw	4-6	2.5Y 3/1	100					SiL	
Oab	6-7	10YR 2/1	100					sapric	buried organic surface
Cg	7-12.5	N4/0	96	10YR 5/6	4	C	PL	SiL	low chroma parent material, ddx pos
Bg	12.5-18.5	5Y 4/1	92	10YR 5/6	8	C	PL	vfSaL	low chroma parent material
C	18.5-20.5	5Y 3/1	100					Sand	Sm2S - variagated color
C	20.5-24	5Y 3/1	100%					VGRSand	~20% river gravel. Single grain variagated color - sand grains

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) Y	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) 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) 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 - massive Depth (inches): NA
SiL/SiCL will be slowly permiable. Seasonal frost expected early.

Hydric Soil Present (Y/N): Y

Notes: Alpha alpha positive from 7-12.5 inches. The higher clay content (SiL - near SiCL) and massive structure will have slow transmissivity. Seasonal frost will perch water early in the growing season. Marginal site but redox features and positive alpha alpha from 7-12.5 are substantial evidence for saturation and reduction seasonally

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) Y or	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 over seasonal frost early in the growing season. Not quite 4" at time of site visit but evidence of >4" of reduced matrix is evident in the soil	
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:

PA04

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__X__ 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)__10__ Dwarf shrub (<0.5m)__19__ Tall herb (≥1m)__0__ Short herb (<1m)__22__ Moss-Lichen__20__ 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%)__X__ Very High Density (80-100%)_____

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

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

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__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_____ Sediment Observed on Wetland Substrate__X__ Fluvaquent Soils Sediment Created_____

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

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ 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__X__ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA014 Field Target: 15303 Date: 7/11/15

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?~~ Form

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 7/11/15

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

X — **Signature / Date** 7/11/15

PA015
4

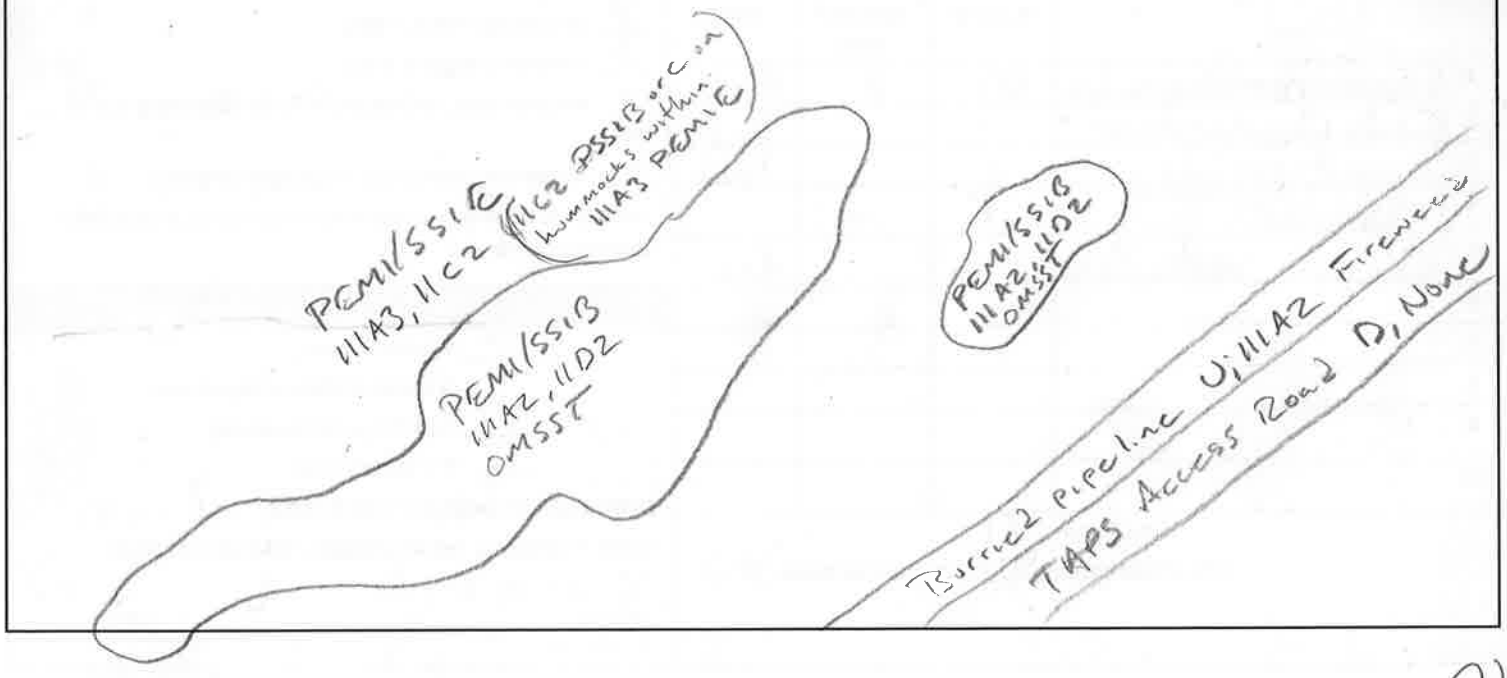
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15237	**Map #:** 6 **Map Date:** 6/29
Date: 7/11/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84PA015	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 113.8		
Latitude: 68° 46' 33.35" N	**Longitude:** 148° 52' 07.92" W		**Datum:** WGS84	
Logbook No.: 01	**Logbook Page No.:** 44	**Picture No.:** PW84PA015_VEGVEGPT_PLOT		

SITE PARAMETERS	
Subregion: Arctic Foothills	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1-2	Local relief (concave, convex, none): Flat, tussocky-small
Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B IIIA2, IID2	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No X (if no explain in Notes) Dry conditions	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEM1/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIIA2, IID2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Mixed shrub-sedge tussock tundra. Shallow permafrost. Saturation at 6". Positive alpha alpha in all mineral horizons.



PA015

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: —

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

Sapling/Shrub Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rhododendron tomentosum	12	Y	FacW
2. Betula nana	3		Fac
3. Vaccinium vitis-idaea	6	Y	Fac
4. Andromeda polifolia	1		FacW
5.			
6.			
7.			
8.			
9.			

Total Cover: 21

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

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:	87	X 2 =	174
FAC species	11	X 3 =	33
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	98 (A)		207 (B)

PI = B/A = 2.11

VEGETATION (use scientific names of plants)

Herb Stratum (26ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Eriophorum vaginatum	75	Y	FacW
2. Rubus chamaemorus	4		FacW
3. Carex bigelowii	2		Fac
4. Pedicularis groenlandica	1		
5. Pedicularis verticillata	T		Fac
6.			
7.			
8.			
9.			
10.			

Total Cover: 81

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

— % Cover of Wetland Bryophytes

37 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Sphagnum sp 15

Moss 20

Lichen 2

PA015

WETLAND DETERMINATION DATA FORM

7/11/15 WB4PA015

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

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O: 0-5.5								
Oa/Cg 5.5-8.5								Saturated
8.5-12.5	5Y 5/1	97	7.5YR 4/6	3	C	RC, PL	vfSaL	Alpha alpha positive-Massive
Cgf 12.5-17	5Y 5/1	100					vfSaL	Alpha alpha positive, frozen

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

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

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

Restrictive Layer (if present): Type: Permafrost Depth (inches): 12.5

Hydric Soil Present (Y/N): Y

Notes: Saturated. Alpha alpha positive (100%) in all mineral horizons.

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

Surface Water Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 6	**EC:** NA

Notes:

PA015

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall)__0__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__15__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __3__ Short herb (<1m) __81__ Moss-Lichen__37__ Floating__0__ Submerged__0__

Number of Wetland Types (M): __3__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ 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_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable__X__ Permafrost

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84PA015 Field Target: 15237 Date: 7/11/15

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~~ Form?

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Abigayle Fisher X 7/11/15

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

X Brian Strong X 7/11/15

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

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15050	Map #213 Map Date: 6/4/2015
Date: 6/5/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84T1001	
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 724	
Latitude: 61° 33' 01.44" N	Longitude: 150° 32' 24.42"		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 01	Picture No.: P_W84T1001_Veg_Veg_Pit_Plug	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Toeslope w/Hummocks Moderate
Slope (%): 0-3%	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Yes
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 X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEM1/SS1B with PSS1/FO1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A2, II B2

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

Toeslope. Slightly concave across and downslope. Mosaic of uplnd and wetland in the immedeate area. Field delination estimated on Field map. Hummocky/tussocky Calamagrostis canadensis creates moderate microtopography in wetter portions of the polygon/wetlnd where surface water occurs for brief periods. Inclusions of PEMIC within the area.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula Neoalaskan	4	Y	FAC Fac
2. Alnus incana tenuifolia	4	Y	Fac
3.			
4.			

Betula neoalaskana changed to FAC Due to attached document on 2 morphological adaptations

Total Cover: 8

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

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana tenuifolia	15	Y	Fac
2. Ribes triste	T	N	Fac
3. Viburnum edule	T	N	FacU
4. Betula Neoalaskan	1	N	~~FacU~~ 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: 4 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	0 X 1 =	0
FACW species:	0 X 2 =	0
FAC species	109 X 3 =	327
FACU species	3 X 4 =	12
UPL species	— X 5 =	—
Column Totals:	112 (A)	339 (B)

PI = B/A = 3.03

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis Canadensis	65	Y	Fac
2. Equisetum arvense	15		Fac
3. Athyrium cyclosorum	5		Fac
4. Mertensia paniculata	1		FacU
5. Dryopteris expansa	T		FacU
6. Sterotopus amplexifolius	T		FacU
7. Aglium boreale	T		FacU
8. Urtica dioica	2		FacU
9. Trientalis europea	T		FACU
10.			

Total Cover: 88

50% of total cover: 44 20% of total cover: 17.6

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

____ Prevalence Index is ≤3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

T % Bare Ground

U % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

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)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
Oe	0 - 5	Orang						hemic	Orangic Saturated
Oa	5 - 10							Sapric	Orangic Saturated
A	10 - 18	10YR3/1	70						
		2.5Y4/1	30						
Cs	18 - 20	N 4/		7.5YR3/2	3	C	PL/RC		Silty Clay loam

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

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

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

Restrictive Layer (if present): Type: clay Depth (inches): 18in
① Clay pan - massive

Hydric Soil Present (Y/N): Y

Notes: Alpha Alpha Positive,

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

Surface Water Present (Y/N): Y	Depth (in): T	**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:** 110µs at 0.5°C

Notes: 110µS @ 0.5°C

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved 10 Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved 25 Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent 75 Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 60 Sapling (<5 dbh, <6m tall) 1 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 70 Short herb (<1m) 15 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated 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_____ No defined stream channel

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** 5.8

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) X Low Intensity (i.e. open space)_____

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: Brc

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1061 Field Target: 15050 Date: 6/5/2015

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Abigayle Fisher X

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

X Bryan Strong X 6/5/2015

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

T1002

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15037	Map #: 226 Map Date: 6/4/15
Date: 6/16/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1002	
Investigators: Bryan Strong Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 741.7		
Latitude: 61.37186		Longitude: 150.83919		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 02	Picture No.: P_W84 T1002_veg_veg_pit_plug_watertable		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 3-5	Local relief (concave, convex, none): Flat - slightly concave with moderate hummocks tussocks
Pre-mapped Alaska LNG/NWI classification: U ICz	Evidence of Wildlife Use: Yes - Moose sign bears, scat
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 X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO1/EM1C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IB2, IIA2

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

Polygon is a mixture of PFO1/EM1 and PEM1/FO1. Significant amounts of standing water 1" to 1.5' deep between Calamagrostis tussocks/hummocks throughout the area. Standing water is running in places but not channelized. Most of the birch trees are growing on hummocks and have suckers at their bases. Some of the area may have enough Picea glauca to qualify as a mixed forest. Upland inclusions may occur but between LZ 741.8 and the point (W84T1002) no inclusions were observed. Site sketch in logbook 001. Soil has a layer of ash material (andic material) over a sand lens. Below sandy lens is a dense, poorly structured horizon with few roots and appears to function as a restrictive layer perching a watertable moving through andic, high K-Sat (permiable) material. Alpha alpha positive (100%) throughout soil profile.

Hom Slope

EC 214 pH 6.7

VW

T1002

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula Neoalaskana	30	Y	Fac
2. Picea glauca	7		FacU
3. N			
4.			

Total Cover: 37

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	2	Y	FacU
2. Viburnum edule	2	Y	FacU
3. Alnus incana ssp. tenuifolia	3	Y	Fac
4. Ribes triste	T		Fac
5. Spirea stevenii	T		FacU
6.			
7.			
8.			
9.			

Total Cover: 7

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: 20	X 2 = 40
FAC species 157 155	X 3 = 465 471
FACU species 146	X 4 = 72
UPL species —	X 5 = —
Column Totals: 175 (A)	544 543 (B)

PI = B/A = 3.69 3.10

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	70	Y	Fac
2. Equisetum arvense	50	Y	Fac
3. Dryopteris expansa	4		FacU
4. Gymnocarpium dryopteris	T		FacU
5. Cornus canadensis	2		FacU
6. Streptopus Amplexifolius	T		FacU
7. Athyrium cyclosorum	2		Fac
8. Rubus arcticus	2		FacW
9. Sanguisorba Sp.	T		
10. Trientalis Europea	1		FacU

Total Cover: 131

50% of total cover: 65.5 20% of total cover: 26.2

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

____ Prevalence Index is ≤3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

2 % Bare Ground

8 % Cover of Wetland Bryophytes

8 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1002

WETLAND DETERMINATION DATA FORM

SOIL Date 6/6/15 Feature ID WG4-T1002 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								hemic organic
Oa 4-6	7.5YR 2.5/1						Sapric	very decomposed, some mineral
A 6-13	10YR 3/2		5YR 4/4	25	C	PL	silt loam	
			2.5Y 4/2	7	D	M	silt loam	
C 13-14	10YR 4/3						loamy sand	Fine Gravels present
2C 14-20	7.5YR 4/1		7.5YR 3/3	3	C	M	silt loam	Organic debris, high clay aquatard, firm, few live roots

[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	2cm Muck (A10)	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: high clay silt loam Depth (inches): 14 inch

Hydric Soil Present (Y/N): Y

restrictive layer = silt loam with poor structure and high % clay component - near SiCL

Notes:
Alpha Alpha Positive to the Surface, Poorly Expressed Restrictive layer

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) 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) Y			

Surface Water Present (Y/N): Y	Depth (in): 2	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 5		
Saturation Present (Y/N): Y (includes capillary fringe)	Depth (in): 2	EC: 214 at 7.5°C	

Notes:
pH 6.7

T1002

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 X Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 57 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 3 Short shrub (0.5-2m) 4
Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 70 Short herb (<1m) 61 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ 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 X No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4) X Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.7

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%)_____ 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)_____ Large (>100 acres) X

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1002 Field Target: 15037 Date: 6/6/15

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?
2. **Vegetation**
   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?
3. **Soil**
   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?
4. **Hydrology**
   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?
5. **Functions and Values**
   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?
6. **Field Logbook**
   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?
7. **Maps**
   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. **Photos**

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

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

X Abigayle Fisher X 6/6/15

Wetland Scientist (print) Signature / Date

X Brogan Strong X 6/6/15

Field Crew Chief (print) Signature / Date

T1003 *

WETLAND DETERMINATION DATA FORM

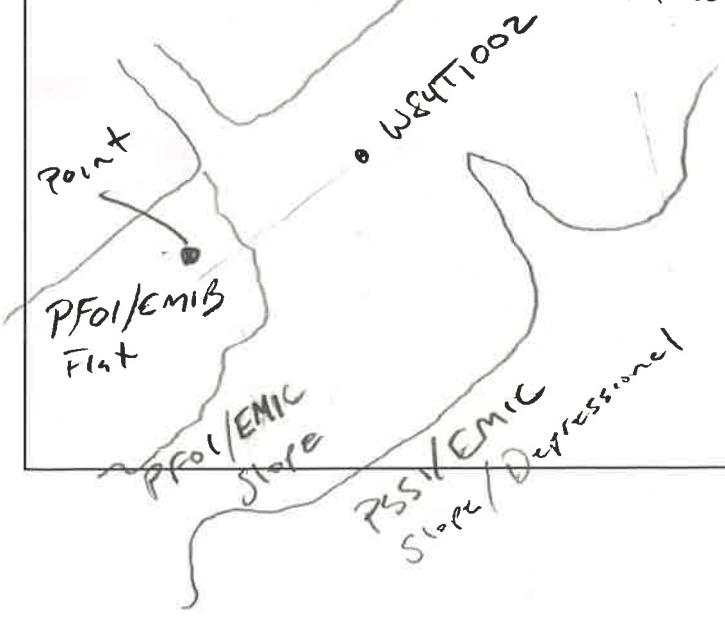
SITE DESCRIPTION			
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____		Field Target: 1503G	Map #: 22 Map Date: 6/4/15
Date: 6/6/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84T1003	
Investigators: Bryan Strong, Aboriginal Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 741.8	
Latitude: 61° 22' 15.22" N	Longitude: 150° 50' 30.24" W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 03	Picture No.: P_W84T1003_veg_veg-pit_plus	

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 2-3	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification: U; ICZ	Evidence of Wildlife Use: Yes, Moose browse
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes ✓ No____
Hydric Soil Present? Yes ✓ No____	**Wetland Type:** PFO1/EMIB
Wetland Hydrology Present? Yes ✓ No____	Alaska Vegetation Classification (Viereck): 1B2, 111A2

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

This appears to be a flat/slope complex. High permiability near surface (above 13") with low permiability silty clay loam below 13" appears to be perching water. Relatively low EC at the point. Below point 30 yards, Much more surface water (similar to W84T1002) suggests a transition to slope HGM. More even canopy of birch at this point than at W84T1002.



HGM: Flat

EC 32µS pH 6.6

T07 4

T1003

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	45	Y	FacU
2. Picea glauca	7		FacU
3.			
4.			

Total Cover: 52

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

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Ribes triste	T		FacU
2. Sorbus SP	1		FacU
3. Spinulum Annotinum	1		FacU
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 2 added to Herb

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	—	X 2 =	—
FAC species	87	X 3 =	261
FACU species	74	X 4 =	296
UPL species	—	X 5 =	—
Column Totals:	161 (A)		557 (B)

PI = B/A = 3.5

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	30	Y	Fac
2. Athyrium cyclosorum	7		Fac
3. Dryopteris expansa	13		FacU
4. Cornus Canadensis	7		FacU
5. Equisetum arvense	30	Y	Fac
6. ~~Ribes Triste~~ BSS			
7. ~~Mountain Ash~~ BSS			
8. Streptopus amplexifolius	T		
9. Equisetum sylvaticum	20	Y	Fac
10.			

Total Cover: 109

50% of total cover: 54.5 20% of total cover: 21.8

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

_____ Prevalence Index is ≤ 3.0

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): ✓

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

T1003

WETLAND DETERMINATION DATA FORM

SOIL Date 6/6/15 Feature ID T1003 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								Saturated
5-13	2.5Y 4/2	85	5YR 4/6	15	C	PL/RC*	Silt Loam	Saturated
13-20	5Y 5/1	75	5YR 3/4	25	C	PL	Silty Clay Loam*	Weakly cemented soft masses of concentrations

[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) 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: Poor structure Silty Clay Loam Depth (inches): 13" Weakly cemented iron masses at interface at 13 inches

Hydric Soil Present (Y/N): Y Alpha alpha positive throughout mineral soil

Notes: *RC=Root Channels 2. high percentage clay, boarderline
Alpha Alpha positive throughout (100%) Water table at ~10 inches

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) M-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-M
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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Waterstained leaves and surface water is limited to one or two small areas/microsites in the polygon. Below 13" Silty Clay Loam (borderline SiL) appears to perch the watertable	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 0	**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): 4 inch	EC: 32mS @ 9.1C pH 6.6 Standing water	

Notes: Much more standing water in microlows just downgradient from the Plot. Appears to transition to slope Hem a short distance downslope

T1003

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_80_ 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_20_ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_52_ Sapling (<5 dbh, <6m tall)_0_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_3_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _70_ Short herb (<1m) _77_ Moss-Lichen_0_ Floating_0_ Submerged_0_

Number of Wetland Types (M): _2_ **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_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_____ Circumneutral (5.5-7.4)_X_ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.6

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_ 2-3%

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1003 Field Target: 15036 Date: 6/6/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Abigayle Fisher X

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/6/15

Field Crew Chief (print) Signature / Date

W84T1004 + T1004

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15047 Map #: 215 Map Date: 6/4/15	
Date: 6/8/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84T1004	
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 232	
Latitude: 61°27'14.17"N	Longitude: 150° 38' 46.40"W		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 06	Picture No.: P_W84T1004_veg_veg_pit_pkg	

SITE PARAMETERS	
Subregion: Southcentral lowlands	Landform (hillslope, terrace, hummocks, etc.): Glacial trough
Slope (%): 2-3	Local relief (concave, convex, none): Flat to slightly concave w/ moderate undulations
Pre-mapped Alaska LNG/NWI classification: U 1C2/1B2	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.) but drier - low snow year
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation X, Soil ✓, or Hydrology____ Naturally Problematic?	No____ (If yes, explain in Notes.)

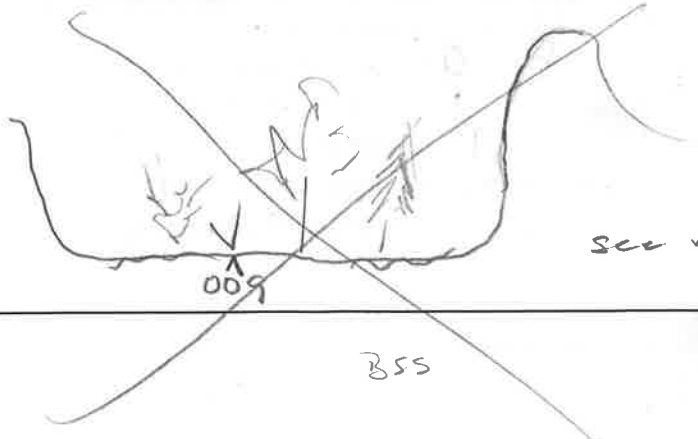
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes ✓ No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PFO1/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 1B2, 11B2

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

Marginal wetland. Potentially a mosaic wetland but trasitioning to water in same vegitation signature to the north and to the south with standing water in microlows throughout area. Slope HGM

Soil pit EC 102mS @ 5.5 PH 6.1 Standing water EC 140mS @ 9.5°C PH 6.5

Soils meet reduced matrix with alpha alpha positive reaction starting at 8" from the mineal surface (>60%). Vegetation also marginal but, typical for southcentral lowland wetlands.



see map for more info

HGM: Slope

EC 140 PH 6.5

T1004

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FacU
2. Picea glauca	6		FacU
3.			
4.			

Total Cover: 36

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	5		FacU
2. Oplopanax horridus	12	Y	FacU
3. Alnus incana ssp tenuifolia	15	Y	Fac
4. Viburnum edule	8	Y	FacU
5.			
6.			
7.			
8.			
9.			

Total Cover: 40

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: —	X 1 =	—
FACW species: 6	X 2 =	12
FAC species 176	X 3 =	528
FACU species 42	X 4 =	168
UPL species —	X 5 =	—
Column Totals: 224 (A)		708 (B)

PI = B/A = 3.16

VEGETATION (use scientific names of plants)

Herb Stratum (20)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	70	Y	Fac
2. Equisetum arvense	60	Y	Fac
3. Dryopteris expansa	3		FacU
4. Gymnocarpium dryopteris	5		FacU
5. Streptopus amplexifolius	2		FacU
6. Geranium erianthum	T		Fac
7. Carex Sp.	T		
8. Cornus Sericea	T		Fac
9. Rubus arcticus	T		Fac
10. Impatiens noli-tangere	6		FacW

Total Cover: 148

50% of total cover: 74 20% of total cover: 29.6

Trientalis europaea	1	FacU
Athyrium cyclosorum	1	Fac

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

— Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

3 % Bare Ground

0 % Cover of Wetland Bryophytes

1 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1004

WETLAND DETERMINATION DATA FORM

SOIL Date 6/8/15 Feature ID W84 T1004 Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-4							Hemic	Organics
4-6	7.5YR 2.5/2	100					Silt Loam	andic material, ash
6-10	2.5Y 4.5/2	100					Loamy Sand	Spotty αα reaction <60% (3)
10-12	7.5YR 2.5/3	100					Hemic	Saturated
12-16	7.5YR 4/1	100					Silt Loam	1. Alpha alpha positive (100%
16-18	10YR 4/2	98	2.5Y 5/1	2	D	PL	Silt Loam	1 Concentrations 7.5YR 4/6 - 2%
16-24	5Y 5/1	95	7.5YR 4/6	5	C	PL	Sandy Loam	1 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 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: N/A Depth (inches): N/A

Hydric Soil Present (Y/N): Y - potentially problematic Soil pit dug in an intermediate position between micro-high and microlow positions - Fairly dry microsite.

Notes: 1. Alpha Alpha positive (60-100%). Alluvial Deposition - stratified layers 12-18" are stratified layers with organics incorporated throughout 10-24" Alpha Alpha Positive (3) Pockets of saturation - Pockets of αα positive material (<60%)

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) 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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) Y	Notes: Undulating microtopography driven mostly by pit/mound topography (tree fall) Point in a glacial trough with alluvial deposition	
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): 12	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 10	EC: 102 µS @ 5.5°C pH 6.1

Notes: Water table at 12" Preferencial flow/free water in places starting at 10" below the organic surface. No standing water in 26' diameter plot but many microlows host surface water north and south of the point. Probably a mosaic area but trending more wet than non-wetland Correction - small microlow with standing water and water stained leaves discovered under dense understory. EC 140 µS pH 6.2 Algae scum in this microlow depression @ 9.5°C

T1004

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 30 Sapling (<5 dbh, <6m tall) 6 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 25 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 70 Short herb (<1m) 78 Moss-Lichen 1 Floating 0 Submerged 8

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__X__ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown__X__ - probably above and below

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: W847T004 Field Target: 1504Z Date: 6/8/15

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

1. **Site Description**

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

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 Abagayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date**

X — **Field Crew Chief (print)**

X Brian Strong 6/8/15 — **Signature / Date**

T1005

WETLAND DETERMINATION DATA FORM

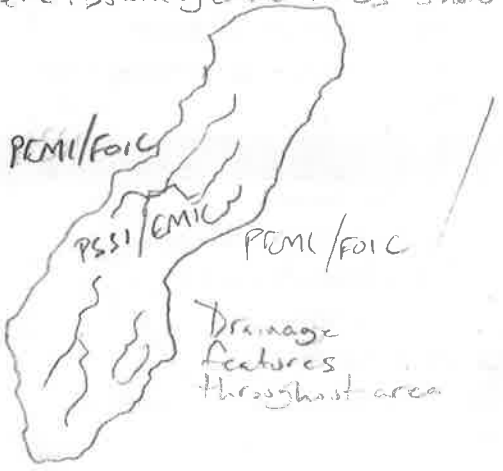
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15038	Map #: 278 Map Date: 6/5/15
Date: 6/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1005	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 741.2		
Latitude: 61° 22' 35.18"		Longitude: 150° 49' 29.55"		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 05	Picture No.: P_W84T1005_veg_veg-p.t_pics		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 2-3	Local relief (concave, convex, none): Flat to slight concave
Pre-mapped Alaska LNG/NWI classification: U1C2	Evidence of Wildlife Use: Yes - heavily browsed w/ moderate hummocks + tussocks of CAL CAN
Are climatic/hydrologic conditions on the site typical for this time of year? Yes____ No__✓__ (if no explain in Notes)	Are "Normal Circumstances" present: Yes__✓__ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No__✓__ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No__✓__ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes__✓__ No____	**Is the Sampled Area within a Wetland?** Yes__✓__ No____
Hydric Soil Present? Yes__✓__ No____	Wetland Type: PSS1/EM1C
Wetland Hydrology Present? Yes__✓__ No____	Alaska Vegetation Classification (Viereck): IIB2, IIIA2

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

Willow and Birch saplings heavily browsed. Moose scat etc... in area. Small stream/drainage features throughout area with channels 1-2' wide, (meandering) mucky bottoms, water depth 5-10" typically. Equisetum fluviatile stems scattered in channels and wet microlows. Wetland throughout area - PFO1/EM1B and PFO1/EM1C interspersed with wetter communities as described here. Drainage features show no evidence of overbank flooding



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 12

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

Sapling/Shrub Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. ~~Calamagrostis canadensis~~			~~Fac~~
2. Vaccinium uliginosum	2		Fac
3. Spiraea stevenii	2		FacU
4. Sal. x pulchra	2		FacW
5. Alnus incana sp. tenuifolia	15	Y	Fac
6. Betula neoalaskana	13	Y	FacU
7.			
8.			
9.			

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 (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:	4 X 1 =	4
FACW species:	3 X 2 =	6
FAC species	125 X 3 =	375
FACU species	17 X 4 =	68
UPL species	— X 5 =	—
Column Totals:	149 (A)	453 (B)

PI = B/A = 3.04

VEGETATION (use scientific names of plants)

Herb Stratum (_____)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus arcticus	1		Fac
2. Equisetum arvense	12		Fac
3. Cornus sericea	T		FacU
4. Rubus chamaemorus	1		FacW
5. Equisetum fluviatile	1		OBL
6. Comarum palustre	3		OBL
7. Trientalis europaea	T		FacU
8. Calamagrostis canadensis	85	Y	Fac
9. Rosa acicularis	T		FacU
10. Moss	10		

Total Cover: 103

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

— Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

20 % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/17	Feature ID WETDOS	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 0-24	7.5YR 3/2						hemic	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X	Alaska Gleyed (A13) 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 8-10"		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): Y

Notes: Water table at 5.7" (hummocks microtopography)

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) ?	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) Y			

Surface Water Present (Y/N): Y	Depth (in): 8	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 6	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 102 @ 6.4°C pH 6.02

Notes:

EC102 @64.2 pH 6.02 pH (soil pit) 5.8

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 65 Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent 35 Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 12 Sapling (<5 dbh, <6m tall) 13 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 6 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 55 Short herb (<1m) 18 Moss-Lichen 20 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ 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) X 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 X 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 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** 6.02

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: W84T1005 Field Target: 150385 Date: 6/7/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

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

L7 WBYT1005_0P

X Abigayle Fisher X

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/7/15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 150ft	Map #: 278 Map Date: 6/4/15
Date: 6/7/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1006	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 741.9		
Latitude: 61° 22' 42.76		Longitude: 150° 49' 22.22		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 05	Picture No.: P_W84T1006_veg-veg-p.c-pl		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Footslope
Slope (%): 2-3	Local relief (concave, convex, none): Flat to moderately concave with hummocks
Pre-mapped Alaska LNG/NWI classification: U1C2	Evidence of Wildlife Use: Moose sign - browes
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 Y No____	**Wetland Type:** PF01/SS1B
Wetland Hydrology Present? Yes Y 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.

Driest site we have seen in the area. Watertable near surface with small microsites saturated to surface or with shallow (1") standing water. Much wetter east of point with numerous drainage features in the form of small meandering channels. Water depth in channels typically 5-10". Streams with muck bottoms and scattered EQUFLU east of point

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	50	Y	Fac
2. Picea glauca	3		FacU
3.			
4.			

Total Cover: 53

50% of total cover: 25.5 20% of total cover: 10.6

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana	3	Y	Fac
2. Rosa acicularis	4	Y	FacU
3. Viburnum edule	4	Y	FacU
4. Ribes triste	T		
5.			
6.			
7.			
8.			
9.			

Total Cover: 11

50% of total cover: 5.5 20% of total cover: 2.2

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	—	X 1 =	—
FACW species:	—	X 2 =	—
FAC species	163	X 3 =	489
FACU species	27	X 4 =	108
UPL species	—	X 5 =	—
Column Totals:	190 (A)		597 (B)

PI = B/A = 3.14

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	70	Y	Fac
2. Equisetum arvense	40	Y	Fac
3. Streptopus amplexifolius	T		FacU
4. Trientalis europaea	T		FacU
5. Dryopteris expansa	15		FacU
6. Cornus suecica	1		FacU
7. Rubus pedatus	T		
8. Rubus arcticus	T		Fac
9.			
10.			

Total Cover: 126

50% of total cover: 63 20% of total cover: 25.2

Hydrophytic Vegetation Indicators:

- X Dominance Test is > 50%
- — Prevalence Index is ≤3.0
- — Morphological Adaptations[1] (Provide supporting data in Notes)
- — Problematic Hydrophytic Vegetation[1] (Explain)

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

- 1 % Bare Ground
- _____ % Cover of Wetland Bryophytes
- 0 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/7/15	Feature ID 006	Soil Pit Required (Y/N) Y

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

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Notes
Oe	0-5.5							Hemic	Saturated at 2" αα positive
A	5.5-7	7.5YR 3/2	100					Sil	Andic material - greasy
Bg	7-16	2.5Y 5/1	40	7.5YR 4/6	17		PL/RC	Loam	
		5Y 5/1	43						
2Cg	16-20	5Y 5/1	93	7.5YR	7		PL	Sandy Loam	alluvial sands - fine gravels

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) 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: N/A Depth (inches): N/A

Hydric Soil Present (Y/N): Y

Notes: Strong reaction to alpha alpha dipiridyl throughout all horizons (100%)

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1)	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) Y	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): 1	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 6	
Saturation Present (Y/N): (includes capillary fringe)	Depth (in): 2	EC: 239 at 8.6 pH: 6.27

Notes:

EC 239 @ 8.6°C pH 6.27 Standing water

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__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) 53 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 3 Short shrub (0.5-2m) 8 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 85 Short herb (<1m) 41 Moss-Lichen 0 Floating 0 Submerged 0

Number of Wetland Types (M): 2 **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven _____ Moderately even X

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

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

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

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

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

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

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)__X__ 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** 6.27

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__ 2-3%

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: Brca Shy GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WSHT1006 Field Target: 5039 Date: 6/17/15

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 Abigayle Fisher X

Wetland Scientist (print) Signature / Date

X Bryan Strong X 6/7/15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

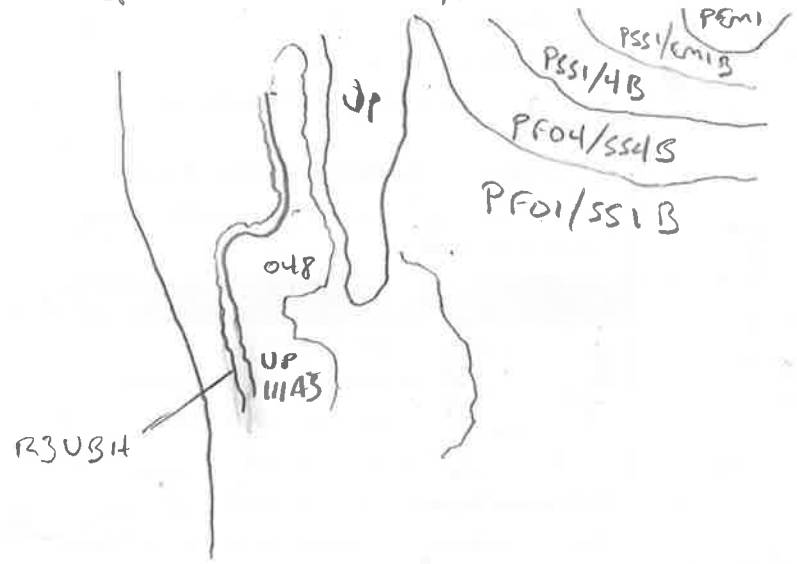
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15048	**Map #:** 25 **Map Date:** 6/4/15
Date: 6/16/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1007	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 732.3		
Latitude: 61° 27 46.2" N	**Longitude:** -150 38 53.82 W			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 6	**Picture No.:** P_W84T1007_veg_veg_p.t_plug		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Stream terrace
Slope (%): 0-3%	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: UIC7	Evidence of Wildlife Use: Yes
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No____	**Is the Sampled Area within a Wetland?** Yes____ No ✓
Hydric Soil Present? Yes____ No ✓	**Wetland Type:** N/A - Upland
Wetland Hydrology Present? Yes____ No ✓	Alaska Vegetation Classification (Viereck): III A 2

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

Stream terrace. Well drained, Ostrich fern forest. Ferns are ~5' tall with sparse understory. No evidence of overbank flooding.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus tremuloides	E*		
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. Sambucus racemosa	10	Y	FacU
2. Alnus	E*		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 2		

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: 92	X 2 =	184
FAC species 1	X 3 =	3
FACU species 10	X 4 =	40
UPL species	X 5 =	
Column Totals: 103	(A)	227 (B)

PI = B/A = 2.2

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Matteuccia struthiopteris	90	Y	FacW
2. Equisetum arvense	1		Fac
3. Streptopus amplexifolius	1		FacU
4. Equisetum pratense	2		FacW
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover: 93			
50% of total cover: 46.5	20% of total cover: 18.6		

Hydrophytic Vegetation Indicators:

- — Dominance Test is > 50%
- X Prevalence Index is ≤3.0
- — Morphological Adaptations[1] (Provide supporting data in Notes)
- — Problematic Hydrophytic Vegetation[1] (Explain)

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

- 0 % Bare Ground
- 0 % Cover of Wetland Bryophytes
- 0 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

* Edge

WETLAND DETERMINATION DATA FORM

SOIL Date 6/8/15 Feature ID W84J1907 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
Oe	0-5								
Bw	5-11	10YR 4/3	60					vfSaL	stratified alluvium
		7.5YR 4/4	40						
BC/A	11-15	10YR 4/1	80					vfSaL	stratified alluvium w/buried surfaces
		7.5YR 2.5/1	20						
BC/A	15-21	7.5YR 4/1	80					vfSaL	"
		7.5YR 2.5/1	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) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N/A

[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: Stratified alluvium. No sign of a water table or overbank flooding on a regular interval. Flooding >5 year return interval.

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)	Notes: No evidence of recent overbank flooding.	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

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

Notes: See Soil 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: W84T1007 Field Target: 15048 Date: 6/8/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Abigayle Fisher | X

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

X Brian Strong | X 6/10/15

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

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 15027	Map #: 233 Map Date: 6/4/15
Date: 6/9/15	Project Name & No.: Alaska LNG 60418403		Feature Id: LW84T1008	
Investigators: Bryan Stroney, Abigayle Fisher				Team No.: LW84
State: Alaska	Region: Alaska	Milepost: 748.6		
Latitude: 61° 20' 19.01" N		Longitude: 150° 55' 44.63"		Datum: WGS84
Logbook No.: 01	Logbook Page No.: 09	Picture No.: P-LW84T1008_veg-veg-pt.plng		

SITE PARAMETERS	
Subregion: Southcentral Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace - Alluvial
Slope (%): 1-3	Local relief (concave, convex, none): Flat to undulating
Pre-mapped Alaska LNG/NWI classification: UIB2, IIB2	Evidence of Wildlife Use: Yes, 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_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IB2, IIB2

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

Not quite enough white spruce to call IC2 here. Large BETNEO with understory of Alder VIBEDU, MENFER, ROSACI, CALCAN, EQUARV, EQUSYL. A few small streams (R4SB) meander through the terrace. Pockets of ground saturated to the surface but, probably <10% wetland inclusions, in immediate area.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	55	Y	Fac
2. Picea glauca	4		FacU
3.			
4.			

Total Cover: 59

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Viburnum edule	12	Y	FacU
2. Rosa acicularis	1		FacU
3. Menziesia ferruginea	1		FacU
4. Alnus ssp.	2		Fac
5. Ribes sp	T		
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: 3 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: —	X 2 = —
FAC species 143	X 3 = 429
FACU species 40	X 4 = 160
UPL species —	X 5 = —
Column Totals: 183 (A)	589 (B)

PI = B/A = 3.2

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	15		FacU
2. Equisetum sylvaticum	15		Fac
3. Equisetum arvense	20	Y	Fac
4. Calamagrostis canadensis	55	Y	Fac
5. Cornus suecica	1		Fac
6. Gymnocarpium dryopteris	1		FacU
7. Streptopus amplexifolius	T		FacU
8. Athyrium cyclosorum	T		FacU
9.			
10.			

Total Cover: 108

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

— Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

~10 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

Soil pit EC 60 at 5.5°C pH 5.2

WETLAND DETERMINATION DATA FORM

SOIL Date 6/9/15 Feature ID W847T1008 Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-4								
A 4-7	7.5YR 2.5/2	100					SiL	near saturation
Bw1 7-14	10YR 4/3	86	7.5YR 3/4	12	C	PL	SiL	7.5YR 3/4 soft massos, saturated
			10YR 4/2	2	D	M		
Bw2 14-20	7.5YR 3/2	100					vfSaL	Poor soil structure
BC 20-24+	10YR 4/3 + 7.5YR 3/2	60/40					vfSaL	Massive structure

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

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

[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
Below 20" poor structure may act as a weak aquitard

Hydric Soil Present (Y/N): N

Notes: Pockets of preferential flow/free water starting at 7" from organic surface. Saturated below 8 inches. Soil pit slowly filling up. No positive reaction to alpha alpha observed. Water in pit may rise to ~18" eventually. Andic material mixed with stratified 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)
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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N-M	Notes: A few small stream features in the immediate area.	
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-M	Depth (in): 18		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 8	EC: 60ms @ 5.5°C pH 5.2 Soil pit	

Notes: Water table - preferencial flow in parts of profile

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: W84T1008 Field Target: 15027 Date: 6/9/15

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

1. **Site Description**

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

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [ ] 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 Abigayle Fisher

Wetland Scientist (print)

X [signature]

Signature / Date

X Bryan Strong

Field Crew Chief (print)

X [signature] 6/9/15

Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____			**Field Target:** 150ft	**Map #:** 233 **Map Date:** 6/4/15
Date: 6/9/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1009	
Investigators: Bryan Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 745.5		
Latitude: 61° 20' 23.16"	**Longitude:** 150° 55' 10.17"		**Datum:** WGS84	
Logbook No.: G1	**Logbook Page No.:** 10	**Picture No.:** P_W84T1009_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Southcentral lowlands	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 1-2%	Local relief (concave, convex, none): Concave, Hummocky - Moderate
Pre-mapped Alaska LNG/NWI classification: PF04B	Evidence of Wildlife Use: Moose / game trail
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) low snow year	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS4/EM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 11A2, 1A2

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



See field map for mapping notes

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Mariana	Present/Edge	FacW	
2.			
3.			
4.			

Total Cover: —

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	37	Y	FacW
2. Alnus incana	3		Fac
3. Rhododendron tomentosum	7		FacW
4. Empetrum nigrum	7		Fac
5. Vaccinium oxycoccus	1		OBL
6. Vaccinium uliginosum	1		Fac
7. Betula nana	1		Fac
8. Rhododendrum groenlandicum	3		Fac
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: 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:	6	X 1 =	6
FACW species:	48	X 2 =	96
FAC species	20	X 3 =	60
FACU species	—	X 4 =	—
UPL species	—	X 5 =	—
Column Totals:	74 (A)		162 (B)

PI = B/A = 2.19

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	4		FacW
2. Carex rariflora	5	Y	OBL
3. Equisetum sylvaticum	5	Y	Fac
4.			
5.			
6.			
7.			
8.			
9. Sphagnum sp	70	? Mosses not	
10. Hylocomium splendens	30	? included in calculations	

Total Cover: 14

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

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

80 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

— % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/9/15	Feature ID W84T1006	Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-24							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) N/A

[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: Could not reach mineral soil

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) 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) N/A	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: Moderate hummocks	
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): 2"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 58 at 9.4°C	pH: 4.9

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 37 Tall shrub (2-6m) 3 Short shrub (0.5-2m) 49 Dwarf shrub (<0.5m) 8 Tall herb (≥1m) 0 Short herb (<1m) 14 Moss-Lichen 80 Floating 0 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_____ 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_X_ Small Scattered Patches_____ Continuous Cover_____

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_ **pH Reading** 4.9

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_X_ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1009 Field Target: 15028 Date: 6/9/15

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?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date**

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

X — **Signature / Date** 6/9/15

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X	Access Road (explain)____	Other (explain)____	Field Target: 5029	Map #: 232 Map Date: 6/4/15
Date: 6/9/2015	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1010	
Investigators: Bryan Strong, Abagayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 745.1		
Latitude: 61° 20' 23.83" N	Longitude: 150° 54' 54.06"		Datum: WGS84	
Logbook No.: 01	Logbook Page No.: P10	Picture No.: P_W84T1010_veg_veg_pit_plug		

SITE PARAMETERS	
Subregion: Southcentral Lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace - Alluvial
Slope (%): 2 - 3	Local relief (concave, convex, none): Concave - Slight undulating/rolling terrain
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Moose Sign
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) low snow year	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X Marginal No____	Wetland Type: PSS1/FO1B
Wetland Hydrology Present? Yes X No____	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. See soil and hydrology notes. Highly variable area. Moderately wet (slightly concave) microsite but, much wetter sites nearby. Also much drier sites. No reaction to alpha alpha and higher k-Sat (hydraulic conductivity) of alluvial sediments suggest the system is oxygenic. Wetter areas may host reducing conditions. (complicated area driven strongly by topography.

Flat - Slope Complex in area - FC at point indicates Flat HGM.



Very open canopy of paper birch and white spruce with understory of Alder and highbush cranberry. Patches of Devil's Club occur - Thick herb layer of Bluejoint, Lady Fern, Shield Fern and EQUARV, EQUSYL.

Completely wet between W84T1010 WDF and LZ 145.3
Complex between W84T1009 and 010 due to rolling and undulating terrain
A small stream was crossed between 009 and 010 but no data was recorded at the site. Stream was incised ~2', 1.5-2' wide S.L/vfSal substrate, clear running

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	3		FacU
2.			
3.			
4.			
Total Cover: 3 (added to shrub)			
50% of total cover: — 20% of total cover: —			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Alnus ssp.	30	Y	Fac
2. Oplopanax horridus	15	Y	FacU
3. Rosa acicularis	12		FacU
4. Ribes triste	1		Fac
5.			
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: 3 (A)

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species:	X 2 =	
FAC species 136	X 3 =	408
FACU species 46	X 4 =	184
UPL species	X 5 =	
Column Totals: 182	(A)	592 (B)

PI = B/A = 3.25

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Athyrium cyclosorum	10		Fac
2. Calamagrostis canadensis	65	Y	Fac
3. Gymnocarpium dryopteris	12		FacU
4. Equisetum sylvaticum	10		Fac
5. Equisetum arvense	20	Y	Fac
6. Heracleum maximum	1		FacU
7. Dryopteris expansa	3		FacU
8. Streptopus amplexifolius	T		FacU
9.			
10.			
Total Cover: 121			
50% of total cover: 60.5 20% of total cover: 24.2			

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

— Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

SOIL Date 6/9/15 Feature ID W84 1010 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 - 2.5							Hemic	
Bw1	2.5 - 8.5	10YR 4/4	96	7.5YR 3/4	3	C	PL	loam	Field capacity/near saturation
				2.5Y 4/1	1	D	PL		
Bw2	8.5 - 11	2.5Y 5/3	87	7.5YR 4/6	10	C	PL	SiL	concentrations along dead roots/PL and in a solid band at interface with horizon below indicating a prolonged water table here
				5YR 4/6	3	C			
Ab	11 - 12	7.5YR 2.5/1	100						Buried surface
Bw	12 - 20	10YR 4/2	93	5YR 4/4	7	C	PL	Loam	Alluvium

[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) High Watertable

[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 No positive reaction to alpha alpha

Hydric Soil Present (Y/N): Marginal - Yes. Strong evidence of a prolonged watertable above 12 inches

Notes: Alluvium. No positive reaction to alpha alpha observed. Likely oxyaquic conditions. At 11 inches, at the interface with a buried surface, a band of prominant iron staining/concentrat occurs indicating a prolonged watertable at this depth.

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) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N undulating
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): N/A	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 9 - 10"		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 7	EC: 45 µS @ 5.3°C pH 5.63	

Notes: A lot of variability in the area. Undulating to rolling topography appears to create significant variability in where the watertable occurs in the landscape. The system generally appears to be oxyaquic with the wettest microsites likely meeting reducing conditions. Inclusions likely unmappable but strongly topography driven.

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)__0__ Tall shrub (2-6m)__30__ Short shrub (0.5-2m)__31__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __65__ Short herb (<1m) __56__ Moss-Lichen__0__ Floating__0__ Submerged__0__

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

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__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)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.6 Soil pit

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: W84TC010 Field Target: 19029 Date: 6/9/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Abigayle Fisher X

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/7/15

Field Crew Chief (print) Signature / Date

T10N

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____			Field Target: 15065	Map #: 199 Map Date: 6/11/15
Date: 6/10/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T10N	
Investigators: Bryan Stroney, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 704.5		
Latitude: 61°47'22.34"N	Longitude: 150°20'53.84"		Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 12	Picture No.: P_W84T10N_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Southcentral lowlands	Landform (hillslope, terrace, hummocks, etc.): Terrace Backslope
Slope (%): 3-5	Local relief (concave, convex, none): Undulating w/ hummocks and mod
Pre-mapped Alaska LNG/NWI classification: U, 1A1	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) low snow year	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	Is the Sampled Area within a Wetland? Yes_____ No X
Hydric Soil Present? Yes_____ No X	Wetland Type: U
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): 1A2

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

Somewhat excessively drained loamy sand spodisol. Mature black spruce 30-50' tall with understory of ericaceous community, dwarf birch, a few Bebb willow and diamond willow. Feather moss >90% cover. A few mature paper birch in area.

Sketch in notebook.

TI 011

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	30	Y	FacW
2. Betula neoalaskana	3		Fac
3.			
4.			

Total Cover: 33

50% of total cover: 16.5 20% of total cover: 6.6

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	15	Y	Fac
2. Rhododendron groenlandicum	4		Fac
3. Vaccinum uliginosum	8		Fac
4. Vaccinum vitis-idaea	10	Y	Fac
5. Betula neoalaskana	3		FacU
6. Salix bebbiana	T		FacW
7. Spirea stevenii	T		FacU
8. Picea mariana	10	Y	FacW
9. Salix pulchra	T		FacW

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 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:	40	X 2 =	80
FAC species	60	X 3 =	180
FACU species	3	X 4 =	12
UPL species	—	X 5 =	—
Column Totals:	103	(A)	272 (B)

PI = B/A = 2.6

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus suecica	20	Y	Fac
2. Equisetum sylvaticum	T		Fac
3. Geocaulon lividum	T		FacU
4. Dryopteris expansa	T		FacU
5. Calamagrostis lapponica	T		Fac
6. Spiraea annotinum	T		FacU
7.			
8.			
9.			
10.			

Total Cover: 20

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1 011

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/15 Feature ID W84T1011 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
O1 0-1								
A 1-2	7.5yr 2.5/3	100					SiL	
E 2-3	10yr 4/1	100					SiL	
Bh 3-5	7.5yr 3/3	100					SaL	
Bhs 5-11	7.5yr 4/6	100					Loamy Sand	
11-21	10yr 4/4	100					Loamy Sand	
BC 21-24	10yr 4/4						Loamy Sand	

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

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

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

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

Notes:

T1011

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: W84T011 Field Target: 15065 Date: 6/10/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

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

X Abigayle Fisher — Wetland Scientist (print)

X — Signature / Date 6/10/15

X — Field Crew Chief (print)

X Brian Strong — Signature / Date 6/10/15

T1012

WETLAND DETERMINATION DATA FORM

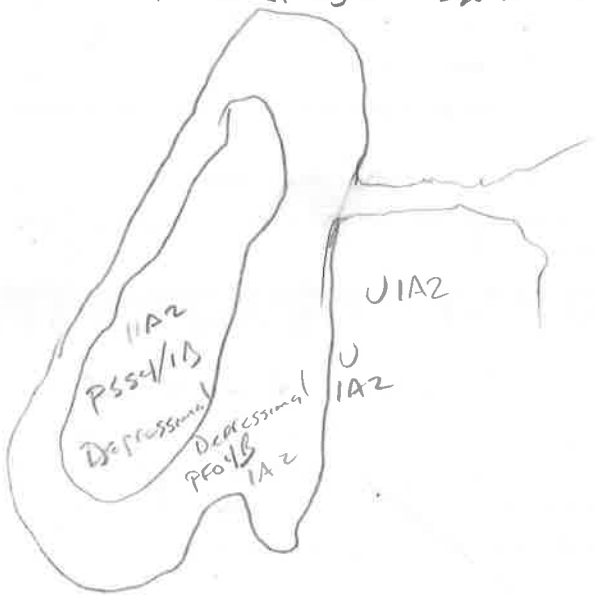
SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15064	**Map #:** 199 **Map Date:** 6/4/15
Date: 6/10/15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W84T1012	
Investigators: Bryan Strong, Abigayle Fisher			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 704.6	
Latitude: 61°47'21.69"N	**Longitude:** 150°20'59.45"		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 12	**Picture No.:** P-W84T1012-VEG-VEG_PIT_PLUG	

SITE PARAMETERS	
Subregion: Southcentral lowlands	Landform (hillslope, terrace, hummocks, etc.): Lowland
Slope (%): 2-3	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS4/1B 11A3, 11C2	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) low snow year	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:** PF04B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 1A2

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

Black spruce mostly 25-30' high evenly spaced with understory of black spruce saps. Approximately 85% sphagnum 15% Feater moss.



T012

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	30	Y	FacW
2.			
3.			
4.			

Total Cover: 30

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	15	Y	FacW
2. Rhododendron tomentosum	6	Y	FacW
3. Betula nana	3		Fac
4. Vaccinium vitis-idaea	2		Fac
5. Vaccinium uliginosum	2		Fac
6. Vaccinium oxycoccus	1		OBL
7.			
8.			
9.			

Total Cover: 35

50% of total cover: 16.5 20% of total cover: 6.6

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	1 X 1 =	1
FACW species:	52 X 2 =	104
FAC species	10 X 3 =	30
FACU species	– X 4 =	–
UPL species	– X 5 =	–
Column Totals:	63 (A)	135 (B)

PI = B/A = 2.14

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	1		Fac
2. Rubus chamaemorus	1		FacW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 2 (added to shrub)

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤3.0

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

– Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

85 % Cover of Wetland Bryophytes

99 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1012

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/K Feature ID WR4T1012 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	0-4							Fibric	Field capacity
Oe	4-9.5							Hemic	saturated
Bh	9.5-12	7.5YR 3/2	100					Silt Loam	Platy structure
Bh	12-20	7.5YR 3/2	90					Silt Loam	massive structure - frozen in place
		7.5Y 2.5/1	10						

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]	
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N	
Histic Epipedon (A2) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N	
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N	
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N	
Thick Dark Surface (A12) N		Other (Explain in Notes) 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: Platy + Massive Silt Loam Depth (inches): 9.5"

Hydric Soil Present (Y/N): Y

Notes: No positive reaction to alpha alpha. Saturation/watertable perched over platy and massive silt loam. Interior of soil peds moist but not saturated. Flat or depressional Hgm here. Small amounts of ice persist in the organic layer.

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 - marginal
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): 1	**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: 650 @ 4.9°C pH 3.9 Standing water

Notes: Koto river south of point

EC 44 @ 1.7°C pH 3.75 (soil pit) EC 65 µS in standing water

T1012

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) 30 Sapling (<5 dbh, <6m tall) 18 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 8 Dwarf shrub (<0.5m) 5 Tall herb (≥1m) 0 Short herb (<1m) 2 Moss-Lichen 99 Floating 0 Submerged 0

Number of Wetland Types (M): 1 **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 3.9

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8/T1012 Field Target: 15064 Date: 6/10/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/10/15

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

X — **Signature / Date** 6/10/15

T1013

WETLAND DETERMINATION DATA FORM

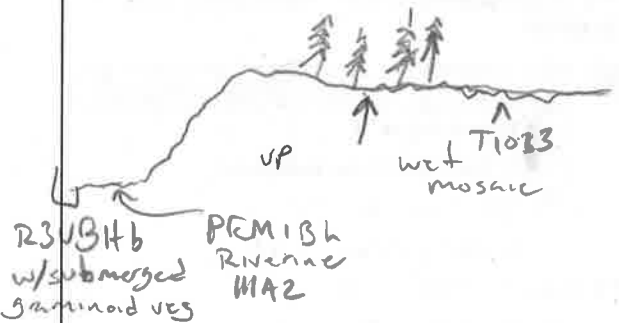
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: ~~1505~~	Map #: 205 Map Date: 6/4/15
Date: 6/10/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1013
Investigators: Bryan Strong, Abrayale Fisher			Team No.: W8C1
State: Alaska	Region: Alaska	Milepost: 715.5	
Latitude: 61°40' 08.40" N	Longitude: 150° 29' 23.30"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 12	Picture No.: P_W84T1013_veg veg-pit plug	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2-3	Local relief (concave, convex, none): Flat, Hummocky moderate
Pre-mapped Alaska LNG/NWI classification: U1C2	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) low slow year	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 marginal X No_____	**Wetland Type:** PF04B
Wetland Hydrology Present? Yes Y No_____	Alaska Vegetation Classification (Viereck): 1A2

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

Marginal site. Very dense massive silt deposit perches water in the area. Standing water occurs in a few microsites in the plot and throughout the area. The site chosen for the soil pit was intermediate between a wetter microsite with obvious concavity and a drier site with more convexity and higher percentage of feather moss. Sphagnum moss = ~65-70% cover with feather mosses in drier microsites. Twayblade orchid in plot and throughout area. No reaction to alpha alpha. Gleyed pores suggests reduction occurs seasonally.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana	40	Y	FacW
2.			
3.			
4.			
Total Cover: 40			
50% of total cover: 20	20% of total cover: 8		
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula nana	3		Fac
2. Vaccinium vitis-idaea	1		Fac
3. Vaccinium uliginosum	7	Y	Fac
4. Betula neoalaskana	4	Y	FacU
5. Vaccinium oxycoccus	1		OBL
6. Rhododendron groenlandicum	T		Fac
7. ~~Eriocaulon lividicum~~ (TSS)	~~T~~		~~FacW~~
8.			
9. water T	T		
Bare T			
Total Cover: 16			
50% of total cover: 8	20% of total cover: 3.2		

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	1	X 1 =	1
FACW species:	42	X 2 =	84
FAC species	19	X 3 =	57
FACU species	4	X 4 =	16
UPL species	—	X 5 =	—
Column Totals:	66 (A)		158 (B)

PI = B/A = 2.4

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	2	Y	FacW
2. Equisetum sylvaticum	6	Y	Fac
3. Cornus Suecica	1		Fac
4. Dryopteris expansa	T		FacU
5. Calamagrostis canadensis	1		Fac
6. Geocaulon lividicum	T		FacW
7. Listera cordata			
8.			
9.			
10.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 2		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

70 % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

T % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1013

WETLAND DETERMINATION DATA FORM

SOIL Date 6/10/15 Feature ID W84T1013 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
O1 0-3							Fibric	
AOg 3-7	7.5yr 2.5/1	100					MkS.L	
Bh 7-8.5	7.5yr 3/2	100					S.L	
CB 8.5-12	5Y 6/2		N 5/0	3	D	PL	Silt	Massive Parent Material colors
B			10yr 4/3	4	C	PL/RC		Few cavisetum roots,
C 12-22	5Y 6/2	100					Silt	Parent material colors - massive very firm

[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	A15 - close but too few gleyed pore linings to invoke.	Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) A15

[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 Silt Very firm Depth (inches): 8.5"

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

Notes: Soil pit dug 10' East of where the GPS point was taken. Preferential flow (small amount) of free water passing through pore linings/ped structure with pockets of more saturated soil. Gleyed pore linings as dead root channels. No positive 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) NK	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) NK	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): X		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): –	Wetland Hydrology Present (Y/N): Y
~~Water Table Present~~ Free water (Y/N): Y	Depth (in): 12" - free water	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): Saturation between soil peds at 8.5	EC: 35 @ 13.1 ms PH 4.58

Notes: Interior of soil peds not saturated. Some free water bleeding from between ped faces. Gleyed pores in dead root channels ~3% - No positive αα reaction at time of site visit. Soil pit 4.5' EC 26 ms @ 6.2

T1013

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)__40__ Sapling (<5 dbh, <6m tall)__4__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__14__ Dwarf shrub (<0.5m)__2__ Tall herb (≥1m)__1__ Short herb (<1m)__9__ 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_____ 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)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 4.58

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: 6/10/15 GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1013 Field Target: 15057 Date: 6/10/15

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

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [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)?

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

X Abigayle Fisher X 6/10/15

Wetland Scientist (print) Signature / Date

X Bryan Strong X 6/10/15

Field Crew Chief (print) Signature / Date

T1014

WETLAND DETERMINATION DATA FORM

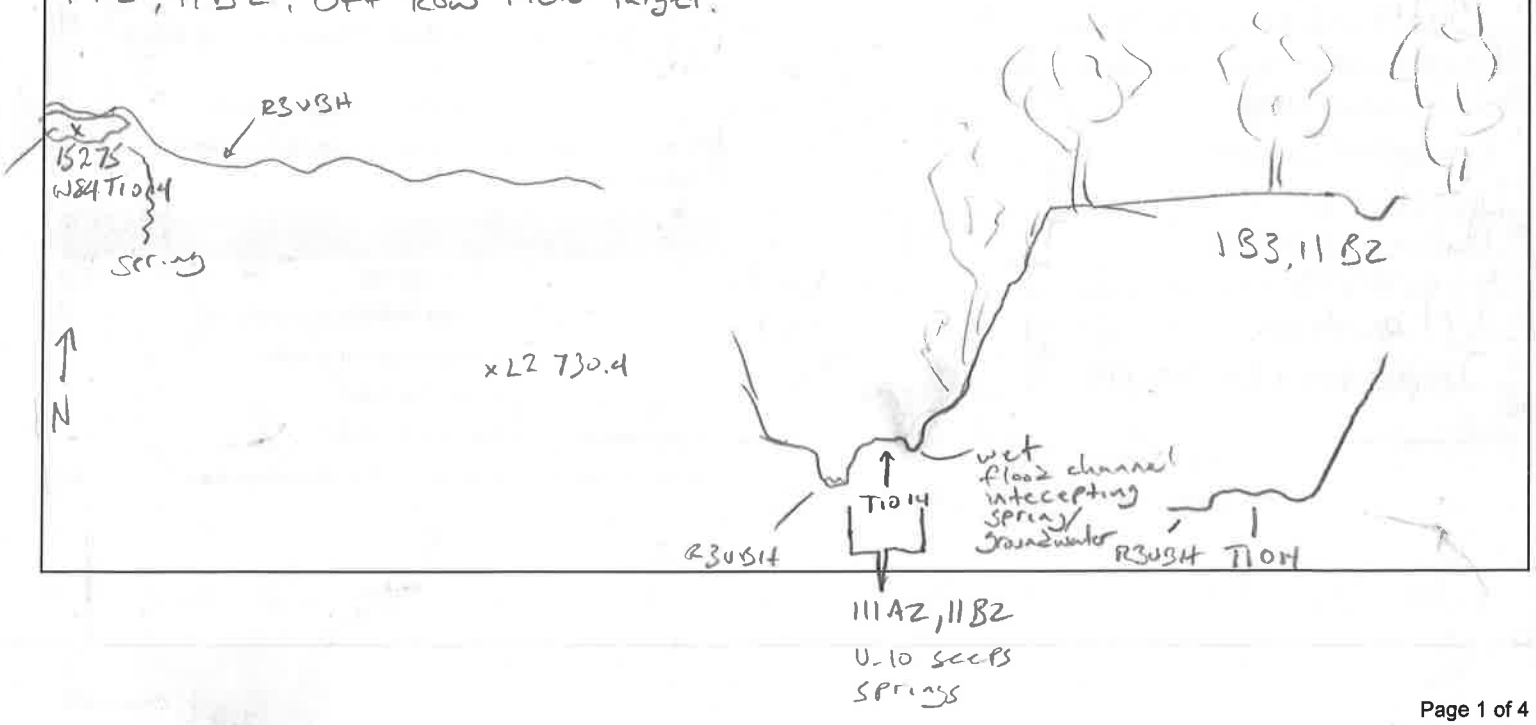
SITE DESCRIPTION				
Survey Type: Centerline___ Access Road (explain)___ Other (explain) X			Field Target: 15275	Map #: ___ Map Date: 6/4/15
Date: 6/16/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1014	
Investigators: Briana Strong Abby Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 130.3 - off ROW		off ROW target
Latitude: 61°29'25.20"		Longitude: 150°38'13.46"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 20	Picture No.: P_W84T1014_VEG_VEG_PIT_PLUG		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Gulch, Stream terrace
Slope (%): 3 - 6	Local relief (concave, convex, none): Undulating - flood channels on terrace
Pre-mapped Alaska LNG/NWI classification: 1B2, 11B2	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No___ (if no explain in Notes) low snow year	Are "Normal Circumstances" present: Yes X No___ (If no, explain in Notes.)
Are Vegetation___, Soil___, or Hydrology___ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation___, Soil___, or Hydrology___ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No___	Is the Sampled Area within a Wetland? Yes___ No X
Hydric Soil Present? Yes___ No X	Wetland Type: Upland
Wetland Hydrology Present? Yes X No___	Alaska Vegetation Classification (Viereck): 111A2, 11B2

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

Many springs throughout area near stream and surrounding LZ 730.4 - Subtle concave/swale features on areas surrounding LZ 730.4 are wet Most of area would be better characterized as 1B2, 11B2 rather than 1B2, 11B2, Off ROW Field Target.



T1014

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	2	Y	Fac
2.			
3.			
4.			

Total Cover: 2 (added to shrub)

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana ssp. tenuifolia	8	Y	Fac
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 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: 100	X 2 =	200
FAC species 18	X 3 =	54
FACU species 18	X 4 =	72
UPL species	X 5 =	
Column Totals: 136 (A)		326 (B)

PI = B/A = 2.39

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Matteuccia struthiopteris	95	Y	FacW
2. Gymnocarpium dryopteris	5		FacU
3. Heracleum maximum	12		FacU
4. Equisetum pratense	5		FacW
5. Equisetum arvense	8		Fac
6. Galium boreale	T		FacU
7. Streptopus amplexifolius	T		FacU
8. Urtica dioica	1		FacU
9. Impatiens noli-tangere	T		FacW
10.			

Total Cover: 126

50% of total cover: 63 20% of total cover: 25.2

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is > 50%
- ✓ Prevalence Index is ≤ 3.0
- — Morphological Adaptations[1] (Provide supporting data in Notes)
- — Problematic Hydrophytic Vegetation[1] (Explain)

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

- 0 % Bare Ground
- 0 % Cover of Wetland Bryophytes
- 0 Total Cover of Bryophytes
- 0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1014

WETLAND DETERMINATION DATA FORM

SOIL Date 6/16/15 Feature ID T1014 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	0-3							Hemic	
AC	3-5	10YR 4/3	100					LSa	
C1	5-9	10YR 5/3	100					Sa2	Single Grain
C2	9-20	2.5Y 5/3	100					Coarse Sand	Single Grain 1/3 of pit is a large stone

[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: Alluvial sand deposits. Adjacent hillside has a spring. A swale/flood channel at the base of the hillside intercepts groundwater from a spring and is wet. This feature is very small (~10' wide) and may not have connectivity to the creek

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) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Stream adjacent to plot Boulder, Stone, Cobble substrate. 15 feet wide 6-10" deep Channel incised ~2'. No evidence of regular overbank flooding. Seers/springs throughout area. Stream is R3UBH	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 6-10" stream	**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:** N/A

Notes:

T1014

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: Brian Shay GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W8ITIO14 Field Target: 15275 Date: 6/16/15

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

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Abigayle Fisher — X

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

X Bryan Strong — X

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

T1015

WETLAND DETERMINATION DATA FORM

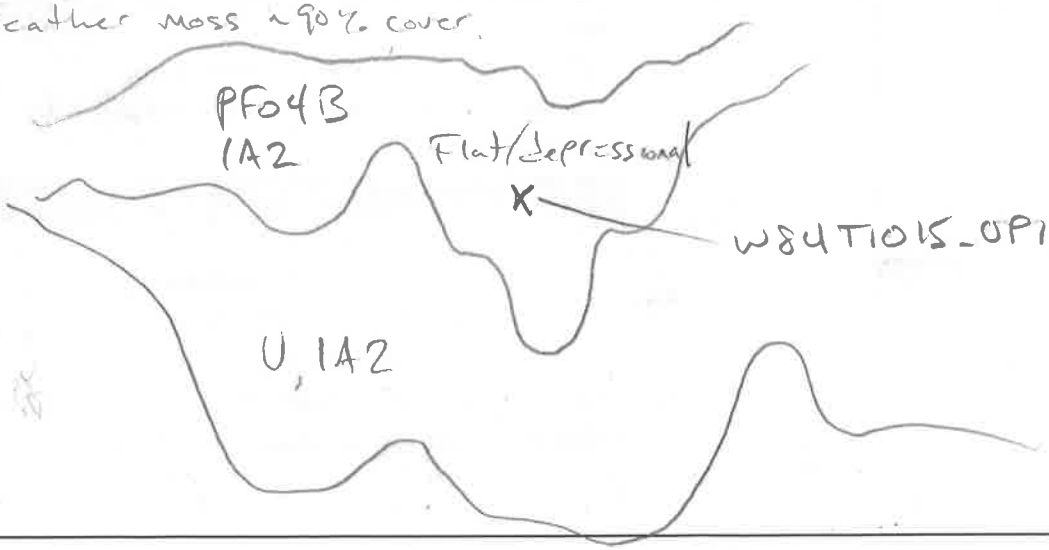
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15055	Map #: 207 Map Date: 6/4/15
Date: 6/11/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1015
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska U U	Milepost: 716.7	
Latitude: 61° 39' 09.57"	Longitude: 150° 24' 17.65"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 13	Picture No.: P_W84T1015_veg_veg_pit_plug	

SITE PARAMETERS			
Subregion: Southcentral		Landform (hillslope, terrace, hummocks, etc.): Terrace	
Slope (%): 2-3%		Local relief (concave, convex, none): Undulating	
Pre-mapped Alaska LNG/NWI classification: U 1 C2		Evidence of Wildlife Use: Moosebed	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) low snow year		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 Y		Wetland Type: Upland	
Wetland Hydrology Present? Yes____ No X		Alaska Vegetation Classification (Viereck): 1 C2	

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

Mostly black spruce (30-40') mixed with birch (60+') with scattered white spruce (80') Aspen (60-70') and very large Bebb willow trees (50'). Scattered birch saplings in the understory with VACULI, VACVIT, LINBOR, CORSUE, Heart-leaved twayblade orchid. Somewhat excessively drained spodisol. Undulating pit/mound topography Feather moss ~90% cover.



U 1C2
X W84T1015 WDF
U; 1C2

T1015

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: 35

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

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium vitis-idaea	12	Y	Fac
2. Rosa acicularis	2		FacU
3. Vaccinium uliginosum	5		Fac
4. Betula neoalaskana	15	Y	Fac
5. Viburnum edule	T		FacU
6. Salix scouleriana			Fac AF
7. Linnaea borealis	T		FacU
8. Salix bebbiana	20	Y	Fac
9.			

Total Cover: 54

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: —	X 1 = —
FACW species: 35	X 2 = 70
FAC species 72	X 3 = 216
FACU species 2	X 4 = 8
UPL species —	X 5 = —
Column Totals: 109 (A)	294 (B)

PI = B/A = 2.7

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Streptopus amplexifolius	T		FacU
2. Chamerion angustifolium	T		FacU
3. Cornus Suecica	20	Y	Fac
4. Rubus pedatus	T		Fac
5. Geocaulon lividum	T		FacU
6. Equisetum arvense	T		Fac
7. Trientalis europaea	T		FacU
8. Neottia cordata	T		FacU
9. Equisetum sylvaticum	T		Fac
10.			

Total Cover: 20

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

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

98 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T015

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/11/15	Feature ID [illegible] 015	Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
Oi 0-3								
Bw/Bh 3-7.5	10yr 3/6	25					SiL	
E 7.5-9.5	10yr 4/4	75						
C 7.5-9.5	2.5y 6/1	100					SiL	charcoal concentrated near top horiz
Bs 9.5-14	10yr 5/6	100					vfSaL	
BC 14-20	2.5y 5/4	80					vfSaL	2.5y 6/3 ea2 matrix color
C 20-22+	5y 5/3	100					fine Sand	Parent material - alluvium

[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
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: No saturation. Somewhat excessively drained Spod-sol

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:

T1015

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: W84T1015 Field Target: 15055 Date: 6/11/15

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~~ Form?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date**

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

X — **Signature / Date** 6/11/15

T1016

Vegetation Classification Data Form

Site Description		
Date: 6/11/15	Project Name & #: Alaska LNG 26221306	Field Target: 150 20
Investigators: Bryan Stroney, Abigayle Fisher		Feature ID: W84T1016
Latitude: 61° 17' 59.09"	Longitude: 151° 02' 07.17" W	Datum: WGS84
Logbook #: 1	Logbook Page #: 14	Picture #: P_W84T1016_veg-veg-pit-plug

Location Description: Open Mixed White spruce Paper birch forest with thick understory of Menziesia (3-4' tall) and some Vaccinium ovalifolium. Terrace is ~3' above depressional wetland at LZ-150.1 to the north. Abrupt wetland boundary.

Common Species Observed (Scientific Name)

Picea glauca T (~70')	20%	Vaccinium ovalifolium S	5%
Betula neoalaskana T (60')	15%	Cornus suecia H	12%
Picea mariana - Sap T	5%	Rubus pedatus H	3%
Menziesia ferruginea S (3-4')	65%	Spinulum annotinum H	T
Percent Cover of Dominant Structure Level:	35%	Dryopteris expansa H	T

Habitat Description: No evidence of moose sign. Squirle middens in area. Passerine songbirds, Gyrfalcon habitat? Very open mature mixed forest canopy

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

I C 2	II C 2	

Notes: Forested, needleleaf, open needleleaf forest

Terrace. Somewhat excessively drained. Well developed Spodisol with loamy sands

Field Crew Chief: Bryan Strong Field Scientist/Technician



PSS1/EM1B
IID2, IIIA3

PSS4/FO4B

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

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

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

1a. Trees over 3 meters (10 ft) tall are present and have a canopy cover of 10 percent or more ..... I. Forest 2

1b. Trees over 3 meters (10 ft) tall are absent or nearly so. Less than 10 percent cover. (Dwarf trees, less than 3 meters [10 ft] tall may be present and abundant 7

I. Forest

2a. Over 75 percent of tree cover contributed by needleleaf (conifer) species ..... I.A Needleleaf forest 3

2b. Less than 75 percent of tree cover contributed by needleleaf (conifer) species 4

3a. Tree canopy of 60-100 percent cover ..... I.A.1 Closed needleleaf forest

3b. Tree canopy of 25-59 percent cover ..... I.A.2 Open needleleaf forest

3c. Tree canopy of 10-24 percent cover ..... I.A.3 Needleleaf woodland

4a. Over 75 percent of tree cover contributed by broadleaf species ..... I.B Broadleaf forest 5

4b. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover 6

5a. Tree canopy of 60-100 percent cover ..... I.B.1 Closed broadleaf forest

5b. Tree canopy of 25-59 percent cover ..... I.B.2 Open broadleaf forest

5c. Tree canopy of 10-24 percent cover ..... I.B.3 Broadleaf woodland

6a. Tree canopy of 60-100 percent cover ..... I.C.1 Closed mixed forest

6b. Tree canopy of 25-59 percent cover ..... I.C.2 Open mixed forest

6c. Tree canopy of 10-24 percent cover ..... I.C.3 Mixed woodland

7a. Vegetation with at least 25 percent cover of erect to decumbent shrubs or with at least 10 percent cover of dwarf trees (less than 3 meters [10 ft] tall) 8

7b. Vegetation herbaceous (may have up to 25 percent shrub cover) 15

II. Scrub

8a. Vegetation with at least 10 percent cover of dwarf trees ..... II.A Dwarf tree scrub 9

8b. Vegetation with at least 25 percent cover of shrubs and less than 10 percent cover of dwarf trees 10

9a. Dwarf tree canopy of 60-100 percent cover ..... II.A.1 Closed dwarf tree scrub

9b. Dwarf tree canopy of 25-59 percent cover ..... II.A.2 Open dwarf tree scrub

9c. Dwarf tree canopy of 10-24 percent cover ..... II.A.3 Dwarf tree scrub woodland

10a. Shrubs more than 1.5 meters (5 ft) tall ..... II.B Tall scrub 11

10b. Shrubs less than 1.5 meters (5 ft) tall 12

11a. Shrub canopy cover greater than 75 percent ..... II.B.1 Closed tall scrub

11b. Shrub canopy cover of 25-74 percent ..... II.B.2 Open tall scrub

12a. Shrubs 20 centimeters to 1.5 meters tall ..... II.C Low scrub 13

12b. Shrubs under 20 centimeters in height ..... II.D Dwarf scrub 14

13a. Shrub canopy cover greater than 75 percent ..... II.C.1 Closed low scrub

13b. Shrub canopy cover of 25-74 percent, or as low as 2 percent if little or no other vegetation cover present ..... II.C.2 Open low scrub

14a. Dryas species dominant in the dwarf shrub layer ..... II.D.1 Dryas dwarf scrub

14b. Ericaceous species dominant in the dwarf shrub layer ..... II.D.2 Ericaceous dwarf scrub

14c. Willow species dominant in the dwarf scrub layer ..... II.D.2 Willow dwarf scrub

III. Herbaceous

15a. Terrestrial vegetation, or if growing in the water, dominated by emergent vegetation 16

15b. Dominant vegetation growing submerged in water or floating on the water surface, but not emerging above the water ..... III.D Aquatic herbaceous 21

16a. Grasses, sedges, or rushes (graminoid) plants dominant ..... III.A Graminoid herbaceous 17

16b. Forbs or bryophytes dominant 18

17a. Grasslands of well-drained, dry sites, such as south-facing bluffs, old beaches, and sand dunes. Typically (but not always) dominated by *Elymus* spp., *Festuca* spp., and *Deschampsia* spp. ..... III.A.1 Dry graminoid herbaceous

17b. On moist sites, but usually not with standing water. Usually dominated by *Calamagrostis* spp., *Carex* spp. or *Eriophorum* spp.; tussocks often present ..... III.A.2 Mesic graminoid herbaceous

17c. On wet sites, standing water present for part of the year; dominated by either sedges or grasses; includes wet tundra, bogs, marshes, and fens ..... III.A.3 Wet graminoid herbaceous

18a. Vegetation dominated by forbs (broadleaf herbs, ferns, or horsetails) ..... III.B Forb herbaceous 19

18b. Vegetation dominated by mosses or lichens ..... III.C Bryoid herbaceous 20

19a. On dry sites, usually rocky and well drained; mostly tundra sites ..... III.B.1 Dry forb herbaceous

19b. On moist sites but without standing water, mostly within forested areas ..... III.B.2 Mesic forb herbaceous

19c. On wet sites, usually with standing water for part of the year ..... III.B.3 Wet forb herbaceous

20a. Vegetation cover dominated by mosses ..... III.C.1 Bryoid moss

20b. Vegetation cover dominated by lichens ..... III.C.2 Bryoid lichen

21a. Vegetation submerged or floating in fresh water ..... III.D.1 Freshwater aquatic herbaceous

21b. Vegetation submerged or floating in brackish water ..... III.D.2 Brackish water aquatic herbaceous

21c. Vegetation submerged or floating in salt water ..... III.D.3 Marine aquatic herbaceous

Vegetation Classification Data Form QA/QC Checklist

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

Feature ID: WSCTT1016 Field Target: 15020 Date: 6/11/15

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

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

X Abigayle Fisher X

Field Technician (print) **Signature**

X Brian Strong X 6/11/15

Field Crew Chief (print) **Signature**

T1017

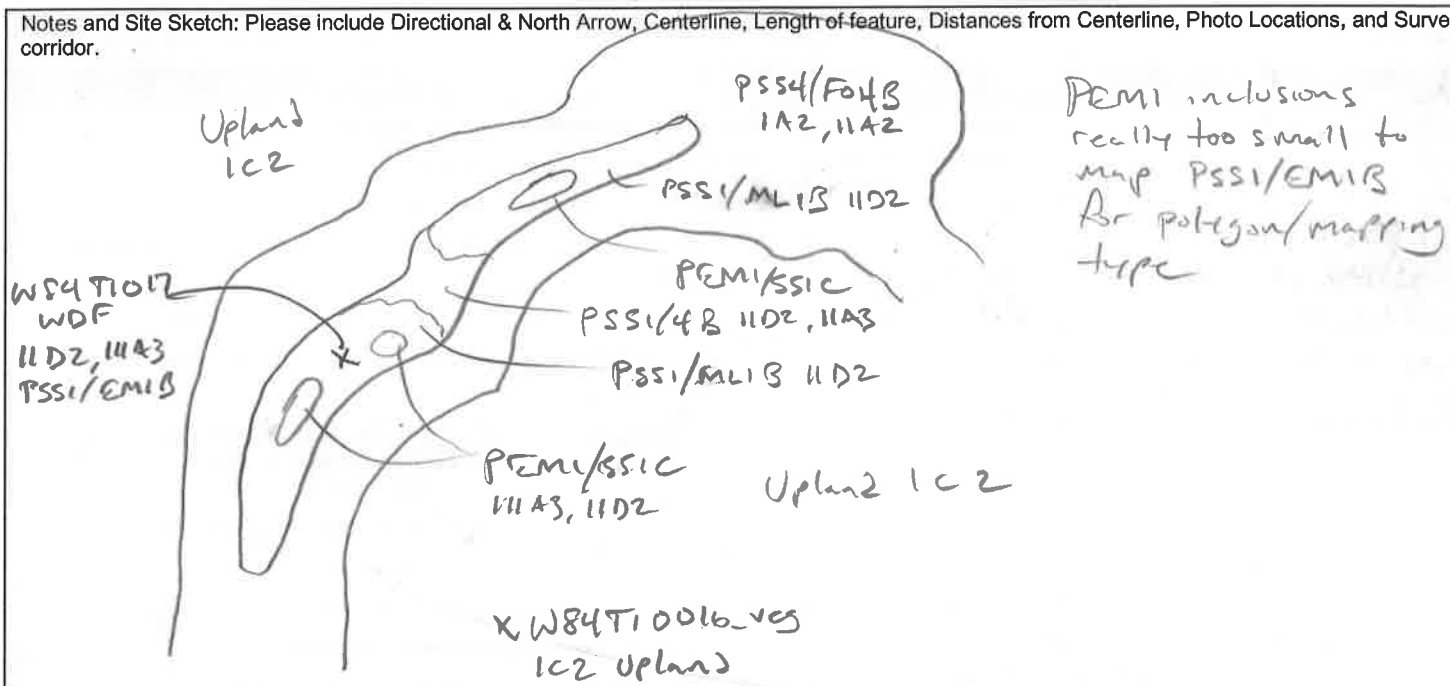
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 150~~20~~	Map #: 237 Map Date: 6/4
Date: 6/11/15	Project Name & No.: Alaska LNG 60418403	Feature Id:	W84T1017
Investigators: Bryan Strong, Abicaude Fisher		Team No.:	W84
State: Alaska	Region: Alaska	Milepost: 750.2	
Latitude: 61° 17' 59.89" N	Longitude: 151° 02' 10.92"	Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 15	Picture No.:	P_W84T1017_VEG_VEG_PIT_PLUG

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-1	Local relief (concave, convex, none): Concave, hummocky-small
Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B IIC IIE	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) low snow year	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1/EM1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): II D2, III A3

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



T107

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea mariana			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. Empetrum nigrum	25	Y	Fac
2. Vaccinum oxycoccus	10	Y	OBL
3. Rhododendrum tomentosum	4		FacW
4. Betula nana	1		Fac
5. Vaccinum uliginosum	T		Fac
6. Picea mariana	T		FacW
7. Andromeda pol. folia	4		FacW
8.			
9.			
Total Cover: 51			
50% of total cover: 25.5	20% of total cover: 10.2		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 48	X 1 =	48
FACW species: 27	X 2 =	54
FAC species 26	X 3 =	78
FACU species —	X 4 =	—
UPL species —	X 5 =	—
Column Totals: 101 (A)		180 (B)

PI = B/A = 1.78

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Drosera rotundifolia	T		OBL
2. Rubus chamaemorus	12	Y	FacW
3. Carex microglochin	35	Y	OBL
4. Eriophorum angustifolium	3		OBL
5. Pedicularis labradorica	T		FacW
6.			
7.			
8.			
9.			
10.			
Total Cover: 50			
50% of total cover: 25	20% of total cover: 10		

Hydrophytic Vegetation Indicators:

X Dominance Test is > 50%

X Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

— % Bare Ground

105 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1017

WETLAND DETERMINATION DATA FORM

SOIL Date 6/11/15 Feature ID W84T1017 Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-8							Fibric	
8-12							Hemic	
12-24							Saprist	

[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: N/A Depth (inches): N/a

Hydric Soil Present (Y/N): Y

Notes: Pockets of vf sand near bottom of pit observed. No restrictive layer in 30'. H_2S

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) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) NA	Microtopographic Relief (D4) N small hummocks
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): 1	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 5	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 25µs @ 8.1°C pH 5.5 soil pit

Notes: 45µs @ 10.7°C pH 5.1 – standing H_2O

T1017

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) 7 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 9 Dwarf shrub (<0.5m) 35 Tall herb (≥1m) 0 Short herb (<1m) 50 Moss-Lichen 100 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_____ Lacustrine Fringe_____ Depressional X Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5) X **pH Reading** 5.1

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 X Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown X Review in GIS (connected below?)

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: Brian Strong GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1017 Field Target: 15020 Date: 6/11/15

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~~ Form?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date**

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

X — **Signature / Date** 6/11/15

T1018

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION					
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____				**Field Target:** 5009	**Map #:** 245 **Map Date:** 6/4
Date: 6/14/15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W84T1018	
Investigators: Bryan Stroner, Abigayle Fisher					**Team No.:** WRL1
State: Alaska	**Region:** Alaska	**Milepost:** 756.6			
Latitude: 61°13'21.90"N		**Longitude:** 151° 07'53.70"			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 16	**Picture No.:** P_W84T1018_VEG_VEG-P1-Pl			

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace - Alluvial
Slope (%): 1 - 3%	Local relief (concave, convex, none): Undulating
Pre-mapped Alaska LNG/NWI classification: VPIC2, IIB2	Evidence of Wildlife Use: No
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** Upland
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IB3, IIB2

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

Plot located under/near a couple of black cottonwood trees (~80' tall) making the percent cover higher than what is representative of the area Poplar ~15% PICGLA ~3% in polygon. IB3, IIB2. A R3UBH stream w/ 2 channels 5.6' wide, 6-10" deep occurs just south of the point at the base of the terrace bluff. Stream has a silty substrate and some large woody debris. Channel is shallow, not deeply incised and slow moving / low gradient.

MAP SAYS R4SB?



T1018

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	35	Y	FacW
2.			
3.			
4.			

Total Cover: 35

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	20	Y	FacU
2. Oplopanax horridus	12	N	FacU
3. Ribes triste	2	N	Fac
4. Alnus incana	20	Y	Fac
5. Rubus idaeus	3	N	FacU
6. Alnus viridis	10	N	Fac
7.			
8.			
9.			

Total Cover: 67

50% of total cover: 33.5 20% of total cover: 13.4

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: 0	X 2 =	0
FAC species 67	X 3 =	201
FACU species 95	X 4 =	380
UPL species 0	X 5 =	0
Column Totals: 162 (A)		581 (B)

PI = B/A = 3.6

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	17	Y	FacU
2. Chamerion angustifolium	1	N	FacU
3. Equisetum arvense	T	N	Fac
4. Streptopus amplexifolius	3	N	FacU
5. Mertensia paniculata	3	N	FacU
6. Galium boreale	T	N	FacU
7. Actaea rubra	T	N	Fac
8. Trientalis europaea	1	N	FacU
9. Athyrium cyclosorum	2	N	Fac
10. Equisetum pratense	33	Y	Fac

Total Cover: 60

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

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

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

T1018

WETLAND DETERMINATION DATA FORM

SOIL Date 6/14/15 Feature ID WRNT1018 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 4-5	10YR 2/1	100					S.L	
Bw/A 5-12	10YR 4/3	90					S.L	Buried surfaces. Andic material
	10YR 2/1							Alluvium
2C 12-21	10YR 4/4	100					VGR Sand	65% gravel - alluvium

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

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

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

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

Hydric Soil Present (Y/N): N

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) 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): N		
Iron Deposits (B5) N			

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

Notes: Stream just south of plot, narrow band of wetland associated

T118

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: W84T1018 Field Target: 15009 Date: 6/14

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/14/15

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

X Brian Strong — **Signature / Date** 6/14/15

T1019

WETLAND DETERMINATION DATA FORM

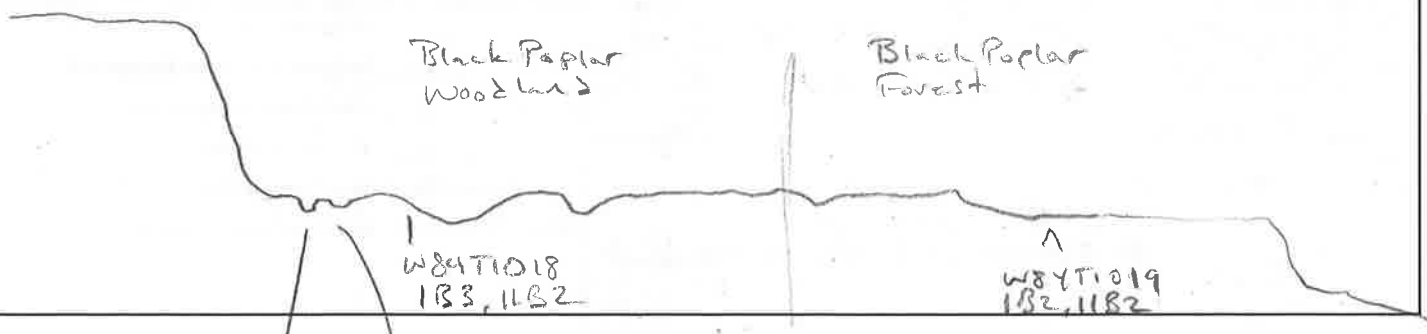
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 5010	Map #: 247 Map Date: 6/4/15
Date: 6/14/15	Project Name & No.: Alaska LNG 26221306		Feature Id: W84 T1019	
Investigators: Bryan Strong Abby Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 756.3		
Latitude: 61 13 30.7 27' accuracy 3-D Rhino		Longitude: 151 07 47.2		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 17	Picture No.: P_W84T1019_VEG_VEG_PIT_PING		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): River Terrace
Slope (%): 2-4	Local relief (concave, convex, none): Rolling, undulating
Pre-mapped Alaska LNG/NWI classification: U, 1C2	~~Soil Map Unit Name:~~ Antimeat: NO
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1B2, 11B3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Many dead PIGLAN throughout area. Once area was 1C2/1C3 Rolling topography created by abandoned flood channels on a low alluvial terrace. No wet ground observed between W84T1018 an W84T1019. Tall open canopy of large poplar mixed with some paper birch and white spruce. Very thick understory of Alder, VIBEDU, ROSACI, OPLHOR with Lady fern, DRYEXP

* Tough pad/GPS failed after last plot. Lat/long recorded w/ Garmin Rhino 120 with 27' 3D accuracy. Site flagged for surveyors to establish GPS point. Site located about 250' from center line - probably west of centerline



T1019

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	20	Y	FacU
2. ~~Alnus viridis ssp. fruticosa~~ (BSS)			~~Fac~~
3. Picea glauca	3		FACU
4. Betula neoalaskana	10	Y	FAC

Total Cover: 33

50% of total cover: 16.5 20% of total cover: 6.6

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Ribes triste	3		Fac
2. Oplopanax horridus	7		FacU
3. Rosa acicularis	2		FacU
4. Alnus viridis fruticosa	37*	Y	FAC
5. Viburnum edule	30*	Y	FacU
6.			
7.			
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: 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	97	X 3 =	291
FACU species	78	X 4 =	312
UPL species	—	X 5 =	—
Column Totals:	175 (A)		603 (B)

PI = B/A = 3.4

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Galium boreale	2		FacU
2. Calamagrostis canadensis	10		Fac
3. Streptopus amplexifolius	3		FacU
4. Dryopteris expansa	8		FacU
5. Gymnocarpium dryopteris	T		FacU
6. Pyrola grandiflora	T		Fac
7. Athyrium cyclosorum	37*	Y	Fac
8. Trientalis europaea	3		FacU
9. Chamerion angustifolium	T		FacU
10. Actaea rubra	T		

Total Cover: 63

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

Hydrophytic Vegetation Indicators:

✓ Dominance Test is > 50%

— Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1019

WETLAND DETERMINATION DATA FORM

SOIL Date 10/15 Feature ID WBT1019 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							fibric	
A/Bw	3-5	10YR 2/2	10					SiL	
		10YR 3/2	90						
Bw	5-10	10YR 4/4	98	7.5YR 4/6	2			SiL	
2C	10-21	10YR 5/4	100					VCB Sand	30% cobble 37% 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: 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: —

Notes:

T1019

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: W8CT1019 Field Target: 1501D Date: 6/14

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Abigail Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/14/15

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

X — **Signature / Date** 6/14/15

T1020

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15033	Map #: 231 Map Date: 6/4/14
Date: 6/15/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1020
Investigators: Brugar Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 744.4	
Latitude: 61° 20' 42.80" N	Longitude: 150° 53' 49.16"		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 18	Picture No.: P_W84T1020_VEG_VEG_PIT_UL	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Alluvial terrace
Slope (%): 1-3	Local relief (concave, convex, none): Rolling, undulating
Pre-mapped Alaska LNG/NWI classification: U; 1B2, 1IB2	Evidence of Wildlife Use: YES - 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: Upland
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1C2. 111A2

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

Alluvial terrace, well drained soils. Patchy canopy. 1C2/1C3 with head high CALCAN and VIBEDU. Thick cover of EQUARV, EQUSYL, EQUPRA mixed with CALCAN. Numerous abandoned channel features throughout the area. Abandoned channels on the upper terrace away from creek at LZ are well drained/non-wetland. Near the creek to the west the canopy is more open and is riverine wetland - PEMI/FOIC.



T1029

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FacU
2. Picea glauca	8	Y	FacU
3.			
4.			

Total Cover: 38

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Viburnum edule	17	Y	FacU
2. Rosa acicularis	T		FacU
3. Ribes triste	2		FacU
4. Picea glauca	2		FacU
5.			
6.			
7.			
8.			
9.			

Total Cover: 21

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

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:	0	X 1 =	0
FACW species:	5	X 2 =	10
FAC species	152	X 3 =	456
FACU species	70	X 4 =	280
UPL species	0	X 5 =	0
Column Totals:	227	(A)	746 (B)

PI = B/A = 3.29

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	90	Y	FacW
2. Equisetum sylvaticum	30	Y	FacW
3. Equisetum arvense	30	Y	FacU
4. Equisetum pratense	5		FacW
5. Chamerion angustifolium	5		FacU
6. Dryopteris expansa	3		FacU
7. Gymnocarpium dryopteris	5		FacU
8. Trientalis europaea	T		FacU
9.			
10.			

Total Cover: 168

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

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

T1020

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/15 Feature ID W84T1020 Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O 0-2.5								
A 2.5-4	10YR 3/2	100					vfSaL	
E 4-6	10YR 5/2	100					S.L	
Bw1 6-9.5	10YR 4/4	100					vfSaL	
Bw2 9.5-23	10YR 5/3	100					S.L	
CB 23-25+	10YR 4/3	100					vfSaL	Alluvium

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

Notes:

T1020

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: [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: WBCT1020 Field Target: 15037 Date: 6/15/15

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

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/15/15

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

X — **Signature / Date** 6/15/15

T1021

WETLAND DETERMINATION DATA FORM

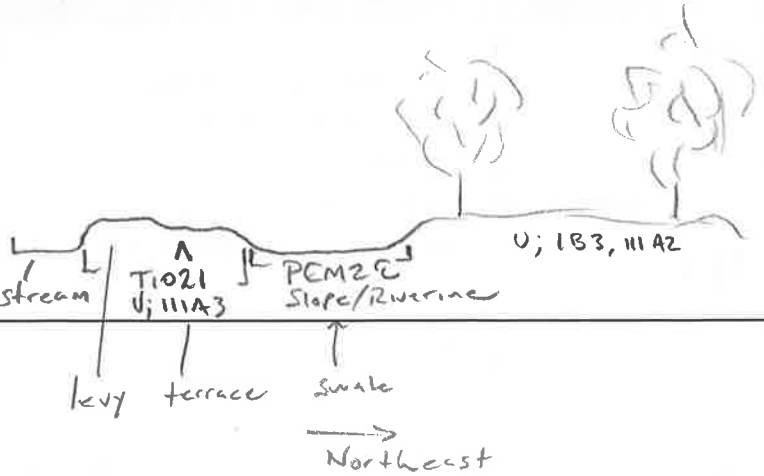
SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 15030	Map #: 231 Map Date: 6/4/15
Date: 6/15/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1021	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 744.9		
Latitude: 61° 20' 28.01"	Longitude: 150° 54' 33.59"		Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 18	Picture No.: P_W84T1021_VEG_VEG_PTP1		

SITE PARAMETERS			
Subregion: Southcentral		Landform (hillslope, terrace, hummocks, etc.): Floodplain/terrace	
Slope (%): 1-3		Local relief (concave, convex, none): Flat to undulating	
Pre-mapped Alaska LNG/NWI classification: U; 1B2, 11B2		Evidence of Wildlife Use: Yes - Moose browse	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) low snow year		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 at point	
Wetland Hydrology Present? Yes X No____		Alaska Vegetation Classification (Viereck): III A2, II B2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Plot in a transitional area between a small creek running red with iron flock and a PEM2C/F backwater wetland. Plot located on natural levy between these features. Very marginal site. Water table likely rises above 12" but site does not meet a hydric soil indicator.

A few large black cottonwood. Thick patches of ostrich fern and EQUARV with EQUFLU scattered. Very close to edge of wetland. Some small flood channels will be wetland inclusions within the plot. Wetland border is ~30-50' North of plot.



T1021

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0 20% of total cover: 0			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Populus balsamifera	1	Y	FacU
2. Alnus incana	3	Y	Fac
3. ~~Asteraceae~~			
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 4 (added to herb)			
50% of total cover: ~~2~~ 20% of total cover: ~~1~~			

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:	7	X 1 =	7
FACW species:	30	X 2 =	60
FAC species	103	X 3 =	309
FACU species	1	X 4 =	4
UPL species	0	X 5 =	0
Column Totals:	141	(A)	380 (B)

PI = B/A = 2.69

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	85	Y	Fac
2. Calamagrostis canadensis	15		Fac
3. Equisetum fluviatile	7		OBL
4. Matteuccia struthiopteris	30	Y	FacW
5. Heracleum maximum	1		FacU
6. Streptopus amplexifolius	1		FacU
7. Chamerion angustifolium	1		FacU
8. Thalictrum pubescens	1		
9. Athyrium cyclosorum	1		
10.			
Total Cover: 141			
50% of total cover: 70.5 20% of total cover: 28.2			

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.

1 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1021

WETLAND DETERMINATION DATA FORM

SOIL	Date	Feature ID	Soil Pit Required (Y/N)
		T1021	Y

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
AC 0-2.5	5Y 4/2	100					SaL	almost SiL
C 2.5-9	5Y 6/2	100					fine Sand	parent Material colors
C 9-11	5Y 5/3						loamy f. sand	parent material color - sand
ACb 11-13	10YR 4/3	94	7.5YR 4/6	3	C	PL	fSaLo	evidence of seasonal watertable
Cg2			5Y 4/1	3	D	RC/PL	fine Sandy loam	weak platy structure
Cg 13-21+	N 4/0	73	5YR 3/4	27	C	PL	loam	field capacity w/ pockets of capillary saturation

[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 - very marginal

Notes: Very strong evidence of a watertable starting at 13 inches with Gleyed N 4/0 and prominent coarse iron concentrations along dead roots - positive alpha alpha reaction starting at 12 inches. Watertable may rise above 12 inches for periods of time but no indicator is met

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) Y
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: evidence of seasonally high watertable Positive alpha alpha starting at 13 inches in sandy material	
Algal Mat or Crust (B4) N	Other (Explain in Notes): Y		
Iron Deposits (B5) N			

Surface Water Present (Y/N):	Depth (in):	
Water Table Present (Y/N): N	Depth (in): NA	**Wetland Hydrology Present (Y/N):** Y
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 13	EC: N/A

Notes:

T1021

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_X_ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_0_ Sapling (<5 dbh, <6m tall)_1_ Tall shrub (2-6m)_3_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _15_ Short herb (<1m) _122_ Moss-Lichen_0_ Floating_0_ Submerged_0_

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

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

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <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)_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_X_ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_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_____ Sediment Observed on Wetland Substrate_X_ Fluvaquent Soils Sediment Created_____

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **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: Bryan Strong GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W847T021 Field Target: 1503() Date: 6/15/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/15/15

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

X — **Signature / Date** 6/15/15

T1022

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION

Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 503	Map #: 231 Map Date: 6/4/15
Date: 6/15/15	Project Name & No.: Alaska LNG 60418403	Feature Id: W84T1022	
Investigators: Bryan Strong, Abigayle Fisher			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 744.7	
Latitude: 61° 20' 33.34"	Longitude: 150° 54' 17.00"		Datum: WGS84
Logbook No.:	Logbook Page No.: 19	Picture No.: P_W84T1022_VEG_VEG_PIT PLUG	

SITE PARAMETERS

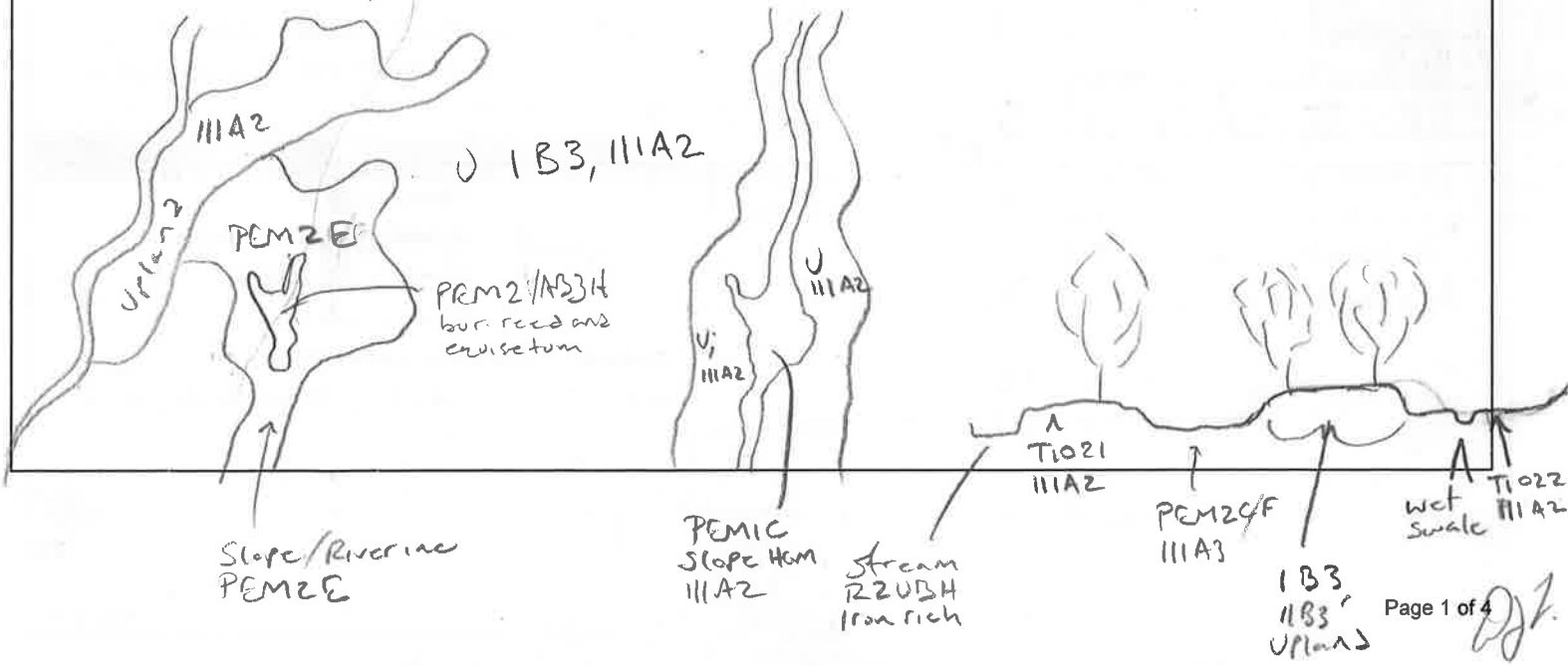
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace - alluvial
Slope (%): 2-3	Local relief (concave, convex, none): Hummocky. moderate
Pre-mapped Alaska LNG/NWI classification: U; 1B2, 11B2	Evidence of Wildlife Use: Moose sign
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes) low snow year	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: Non-wetland with wet inclusions
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 111A2, 11B2

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

Variable microtopography - wet swale 10' south of soil pit with stagnant water thick iron flock and iron sheen. Several small swale features (vegetated) in the signature with standing water or saturation to the surface between CALCAN hummocks. U_20 reasonable here. Thick head high CALCAN, with EQUARV, Stinging nettle, Cow parsnip, Common rasberry and elderberry.



T1022

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betnea - present	0		
2. PICGLA - present	0		
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (26 SL)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus idaeus	3	Y	FacU
2. Sambucus racemosa	3	Y	FacU
3. Alnus incana - present	0		
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 6			
50% of total cover: 3 20% of total cover: 1.2			

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 33.3 (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	21	X 4 =	84
UPL species	0	X 5 =	0
Column Totals:	121	(A)	384 (B)

PI = B/A = 3.17

VEGETATION (use scientific names of plants)

Herb Stratum (26 FT)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	85	Y	Fac
2. Chamerion angustifolium	6		FacU
3. Urtica dioica	3		FacU
4. Equisetum arvense	15		Fac
5. Heracleum maximum	5		FacU
6. Streptopus amplexifolius	T		FacU
7. Trientalis europaea	1		FacU
8. Mertensia paniculata	T		
9. Athyrium cf.	T		
10.			
Total Cover: 115			
50% of total cover: 57.5 20% of total cover: 23			

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

1 % Cover of Wetland Bryophytes

T Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

OTI022

WETLAND DETERMINATION DATA FORM

SOIL Date 6/15/22 Feature ID OTI022 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
A 0-5	10yr 2/2	100					SiL	
Bw1 5-10	10yr 4/3	100					Sandy loam	stratified alluvium
Bw2 10-16	10yr 4/3						Loam	stratified alluvium
CS3 16-22	2.5Y 4/1	85	7.5yr 4/6	15	C	PL	Loamy Sand	Saturated 2.5Y 4/1 to 3/1

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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: Mosaic area. A wet swale occurs in plot with stagnant water, iron flocc + sheen. Some microlows between CALCAN hummocks are saturated to surface. No positive alpha alpha 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) 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: 10' from soil pit a wet swale runs north-south with standing water etc....	
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): 20		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 16	EC: 131 @ 11.1°C	pH 6

Notes: wet swale ~10' south of soil pit in plot. Stagnant water w/ iron flocc + sheen. Some microlows between CALCAN tussock saturated to the soil surface.

T1022

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: W84TF022 Field Target: 15031 Date: 6/15/15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date** 6/15/15

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

X — **Signature / Date** 6/15/15

T1023

Vegetation Classification Data Form

Site Description		
Date: 6/16/15	Project Name & #: Alaska LNG 26221306	Field Target: 15018023
Investigators: Brian Strong, Abby Fisher		Feature ID: W84T1023
Latitude: 61 16 10.09	Longitude: -151 05 17.89	Datum: WGS84
Logbook #: 1	Logbook Page #: 20	Picture #: P_W84T1023_VEG_VEG_PIT_PAN

Location Description:

Low terrace. Dry site. Somewhat excessively drained alluvial soils with sand and loamy sand-stratified alluvium. No evidence of flooding or saturated soils in area.

Common Species Observed (Scientific Name)

Betula neoalaskana T 70' 20%	Oplopanax horridus
Picea glauca T 30' 3%	Dryopteris expansa
Alnus incana T and Sar	Calamagrostis canadensis
Viburnum edule	Rosa acicularis

Percent Cover of Dominant Structure Level: 20% Betula neoalaskana w/ 3% Picea glauca

Habitat Description:

Quite a few standing dead white spruce in a woodland forest canopy of mature paperbirch. Very dense understory of devils club, VIREDU, DRYEXP

Alaska Vegetation Classification: Level I, Level II, Level III and ALNINC. PICGLA snags ~70-80'

1B3, 11B2	11B2	

Notes:

Upland site. 1B3, 11B2 at point. Most of the PICGLA are standing dead. Was more of a 1C3 mixed forest before beetle kill

Field Crew Chief: Brian Strong

Field Scientist/Technician

Vegetation Classification Data Form

Table I-Alaska vegetation classification to level III

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

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

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

Vegetation Classification Data Form QA/QC Checklist

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

Feature ID: W84T1073 Field Target: 15018 Date: 6/16/15

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

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

X Abigayle Fisher X

Field Technician (print) **Signature**

X Brian Strong X 6/16/15

Field Crew Chief (print) **Signature**

T1024

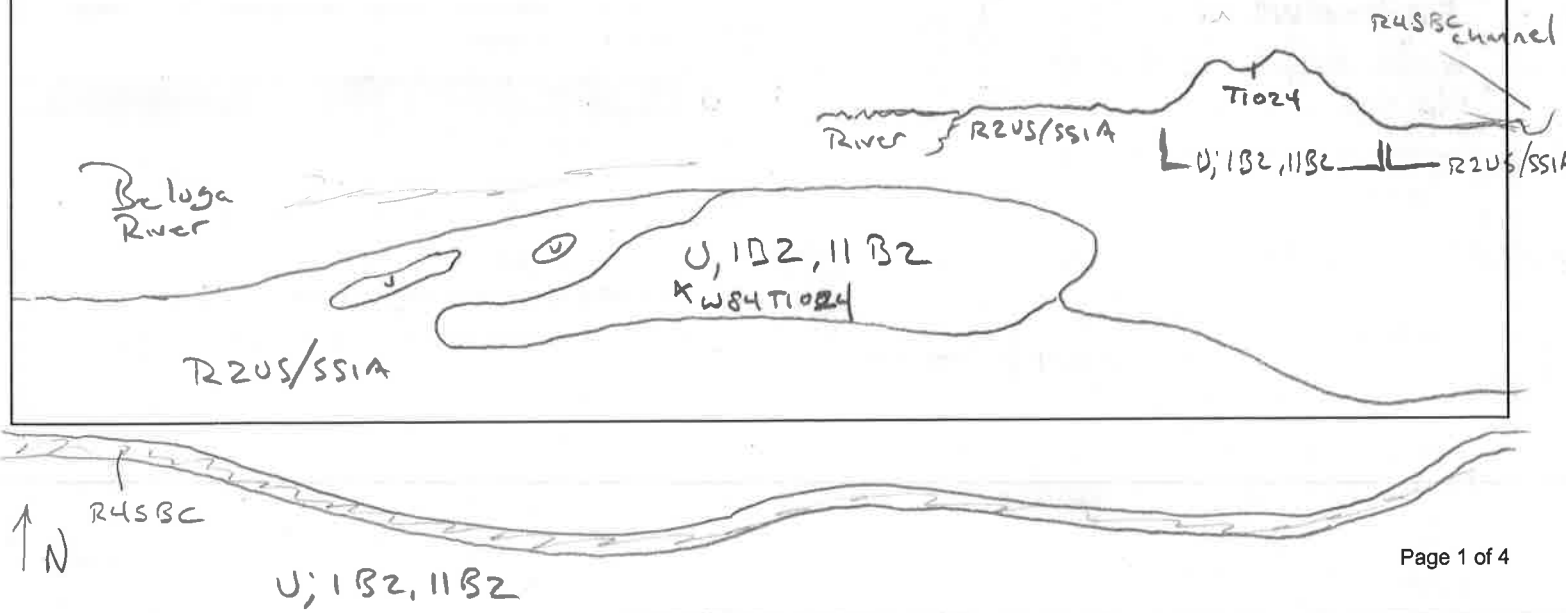
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X Access Road (explain)____ Other (explain)____			Field Target: 1501	Map #: 246 Map Date: 6/4/15
Date: 6/16/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1024	
Investigators: Bryan Strong, Abigayle Fisher				Team No.: W8C1
State: Alaska	Region: Alaska	Milepost: 756.1		
Latitude: 61° 13' 43.63"	Longitude: 151° 07' 38.69"		Datum: WGS84	
Logbook No.: 1	Logbook Page No.: 70	Picture No.: DW84T1024_VEG_VEG_PIT_FLAG		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace/Gravel Bar
Slope (%): ~3	Local relief (concave, convex, none): Convex, undulating
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Bear tracks
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) low snow year	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No X	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1B2, 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Stabilized gravel bar. No evidence of regular flooding at the point surrounded by R2US/SS1A with evidence of seasonal flooding. Lignite scattered throughout the area. See hydrology notes.



T1024

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
AF 1. ~~Populus balsamifera~~	25	Y	FacU
2. Populus balsamifera	25	Y	FacU
3.			
4.			
Total Cover: 25			
50% of total cover: 12.5	20% of total cover: 5		

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
AF 1. ~~Populus balsamifera~~	40	Y	FacU
2. Picea glauca	5		FacU
3. Salix (Scouleriana	1		Fac
4. Populus balsamifera	40	Y	FacU
5.			
6.			
7.			
8.			
9.			
Total Cover: 46			
50% of total cover: 23	20% of total cover: 9.2		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 0	X 1 =	—
FACW species: 0	X 2 =	—
FAC species 7	X 3 =	21
FACU species 73	X 4 =	292
UPL species 0	X 5 =	—
Column Totals: 80	(A)	313 (B)

PI = B/A = 3.91

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Orthilia secunda	3	Y	FacU
2. Pyrola grandiflora	6	Y	Fac
DSS 3. ~~Lupinus nootkatensis~~	T		FacU
4. Equisetum arvense	T		Fac
DSS 5. Orchid Plantanthera sp	T		
6. Lupinus articus	T		FacU
7.			
8.			
9.			
10.			
Total Cover: 9			
50% of total cover: 4.5	20% of total cover: 1.8		

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

5 % Bare Ground

0 % Cover of Wetland Bryophytes

T Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

Plantanthera sp not collected as only one specimin observed. Green flowers, 2 basal lvs.

T1024

WETLAND DETERMINATION DATA FORM

SOIL Date 6/16/15 Feature ID W84T1024 Soil Pit Required (Y/N) N

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-2	5Y 5/2	100					SiL	
2-16	5Y 5/3	100					vcSand	60% cobbles 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/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) 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: On a stable gravel bar deposit that does not see regular flooding. Moss and lichen becoming established, No rack, drift or sediment deposits. Ground surface mostly leaf litter with cobbles and stones	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

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

Notes: No evidence of flooding here. No rack, drift or sediment deposits. Stable Gravel

T1024

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: Brian Strong GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1024 Field Target: 1501 1 Date: 6/16/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Abigayle Fisher — **Wetland Scientist (print)**

X — **Signature / Date**

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

X — **Signature / Date** 6/16/15

T1025

WETLAND DETERMINATION DATA FORM

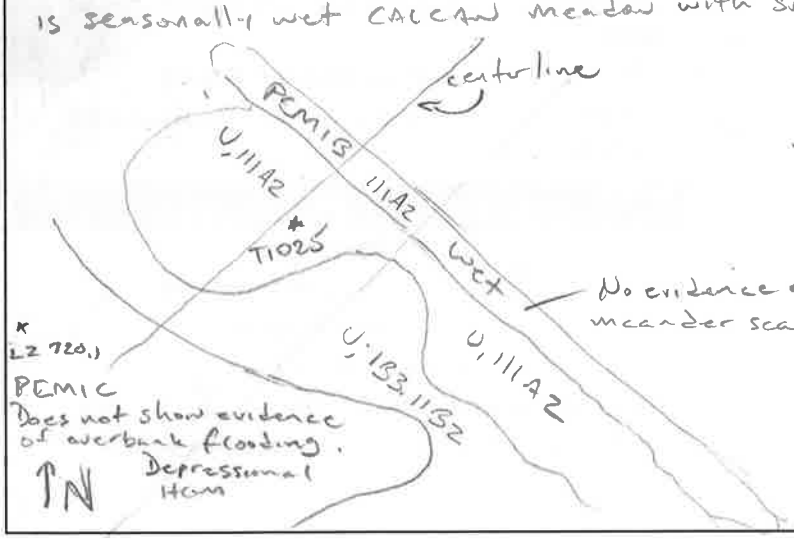
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15052	**Map #:** ____ **Map Date:** 6/4
Date: 6-17-2015	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1025	
Investigators: BS, KV				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 720		
Latitude: 61° 36' 21.5090" N		**Longitude:** 150° 30' 10.8044" W		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 21	**Picture No.:** PW84T1025_001 thru _004		

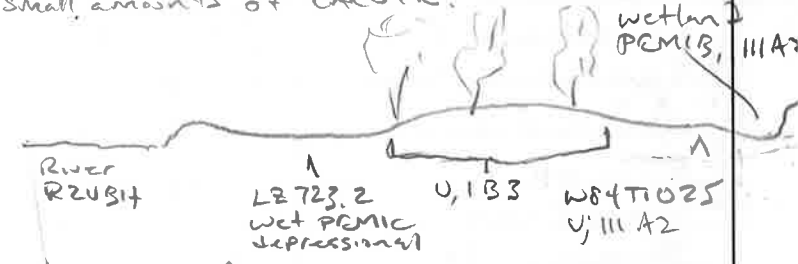
SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.):
Slope (%):	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Moose bed, browse
Are climatic/hydrologic conditions on the site typical for this time of year? Yes Y No____ (if no explain in Notes) low snow year	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) some disturbance apparent
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.) a few invasive spp in area

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): III A2

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

A few scattered paper birch and white spruce in a mesic herb meadow. Area appears to have had some disturbance with a patch of dandylion just west of the plot and purple vetch. Parts of meadow are thick with cow parsnip and Rosaci on the driest part of the meadow to the southwest. The northwest edge of the meadow is seasonally wet CALCAN meadow with small amounts of CACUTE.





No evidence of overbank flooding in abandoned channel/meander scar. Depressional Hem, PEMIB, III A2

FL025

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	7	Y	FAC
2. Picea mariana			FACW
3. Picea glauca	2	Y	FAC
4. Populus balsamifera	Edge		
Total Cover: 9			
50% of total cover: 4.5 20% of total cover: 1.8			
Sapling/Shrub Stratum (26 ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Alnus incana	2	Y	FAC
2. Rosa acicularis	4	Y	FACU
3. Rubus idaeus	T		
4. Viburnum edule	T		
5.			
6.			
7.			
8.			
9.			
Total Cover: 6			
50% of total cover: 3 20% of total cover: 1.2			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species: 0	X 1 = 0
FACW species: 25	X 2 = 50
FAC species 109	X 3 = 327
FACU species 16	X 4 = 64
UPL species 0	X 5 = 0
Column Totals: 150 (A)	441 (B)

PI = B/A = 2.94

VEGETATION (use scientific names of plants)

Herb Stratum (26 Ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	70	Y	FAC
2. Equisetum arvense	30	Y	FAC
3. Equisetum pratense	25	Y	FACW
4. Heracleum maximum	10		FACU
5. Vicia sp	5		
6. Rubus idaeus	T		
7. Taraxacum sp	T		
8. Mertensia paniculata	T		
9. Stellaria sp	T		
10. Geum macrophyllum	T		
Thalictrum sparsiflorum T			
Total Cover: 140			
50% of total cover: 70 20% of total cover: 28			

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

0 % 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):

T1025

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/15 Feature ID 284T1025 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
A	0-4	10YR 4/2	100					S.CL	
Bw1	4-8	10YR 5/2	100					S.CL	
Ab	8-9	10YR 2/2	100					S.CL	
Bw2	9-13	10YR 5/2	100					S.CL	
Bw3	13-22	2.5Y 5/2	D	2.5Y 5/1		2	PL	S.CL	fine depletions in PL
	13-22		C	10YR 4/4		5	M		fine concentration in 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: Platy S.CL Depth (inches): 13

Hydric Soil Present (Y/N): N

Notes: No saturation. S.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: Shallow aquitard = S.CL with firm consistency	
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 marginal
Water Table Present (Y/N): N	Depth (in): NA	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): N/A	**EC:** NA

Notes:

T1025

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_X_____ 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: KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85T1025 Field Target: 15052 Date: 6-17-15

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**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

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

X Kaley Volper — **Wetland Scientist (print)**

X Kaley Volper 6-17-15 — **Signature / Date**

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

X [signature] 6/17/15 — **Signature / Date**

T1026

WETLAND DETERMINATION DATA FORM

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SITE DESCRIPTION

Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15032	**Map #:** 209 **Map Date:** 6/4/15
Date: 6/17/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1026
Investigators: Brian Strong, Kali Volper, Bob Dupree			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 744.6	
Latitude: 61° 21' 37.8254" N	**Longitude:** 150°54' 04.1048" W		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 20	**Picture No.:** W84T1026-001 - thru - 004	

SITE PARAMETERS

Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace - alluvial
Slope (%): 1-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Moose sign, bear tracks on gravel ba

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)

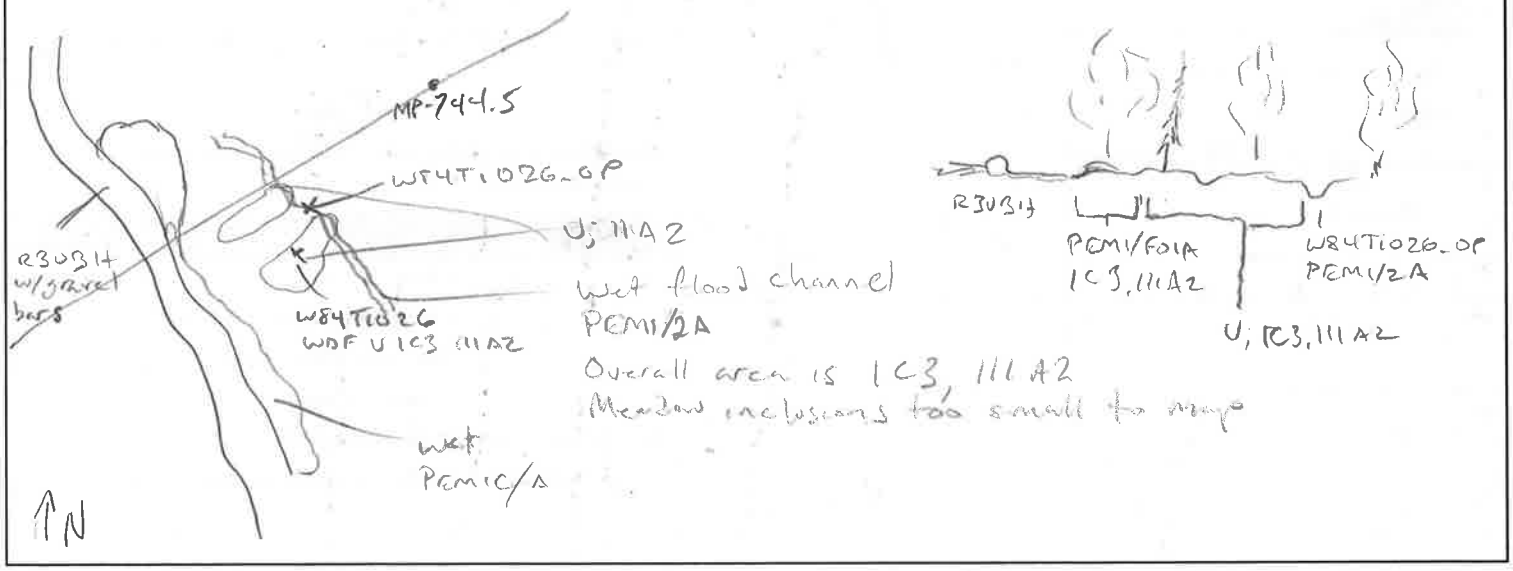
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic? No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? Yes Y No____	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No N	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No N	Alaska Vegetation Classification (Viereck): 1C3, 111A2

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

Point taken in a meadow within a larger polygon of woodland mixed-forest. A small flood channel ~7' wide hosts obligate sedges and appears to be a PEMIB wetland on the west edge of the mesic herb meadow



W84T1026

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea glauca	3	Y	FACU
2. Betula neoalaskana	8	Y	FAC
3.			
4.			

Total Cover: 11

50% of total cover: 5.5 20% of total cover: 2.2

Sapling/Shrub Stratum (20ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	T		FAC
2. Rosa acicularis	2	Y	FACU
3. Salix alaxensis	T		FAC
4. Populus balsamifera	T		FACU
5. Heracleum maximum	4	Y	FACU
6. ~~Athyrium cyclosporum~~			
7. Alnus incana	4	Y	FAC
8.			
9.			

Total Cover: 10

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

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 57 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	160	X 3 =	480
FACU species	13	X 4 =	52
UPL species	0	X 5 =	0
Column Totals:	173	(A)	532 (B)

PI = B/A = 3.075

VEGETATION (use scientific names of plants)

Herb Stratum (20ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	55	Y	FAC
2. Equisetum arvense	90	Y	FAC
3. Poa sp	T		
4. Chamerion angustifolium	T		FACU
5. Grass sp	T		
6. Urtica dioica	4		FACU
7. Athyrium cyclosorum	3		FAC
8. Thalictrum sparciflorum	T		
9. Mnium sp	T		
10. Streptopsis amplexifolia	T		
Carex media T			
Artemesia norvegica T			
Cornus macrophylla T			

Total Cover: 148

50% of total cover: 74 20% of total cover: 29.6

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

5 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1026

WETLAND DETERMINATION DATA FORM

SOIL Date 6/17/15 Feature ID W84T1026 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
C 0-12	2.5-Y 6/2	100					fine Sand	single grain - very dry
Ab/Bw 12-18	2.5-Y 4/2	100					fine Sandy Loam	Stratified loamy alluvial
Ab 18-19	10-YR 2/2	100					vfSaL	deposits with buried
Bw 18-21	2.5-Y 4/2	100					vfSaL	surfaces

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

Notes:

T1026

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: Brad Shaw GPS Technician QA/QC check: KW

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1026 Field Target: 15032 Date: 6-17-15

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**

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

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 Haley Volper — **Wetland Scientist (print)**

X Haley Volper 6-17-15 — **Signature / Date**

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

X Brian Strong 6/17/15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

see notes

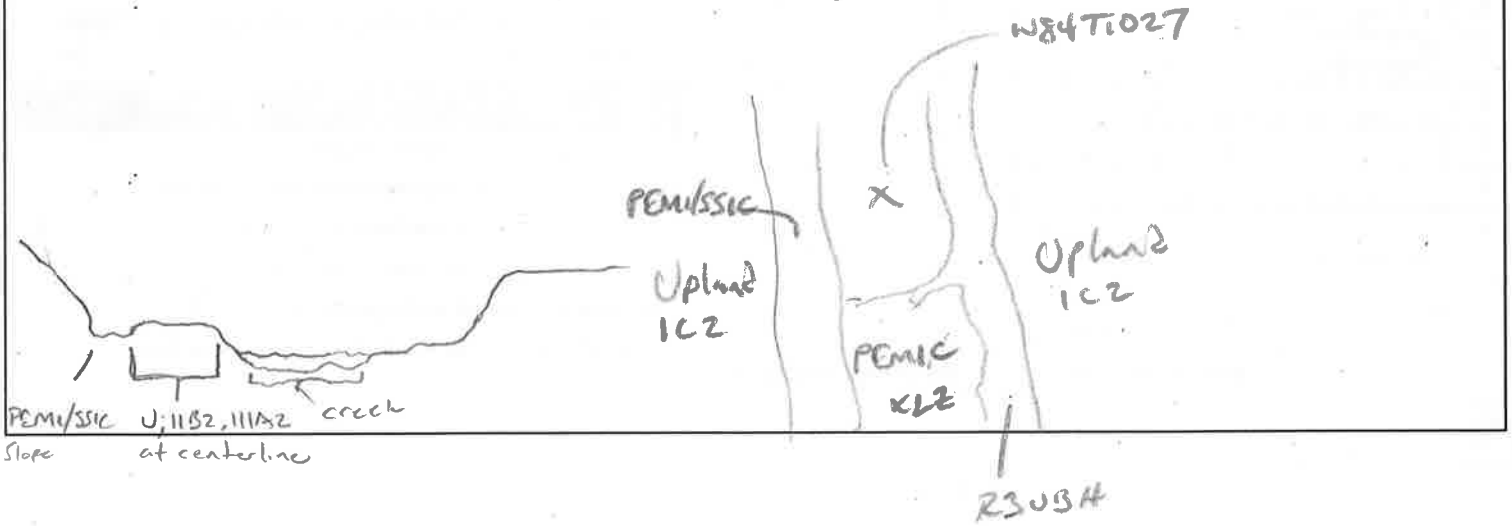
SITE DESCRIPTION				
Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____			Field Target: 1506	Map #: NA Map Date: NA
Date: 6/19/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84TI027	
Investigators: Briana Strong, Kiley Volper				Team No.: W84
State: Alaska	Region: Alaska	Milepost: 707.1		
Latitude: 61° 45' 18.0096" N		Longitude: 150° 21' 04.3434" W		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 23	Picture No.: W84TI027_001 thru _004		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Stream terrace
Slope (%): 2-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: browsed veg
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 X	**Is the Sampled Area within a Wetland?** Yes____ No ✓
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11 B2 111 A2

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

Backwater wetland/flood channel directly North of plot against tree line where slope break occurs. See hydrology notes. Wetland type reflects plot, but wetland inclusions occur throughout the immediate area. Stream terrace is much wetter West of point at LZ 707.1/707.15. Cowardin at point is 111A2 but area is a mix of 111A2 and 11B2. Point location adjusted due to access issues. No mar is available to update at this time



T1027

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
50% of total cover: ____ 20% of total cover: ____			
Sapling/Shrub Stratum (20 ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Betula neoalaskana	T		FAC
2. Alnus incana	3		FAC
3. Rubus idaeus	13	Y	FACU
4. Salix Pulcha	5	Y	FAC
5.			
6.			
7.			
8.			
9.			
Total Cover: 21			
50% of total cover: 10,5 20% of total cover: 4,2			

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species: 0	X 1 =	0
FACW species: 0	X 2 =	0
FAC species 102	X 3 =	306
FACU species 52	X 4 =	208
UPL species 0	X 5 =	0
Column Totals: 154	(A)	514 (B)

PI = B/A = 3,3

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	85	Y	FAC
2. Chamerion angustifolium	35	Y	FACU
3. Mertensia paniculata	4		FACU
4. Athyrium cyclosorum	2		FAC
5. Artemisia norvegica	4		FAC
6. Geum macrophyllum	2		FAC
7. Thalictrum sparsiflorum	T		FACU
8. Calamagrostis canadensis	1		FAC
9.			
10.			
Total Cover: 133			
50% of total cover: 66.5 20% of total cover: 26.6			

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

2 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

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WETLAND DETERMINATION DATA FORM

6/19/15 W84T1027 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
OeA	0-2	10YR 3/2	100					Hemic/FSaL	Organics mixed with fSaL
Bw	2-8	7.5YR 3/3	99	7.5YR 4/2	1	D	PL	SiL	A few Mn concentrations - Andic
CB	8-10	10YR 4/3	100					SaL	
BC	10-16	10YR 4/2	100					SiL/SaL	Stratified alluvium - SiL/SaL
BC	16-22	10YR 5/2		2.5Y 5/2	2	D	PL	vfSaL/SiL	Stratified alluvium
				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) 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 but not saturated. Wetland inclusions throughout area.

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: Just north of soil pit (approx 15') the terrace drops down ~2' and turns wet with a backwater floodchannel with stagnant standing water, COMPACAQU, etc. - discontinuous channel/backwater	
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:

T1027

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: W84T1027 Field Target: 15063 Date: 6-19-15

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?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

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

X Kaley Volper — **Wetland Scientist (print)**

X Kaley Volper 6-19-15 — **Signature / Date**

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

X [signature] 6/19/15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15062	**Map #:** 201 **Map Date:** 6/4/15
Date: 6/19/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1028	
Investigators: BS, KV				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** 707.4		
Latitude: 61° 45' 02.5760" N		**Longitude:** 150° 21' 06.0900" W		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:**	**Picture No.:** P_W84T1028_001 thru _004		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification:	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) low snow year	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 ✓
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1 C 2

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

Tall, mature BETNEO, PICGLA (parklike) w/ even aged trees ~70' tall low understory of VIBEDU showing heavy browse cropped at ~3' tall. Edges of mixed forest surrounding wetland features in the area are wetland with standing water observed or evidence of standing water. Wet depression South of the point is a bluejoint meadow, PEMIC with a wetter center PEMIE, III A 3. Most of the corridor is dry here.

WETLAND DETERMINATION DATA FORM

W84T1028

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60 ft)	Absolute % Cover	Dominant Species?	Indicator Status
Betula neoalaskana	40	(Y/N)	FAC
1. Picea glauca	15	Y	FACU
2.			
3.			
4.			
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: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 40 (A/B)

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	3		FACU
2. Linnaea borealis	1		FACU
3. ~~Vaccinium vitis-idaea~~			~~FAC~~
4. Vaccinium edule	40	Y	FACU
5. Spiraea stevenii	T		FACU
6. Populus tremuloides	T		FACU
7. Oplopanax horridus	T		
8.			
9.			
Total Cover: 44			
50% of total cover: 22	20% of total cover: 8.8		

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	5	X 2 =	10
FAC species	82	X 3 =	246
FACU species	109	X 4 =	436
UPL species	0	X 5 =	0
Column Totals:	196 (A)		692 (B)

PI = B/A = 3.5

6/19 PV

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum pratense	5		FACW
2. Chamerion angustifolium	2		FACU
3. Equisetum sylvaticum	7		FAC
4. Cornus suecica	27	Y	FAC
5. Spinulum annotinum	3		FACU
6. Geranium erianthum	T		FACU
7. Calamagrostis canadensis	7		FAC
8. Streptopus amplexifolius	T		FACU
9. Gymnocarpium dryopteris	45	Y	FACU
10. Sanguisorba sp	T		
Rubus pedatus	T		FAC
Trientalis europea	T		
Stellaria sp	T		
1% Total Cover: 97			
50% of total cover: 48.5	20% of total cover: 19.4		

Hydrophytic Vegetation Indicators:

~~N~~ Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

1 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

T1028

WETLAND DETERMINATION DATA FORM

6/19/15 W84T1028

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							fibric	
E 3-5	10YR 5/1	100					SiL	Powder dry
Bs 5-14	10YR 5/6	100					vfSaL	dry
B_{w_2} 14-22	10YR 5/4	100					vf SaL	dry

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

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

T1028

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: [illegible] GPS Technician QA/QC check: KV

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1028 Field Target: 15062 Date: 6-19-15

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?

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Haley Volper — **Wetland Scientist (print)**

X Haley Volper 6-19-15 — **Signature / Date**

X [signature] — **Field Crew Chief (print)**

X [signature] 6/20/15 — **Signature / Date**

T1029

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 1505	**Map #:** 2 of **Map Date:** 6/4/15
Date: 6-19-15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84T1029
Investigators: Bryan Strong, Haley Volper			**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:**	
Latitude: 61° 38' 25.2313" N	**Longitude:** 150° 29' 12.9281" W		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:**	**Picture No.:** P_W84T1029_001 thru_004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 2-3%	Local relief (concave, convex, none): Flat to slightly undulating due to pit/mound topography and rotton logs
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes____ No ✓	**Is the Sampled Area within a Wetland?** Yes____ No ✓
Hydric Soil Present? Yes____ No ✓	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No ✓	Alaska Vegetation Classification (Viereck): IC2, IIC2

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

Open mature canopy dominated by PICGLA (50-60') BETNEO (60-70') with scattered PICMAR-T (30-40'). Understory of ROSACI, SPISTEV, VIBEDU with, CALCAN, DRYEXP, SPIANN, CORSUE, BETNEO saps and VIBEDU have been browsed by moose. Pleasant forest here. Point location adjusted. Point location is off the map but mapping updated in the area observed as we worked in the area

W84T1029

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	30	Y	FAC
2. Picea glauca	35	Y	FACU
3. Picea mariana	5		FACW
4. Popotus tremuloidies	5		FACU

Total Cover: 75

50% of total cover: 37.5 20% of total cover: 15

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	15	Y	FACU
2. Betula neoalaskana	10	Y	FAC
3. Vaccinium vitis-idaea	T		FAC
4. Spirea stevenii	15	Y	FACU
5. Linnaea borealis	3		FACU
6. Viburnum edule	3		FACU
7. Ribies sp	T		
8.			
9.			

Total Cover: 46

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

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	5	X 2 =	10
FAC species	84	X 3 =	252
FACU species	98	X 4 =	392
UPL species	0	X 5 =	0
Column Totals:	187	(A)	654 (B)

PI = B/A = 3.5

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	12		FAC
2. Calamagrostis canadensis	7		FAC
3. Chamerion angustifolium	T		FACU
4. Epilobium anotinum	20	Y	FACU
5. Cornus suecica	25	Y	FAC
6. Dryopteris expansa	2		FACU
7. Rubus arcticus	T		
8. Carex	T		
9. Trientalis europea	T		
10. Dryopteris gymnocarpum	T		
Streptopsis amplexifolia	T		
Rubus pedatus	T		

Total Cover: 66

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

Feather moss 15

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

15 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

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

T1029

WETLAND DETERMINATION DATA FORM

6/19/15 W84T1029

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 0-2							hemic	
A 2-3.5	10YR 2/2	100					SiL	
Bw1 3.5-8	10YR 3/2	30					SiL	
	7.5YR 3/3	70						
Bw2 8-20	10YR 4/3	85					SiL	borderline vfSaL
	2.5Y 5/4	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: N Depth (inches): N

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:

TT029

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

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

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

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

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

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

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

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

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

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

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

SOIL VARIABLES

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

HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

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

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

LANDSCAPE VARIABLES (M)

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

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84TI029 Field Target: 15054 Date: 6-19-15

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?

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**

NA ☐ 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)?

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

X Kaley Volper — **Wetland Scientist (print)**

X Kaley Volper 6/19/15 — **Signature / Date**

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

X Brian Strong 6/19/15 — **Signature / Date**

T1030

WETLAND DETERMINATION DATA FORM

point off the edge of map

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 15051	Map #: 211 Map Date: 6/4
Date: 6-20-15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1030
Investigators: BS, KV			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 721.2	
Latitude: 61° 35' 19.9216"N	Longitude: 150° 31' 09.0059"W		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 25	Picture No.: P_W84T1030_001 thru _004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Swale - broad
Slope (%): 3 - 4	Local relief (concave, convex, none): Slightly concave - Flat - undula
Pre-mapped Alaska LNG/NWI classification: U 1C2, 11B2	Evidence of Wildlife Use: Moose
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 X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	Wetland Type: PEMI/FO1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A 2 1 B3

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

Problematic andic soil. Saturated, alpha alpha positive with appropriate landscape position. Most of the area is non-wetland but, swaling features in the area will be wetland. Approximately 70' southwest of the point the slope steepens, tree canopy becomes denser and area becomes non-wetland. Wet areas driven by topography.

T1030

WETLAND DETERMINATION DATA FORM

W84T1030

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 60 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	10	Y	FAC
2. Picea glauca	5	Y	FACU
3.			
4.			

Total Cover: 15

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

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus sp.	6	Y	FAC
2. Sambucus racemosa	2		FACU
3. Oplopanax horridus	3	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 11

50% of total cover: 5.5 20% of total cover: 2.2

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	146	X 3 =	438
FACU species	10	X 4 =	40
UPL species	0	X 5 =	0
Column Totals:	156 (A)		478 (B)

PI = B/A = 3.06

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	87	Y	FAC
2. Equisetum sylvaticum	3		FAC
3. Thalictrum sparsiflorum	T		FACU
4. Athyrium cyclosorum	20	Y	FAC
5. Equisetum arvense	20	Y	FAC
6. Streptopus amplexifolius	T		FACU
7. Impatiens noli-tangere	T		FACW
8. Trientalis europaea	T		FACU
9. Galium boreale	T		
10.			

Total Cover: 130

50% of total cover: 65 20% of total cover: 26

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

1 % Bare Ground

2 % Cover of Wetland Bryophytes

2 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

T1030

WETLAND DETERMINATION DATA FORM

6/20/15 W84T1030 Y

SOIL Date 6/20/15 Feature ID W84T1030 Soil Pit Required (Y/N) Y

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-2								
A 2-9	10yr 2/2	100					S.L	Alpha alpha positive, saturated
BA 9-16.5	10yr 3/1	100					S.L	Alpha alpha positive
CBh 16.5-20	2.5Y 5/3	70					vfSaL	Restrictive layer - massive vfSaL
	10yr 3/4	30						
Bh 20-22	7.5yr 2.5/3	100					S.L	Saturated, slightly thixotropic

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

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 X
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 vfSaL Depth (inches): 16.5

Hydric Soil Present (Y/N): Y Problematic, Andic material

Notes: 16.5-20 = Restrictive layer, massive vfSaL - slightly thixotropic. Free water seeping out from interface at 16.5. Alpha alpha positive (>60%) from 2" to 11" in saturated soil material. Soil below 11 is at field capacity from 11-15 before saturation/free water is encountered above the restrictive layer at 16.5. 16.5-20 is also alpha alpha positive

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) Y	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) Y	Microtopographic Relief (D4) N
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: Alpha alpha positive	
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): 16 - free H_2O	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2-12, N-22	EC: 88 µs 9.7°C pH 5.32 - Soil pit water

Notes: Free water seeping above restrictive layer at 16 inches. 12-14 inches is arguably saturated. Certainly at field capacity. Low snow year. Site is wetter than observed during wetter periods and early in the growing season.

T1030

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 15 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 6 Short shrub (0.5-2m) 5 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 87 Short herb (<1m) 43 Moss-Lichen 2 Floating — Submerged —

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

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

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

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

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

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

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

Vegetative Interspersion (P): Low (large patches, concentric rings)__✓__ 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__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_____ 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_____ Unknown__X__

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

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

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

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

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1030 Field Target: 15051 Date: 6-20-15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. **Photos**

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

X Haley Volper — **Wetland Scientist (print)**

X Haley Volper 6/20/15 — **Signature / Date**

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

X Brian Strong 6/20/15 — **Signature / Date**

T151

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)_____		Field Target: 5244	Map #: 195 Map Date: 6/4
Date: 6/20/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W84T1031
Investigators: BS, KV			Team No.: W84
State: Alaska	Region: Alaska	Milepost: 693.15	
Latitude: 61°55'55.1719" N	Longitude: 150°41'55.0202" W		Datum: WGS84
Logbook No.: 1	Logbook Page No.: 26	Picture No.: P_W84T1031_001 thru _004	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace
Slope (%): 1-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: 11B2, 11C2	Evidence of Wildlife Use: moose droppings
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes ✓ No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No ✓ (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No ✓ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes ✓ No_____	**Is the Sampled Area within a Wetland?** Yes_____ No ✓
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No ✓	Alaska Vegetation Classification (Viereck): III A2 II B2

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

Burned black spruce forest. Snags ~35' tall. A few PICGLA saplings becoming established along with POPTRE and POPBAL. Good cover of CORSUE, CALCAN, SALBEB, ROSACI. Somewhat excessively drained sol. Spodisol. Great moose habitat. Parts of area are thick with 5-7' tall POPTRE saplings with heavy browse. About 13% cover Bebb willow with ~12% bare ground/and litter. Burn occured and estimated **five years** ago

T1031

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (26 ft)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Salix bebbiana	5	Y	FAC
2. Populus tremuloides	2	Y	FACU
3. Vaccinium vitis-idaea	T		FAC
4. Rosa acicularis	3	Y	FACU
5. Picea glauca	T		FACU
6. Populus balsamifera	T		FACU
7.			
8.			
9.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 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:	1	X 2 =	2
FAC species	8	X 3 =	24
FACU species	45	X 4 =	180
UPL species	0	X 5 =	0
Column Totals:	54 (A)		204 (B)

PI = B/A = 3.78

Picea mariana snags - burned - probably ~35% cover before burn ~35' tall
A few POPTRE snags also

VEGETATION (use scientific names of plants)

Herb Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	3		FACU
2. Cornus suecica	20	Y	FAC
3. Equisetum pratense	1		FACW
4. Calamagrostis canadensis	20	Y	FAC
5. Lupinus arcticus	T		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: 44			
50% of total cover: 22	20% of total cover: 8.8		

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

____ % Bare Ground

0 % 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):

T1031

WETLAND DETERMINATION DATA FORM

6/20/15 W84T1031

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	0-1							burned organics	
A	1-2	10YR 2/1	100					SiL	charcoal rich
Bw/Oy	2-6	10YR 3/3	60						10YR 5/6 2nd matrix color
Bs	6-11	7.5YR 5/8	60					VfSaL	2.5Y 7/3 2nd matrix color
E	11-13	10YR 6/1	100					LSa	
Bhs	13-22	5YR 4/6	100					LSa	

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

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) X N	Alaska Gleyed (A13) X N	Alaska Color Change (TA4)[4] X N
Histic Epipedon (A2) X N	Alaska Redox (A14) X N	Alaska Alpine Swales (TA5) X N
Black Histic (A3) X N	Alaska Gleyed Pores (A15) X N	Alaska Redox with 2.5Y Hue X N
Hydrogen Sulfide (A4) X N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer X N
Thick Dark Surface (A12) X 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 with well developed E and Bhs horizons, well drained. Non-wetland before the area burned.

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:

T1031

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: BMD GPS Technician QA/QC check: KN

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84T1031 Field Target: 15244 Date: 6-20-15

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

TSS TSS

8. **Photos**

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

X Haley Volker — **Wetland Scientist (print)**

X Haley Volker 6/20/15 — **Signature / Date**

X — **Field Crew Chief (print)**

X — **Signature / Date**

YL001

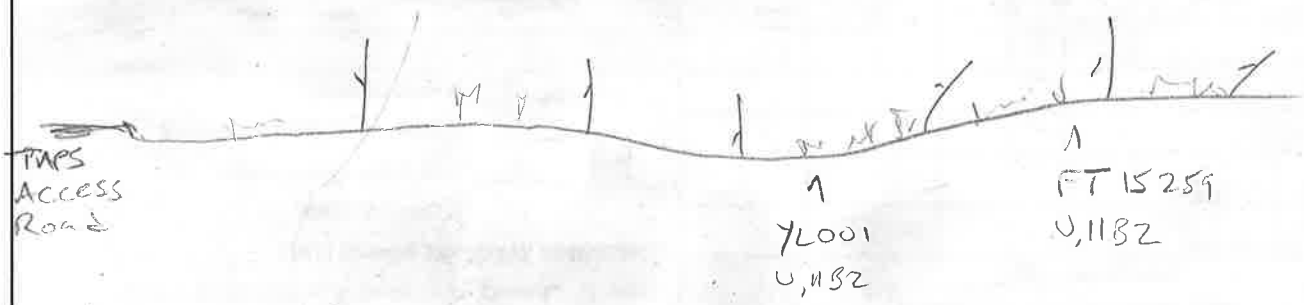
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) x Facility			**Field Target:** 15259	**Map #:** ____ **Map Date:** 6/29
Date: 7/16/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W84YL001	
Investigators: Brycen Strong, Abigayle Fisher				**Team No.:** W84
State: Alaska	**Region:** Alaska	**Milepost:** N/A off Row		
Latitude: 65° 42' 24.47" N	**Longitude:** 149° 10' 24.71" W			**Datum:** WGS84
Logbook No.: 01	**Logbook Page No.:** 50	**Picture No.:** P_W84YL001_VEG_VEG_PIT_PLOT		

SITE PARAMETERS	
Subregion: Interior	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 5% measured	Local relief (concave, convex, none): Slightly concave - flat
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB, 11B2, 111A2	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 conditions	Are "Normal Circumstances" present: Yes__X__ No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No__X__ (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No__X__ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No__X__	**Is the Sampled Area within a Wetland?** Yes_____ No__X__
Hydric Soil Present? Yes_____ No__X__	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No__X__	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: Point taken in an opening in the tall scrub - a slightly wetter microsite. Most of area is 11B2, 111A2 but, pockets of 111A2 and 11C2 as seen at the point. Point taken in subtle swale. No frost table in 3". Site may have been wetter before the fire. Hot fire. Burned PICMAR. Some standing dead PICMAR 12-20' tall but, mostly downfall, and burned stumps. Regen of SALBEB (3-7') - POPTRE (3-7'), BETNEO (3-10') with CHAANG, ARCLAT, EQUSYL. A white fireweed observed in plot. Point moved to better inform mapping.



YL001

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: —

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

Sapling/Shrub Stratum (26 ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
AF 1. Equisetum sylvaticum			Fac
2. Picea glauca	2	N	FacU
3. Rhododendrum groenlandicum	2	N	Fac
4. Populus tremuloides	T		FacU
5. Betula neoalaskana	T		FacU
6. Vaccinium uliginosum	T		Fac
7. Rosa acicularis	T		FacU
8. Salix bebbiana	17 ~~12~~ 3SS	Y	FAC
9. Salix pulchra	1	N	FACW

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: 3 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species:		X 1 =
FACW species:	12	X 2 = 24
FAC species	32	X 3 = 96
FACU species	21	X 4 = 84
UPL species		X 5 =
Column Totals:	65 (A)	204 (B)

PI = B/A = 3.14

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	10	Y	Fac
2. Equisetum arvense	3	N	Fac
3. Chamerion angustifolium*	18	Y	FacU
4. Carex media	4	N	FACW
5. Arctagrostis latifolia	7	N	FacW
6. Equisetum scirpoides	1	N	FacU
7. Erigeron sp	T		
8. Luzula sp.	T		
9. Agrostis scabra	T		
10. Rubus chamaemorus	T		

Total Cover: 43

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

Stellaria sp.	T	
Mertensia paniculata	T	FacU

Litter
Moss

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

T % Bare Ground

0 % 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):

* A white chamerion was spotted in plot

YL001

WETLAND DETERMINATION DATA FORM

7/16/15 W84YL001 N

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

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

	Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oa	0 - 3								charcoal rich
Bw_1	3 - 9	2.5Y 4/3	86	10YR 5/4	7	C	M	SiL	Platy or massive
				2.5Y 5/1	7	C	M		
Bw_2	9 - 22	2.5Y 4/3	91	2.5Y 5/1	2	C	M	SiL	massive
		10YR 3/1	5	10YR 5/4	2	C	M		
Bw_3	22 - 28	2.5Y 4/3	88					SiL	massive to platy
		10YR 3/1	12						

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

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

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

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

Hydric Soil Present (Y/N): N

Notes: Slightly plastic, slightly sticky, No permafrost / frost table in 30"

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): N		
Iron Deposits (B5) N			

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

Notes:

YL001

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: Abigail Fisher

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W84YL001 Field Target: 15259 Date: 7/16/15

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	X
Wetland Scientist (print)	**Signature / Date**
X Brian Strong	X 7/16/15
Field Crew Chief (print)	**Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15254	Map #: 153 Map Date: 29 June 15
Date: 8/15/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85HT001
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 545.1	
Latitude: 63° 39' 36.57		Longitude: 148° 45' 16.21	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 39	Picture No.: P.pit plug veg. veg N, S	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): hill side
Slope (%): 3-5	Local relief (concave, convex, none): flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: U 1A2, 11B2, 11C2	Evidence of Wildlife Use: Caribou fecal matter
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 X, or Hydrology____ Naturally Problematic?	No____ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: PFO4/SS1B
Wetland Hydrology Present? Yes X 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.

Site shows evidence of long ago fire w/ trunks burned but no other obvious signs other than small amount of charcoal. Site is pic Cola open forest w/ trees ~ 15-35' tall w/ an understory of Bet nana but low diversity otherwise. Cryptogram + Lichen + moss mat covering ground. Water table @ 20 (stabalized) Bg horizon shows water table to rise to 16.5" somewhat consistently. Problematic soils, Oa could be result of fire and not effect of saturation. Repeat visit earlier in season may be benificial.

Localized wet area. Dug hole to the east as ground raises and site dries up. To the North, West, + South of area ground raises in elevation and becomes dry again

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	FacU
2.			
3.			
4.			

Total Cover: 30

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula nana	35	Y	FAC
2. Vaccinium uliginosum	25	Y	FAC
3. Rhododendrum tomentosum	15		FACW
4. Vaccinium vitis-idaea	7		FAC
5. Salix myrtifolia	1		FACW
6. Salix pulchra	1		FACW
7. rosa acicularis	T		FACU
8. Picea Glauca	3		FACU
9. Empetrum nigrum	4		FAC
Salix glauca T			

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: 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: 17	X 2 =	34
FAC species 73	X 3 =	219
FACU species 33	X 4 =	132
UPL species	X 5 =	
Column Totals: 123	(A)	385 (B)

PI = B/A = 3.13

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Saussurea angustifolia	T		FAC
2. Festuca altaica	2	Y	FAC
3. Equisetum scirpoides	T		
4. Petasites frigidus	T		
5. Arctagrostis latifolia	T		
6.			
7.			
8.			
9.			
10.			

Total Cover: 2

50% of total cover: 1 20% of total cover: 0.4

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

40 Total Cover of Bryophytes 50% cryptogram + Lichen

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

8.15.15 W85HT001 Y

SOIL Date 8.15.15 Feature ID W85HT001 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	2.5YR 2.5/2	100						Average depth of O matter recorded
Oa 5-6.5	10YR 2/1 Black						muck	charcoal present
C Oa 6.5-14"	10YR 2/1 Black		Cobbles ~80% Oa ~20%				Extremely Cobbly	muck
Bg 14-24	10YR 5/1	49	10YR 6/4	2	C	M	Extremely gravelly	silt loam
	10YR 5/2	49						

[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 & 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) Y	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) Peat Muck

[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): —

Hydric Soil Present (Y/N): Y

Notes: Organic depth varies in relation to cobble. Pick up organics fill cobble spaces to depth of 14" with rocks increasing & organic matter decreasing. Negative ∝ & throughout. voids in

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) Y	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 21		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 19	EC: 100	5.72 pH 41°F

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W8SHT001 8.15.15

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 30 Sapling (<5 dbh, <6m tall) 3 Tall shrub (2-6m)_____ Short shrub (0.5-2m) 70 Dwarf shrub (<0.5m) 10 Tall herb (≥1m) 2 Short herb (<1m) _____ Moss-Lichen 40 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%)__X__ Very High Density (80-100%)_____

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

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

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

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__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__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** 5.72

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 X

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

Crew Chief QA/QC check: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT001 Field Target: 15254 Date: 8/15/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

Wetland Scientist (print) — Signature / Date

X Jessie Brownlee — X [signature] 8.18.15

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15253	Map #: 153 Map Date: 6.29.15
Date: 9/15/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W8SHT002
Investigators: JB, JA			Team No.: W8T
State: Alaska	Region: Alaska	Milepost: 545.1	
Latitude: 63°39'34.98		Longitude: 148°45'25.16	Datum: WGS84
Logbook No.: 2	Logbook Page No.: 40	Picture No.: P-pit, plang, veg, veg	

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

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: PF04/SS1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 1A2 11C2

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

Site marks the up/wet boundary for this PF04/SS1B. As you move down slope toward PEM1B ground starts to undulate severely with 2' drops from higher ground where all the plants show preferential growth. It gets wetter as you move down stop w/ watertable @ surface in these depressions. Large cobbles in depressions and filled soil pit w/ no mineral. Area is a mosaic w/ higher elevation mounds being out of watertable but enough of area is wet.



PEM1B is really PSS4/1E w/ stunted PicCola, Red Nan, Calcan, Carex, Stunting Surface water

Wet from HT002 to depression.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 1120)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	30	Y	FACW
2.			
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 10

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	5		FACW
2. Betula nana	40	Y	FAC
3. vaccinium uliginosum	13		FAC
4. vaccinium vitis-idaea	10	Y	FAC
5. Empetrum nigrum	7		FAC
6. Dasiphora fruticosa	3		FAC
7. Arctous rubra	3		FAC
8. Salix myrtillifolia	7		FACW
9. Rhododendrum tomentosum	3		FAC

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: 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:	7	X 2 =	14
FAC species	107	X 3 =	321
FACU species	35	X 4 =	140
UPL species		X 5 =	
Column Totals:	149	(A)	475 (B)

PI = B/A = 3.18

Salix pulchra	S	T		FACW
Rhododendrum groenlandicum	5	T		FAC
Betula ned/glandulosa hybrid	5	10	Y	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Petasites Frigidus	T		FACW
2. Festuca Altaica	15	Y	FAC
3. chamerion angustifolium	T		FACU
4. Calamagrostis lapponica	3		FAC
5. Equisetum palustre	T		FACW
6.			
7.			
8.			
9.			
10.			

Total Cover: 18

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

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

30 Total Cover of Bryophytes 30% lichen/cryptogram

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

W85HT002

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

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

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi 0-4		100						Saturated organics
C 4-15		100					-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) X

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

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

Hydric Soil Present (Y/N): Y Positive XX in the organic layer.

Notes: Soil Does Not make an exact indicator but given water table @ 3" and reducing conditions in organics using B3 F3 to pass soil indicator.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) Y	Geomorphic Position (D2) N
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) Y	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) Y	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): 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: 11	6.1 pH 42.7°F

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

8.15.15 W85HT002

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)__30__ Sapling (<5 dbh, <6m tall)__5__ Tall shrub (2-6m)_____ Short shrub (0.5-2m)__69__ Dwarf shrub (<0.5m) __27__ Tall herb (≥1m) __15__ Short herb (<1m) __3__ Moss-Lichen__30__ 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_____ 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__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__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__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

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

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

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

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

Water pH (P): No surface water_____ 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_____ 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: Jessie Brownell

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT002 Field Target: 15253 Date: 8/15/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

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

X Jennifer Anderson — X — 8/15/15

Wetland Scientist (print) — Signature / Date

X Jessie Brownlee — X — 8.15

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) ? no idea			**Field Target:** 15088	**Map #:** 164 **Map Date:** 29 June
Date: 8/16/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85HT003	
Investigators: JB, JA				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 582.		
Latitude: 63°15'32.89	**Longitude:** 149°16'06.07			**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 1	**Picture No.:** P_veg_veg-pit-plug, N, S		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): slight swale
Slope (%): 0-3	Local relief (concave, convex, none): undulating / slightly concave
Pre-mapped Alaska LNG/NWI classification: PF04/1B	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___, 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/F04B
Wetland Hydrology Present? Yes X No___	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.

Slight Swale feature in otherwise PF04/1B forest. Swale was a slightly concave & undulating. Dense Alder w/ diverse forb community surrounding forest toward LE 582 was wet. Alders very thick.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	30	Y	FacU
2.			
3.			
4.			

Total Cover: 30

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

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix pulchra 6-10'	60	Y	FACW
2. Alnus viridis fruticosa	T		FAC
3. Dasiphora fruticosa	3		FAC
4. Salix bebbiana 6-10'	10		Fac
5. Spiraea stevensii	T		FacU
6.			
7.			
8.			
9.			

Total Cover: 73

50% of total cover: 36.5 20% of total cover: 14.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 6 X 1 = 6

FACW species: 130 X 2 = 260

FAC species 66 X 3 = 198

FACU species 32 X 4 = 128

UPL species X 5 =

Column Totals: 234 (A) 592 (B)

PI = B/A = 2.52

Comarum palustre	H	6	OBL
Petasites frigidus	H	2	Fac W
composit sp	H	T	—
Saxifrag sp	H	3	—
succulent sp	H	1	—
trientalis europaea	H	T	Fac U
Parnassia palustris	2	2	Fac W
Carex disperma	H	20	FACW Y

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rubus chamaemorus	7		FACW
2. Equisetum palustre	30	Y	FACW
3. Equisetum sylvaticum	35	Y	FAC
4. Rubus arcticus	2		Fac
5. viola sp	T		—
6. rumex Arcticus	1		FacW
7. Calamagrostis canadensis	15		Fac
8. Mertensia paniculata	2		FacU
9. Sangasorba canadensis	7		FACW
10. Galium trifidum	2		FACW
Aconitum delphinifolium		T	T

Total Cover: 131

50% of total cover: 65.5 20% of total cover: 26.2

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

6 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

1 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

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

WETLAND DETERMINATION DATA FORM

8/16/15 W8SHT003

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
0-6								Saturated organics
6-10							muck	saturated organics
10-14	10YR 5/1	60	10YR 5/4	10	Con	M	very gravelly clay loam	high gravel + cobble pick up
"	10YR 5/2	20	5Y 5/1	10	Dens	M		
14-+	same as Bg1						very gravelly 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) Y	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N Need
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) Muck 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: Y Depth (inches): 14 calling Dense clay layer as restrictive.

Hydric Soil Present (Y/N): Y

Notes: Neg XX. Thick organic w/ 4" of muck. Clay acting as restrictive layer

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

Surface Water Present (Y/N): 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: 44	

Notes:

4.87

AQUATIC SITE ASSESSMENT DATA FORM

W8SHT003 8-16-15

VEGETATION VARIABLES P= Plot, M= Matrix

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

Percent Cover (P): Tree (>5 dbh, >6m tall) 30 Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m) 70 Short shrub (0.5-2m) 3 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) 15 Short herb (<1m) 1 Moss-Lichen 80 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_____ 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) _____ 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__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

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

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

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

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

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

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 4.87

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)_____ Large (>100 acres)__X__

Crew Chief QA/QC check: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT003 Field Target: 15088 Date: 8/16/15

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

1. Site Description

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

2. Vegetation

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

3. Soil

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

4. Hydrology

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

5. Functions and Values

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

6. Field Logbook

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

7. Maps

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

8. Photos

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

X Jennifer Anderson — X [signature] 8/18/15

Wetland Scientist (print) — Signature / Date

X Jessie Brownlee — X [signature] 8.18.15

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

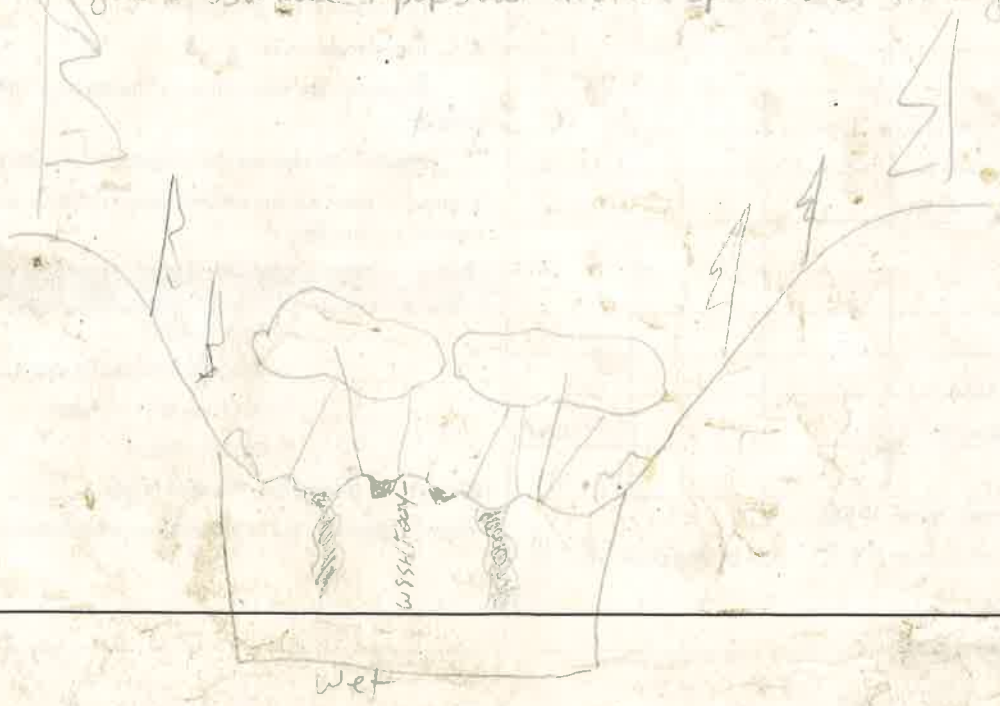
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15078	**Map #:** 172 **Map Date:** 6.29.15
Date: 8.16.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** WBS HT004	
Investigators: JB, JA				**Team No.:** WBS
State: Alaska	**Region:** Alaska	**Milepost:** 590.8		
Latitude: 63°09'20.87"	**Longitude:** 149°22'30.94"		**Datum:** WGS84	
Logbook No.: 3	**Logbook Page No.:** 1	**Picture No.:** P_vegwesn Rt. plug N.S		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): swale
Slope (%): 5-8	Local relief (concave, convex, none): concave/undulating
Pre-mapped Alaska LNG/NWI classification: U', 1A2, 11B2	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 X, or Hydrology____ Naturally Problematic?	No____ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSSIC
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11B1

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

Swale feature draining up slope, several small channels bisect this tall dense Alder thicket. High forb diversity. Use Lidar for drawing in feature. Channel goes subsurface & pops out in other spots. wet throughout swale.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

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

Total Cover: ____

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

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix bebbiana	T		FAC
2. Alnus incana tenuifolia	65	Y	FAC
3. viburnum edule	7		FACU
4. Salix pulchra	10		FACW
5.			
6.			
7.			
8.			
9.			

Total Cover: 82

50% of total cover: 41 20% of total cover: 16.4

Dominance Test worksheet:

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

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

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	X 1 =	
FACW species: 26	X 2 =	52
FAC species 110	X 3 =	330
FACU species 49	X 4 =	196
UPL species	X 5 =	
Column Totals: 185	(A)	558 (B)

PI = B/A = 3.01

Saxifrag sp	H	T	—
Heracleum maximum	H	T	FACU
Equisetum sylvaticum	H	13 Y	FAC
Gymnocarpium dryopteris	H	2	FACU
Trientalis europaea	H	T	
Chamerion angustifolium		2	FACU
Rhododendron tristeE	H	7	FAC
Rubus Arcticus	H	5	FACU

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Mertensia paniculata	8		FACU
2. Sanguisorba canadensis	9	Y	FACW
3. Thalictrum occidentale	5		FACU
4. Streptopus amplexifolius	1		FACU
5. Equisetum pratense	7		FACW
6. viola spp	6		—
7. aconitium delphinifolium	3		FAC
8. Calamagrostis canadensis	20	Y	FAC
9. Phegopteris connectilis	15	Y	FACU
10. Dryopteris expansa	10		FACU
Rubus arcticus			FAC

Total Cover: 103

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

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

20 % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.16.15 WBSHT004 Y

SOIL Date _____ Feature ID _____ Soil Pit Required (Y/N) _____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
A 0-2	10YR 3/2	100					sandy loam	
Bw 2-5	10YR 3/2	100					loamy coarse sand	
C 5-6	—						gravels	
Ab1 6-7	10YR 2/2	100					sandy loam	
B 7-8	10YR 3/2	100					loamy coarse sand	
Ab2 8-9	10YR 2/1	100					sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Soils show repeated signs of depositional events from the many channels running through the drainage. The above description is repeated to depth. Neg α α. Soil does not make specific indication but can be assumed to be saturated for 2 consecutive weeks

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) 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): Y	Depth (in): 3	**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: 20	5.14 pH

Notes: Watertable to surface.

AQUATIC SITE ASSESSMENT DATA FORM

WBSHT004 8.16.15

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_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)_65_____ Short shrub (0.5-2m)_17_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _23_____ Short herb (<1m) _30_____ Moss-Lichen_40_____ 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_____ Lacustrine Fringe_____ Depressional _____ Riverine _X_____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_X_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_X_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_X_____

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)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_____ **pH Reading** 5.14

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: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT004 Field Target: 15078 Date: 8/16/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 8/16/15

Wetland Scientist (print) — Signature / Date

X Jessie Broomhall — X [signature] 8.18.15

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

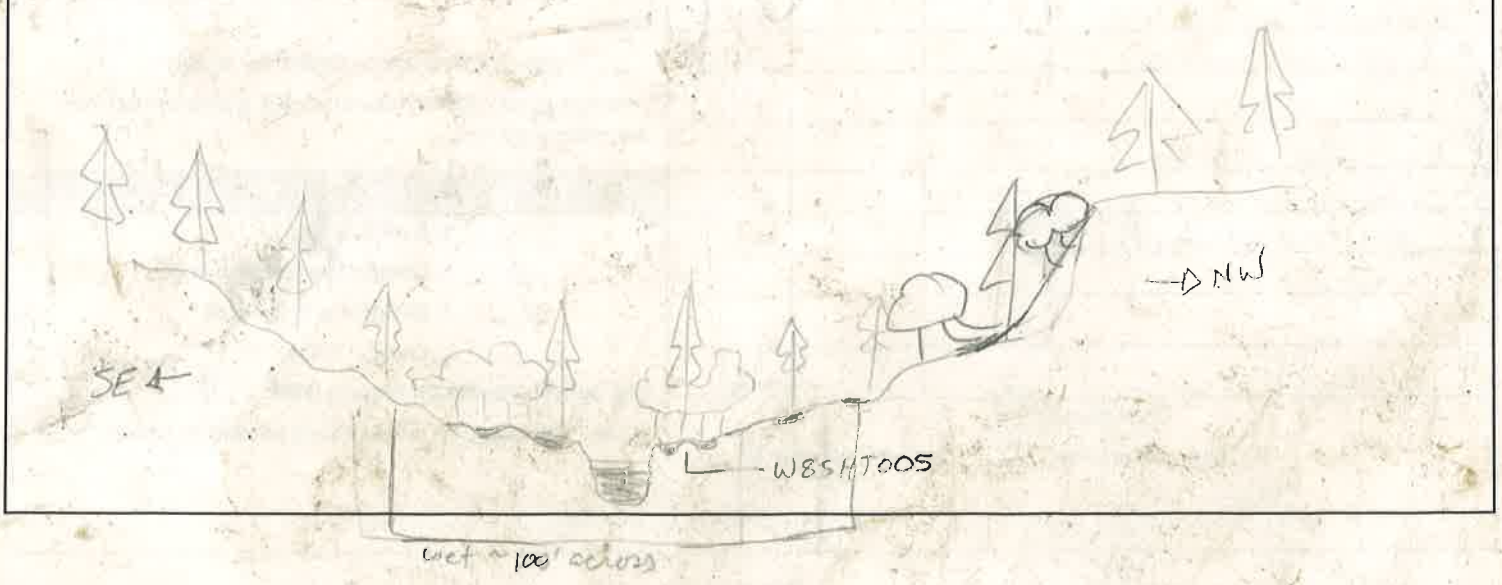
SITE DESCRIPTION			
Survey Type: Centerline X Access Road (explain)____ Other (explain)____		Field Target: 15076	Map #: 174 Map Date: 6.29.15
Date: 8/16/15	Project Name & No.: Alaska LNG 60418403		Feature Id: W85HT005
Investigators: JB, JA			Team No.: W85
State: Alaska	Region: Alaska	Milepost: 592.3	
Latitude: 63°08'33.49		Longitude: 149°24'14.79	Datum: WGS84
Logbook No.: 3	Logbook Page No.: 2	Picture No.: P_Veg_Veg_-pit, plug	

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 5-8	Local relief (concave, convex, none): ↔ concave / undulating ↕
Pre-mapped Alaska LNG/NWI classification: U, 1A2, 11B2	Evidence of Wildlife Use: Old 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 X, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No X	Is the Sampled Area within a Wetland? Yes X No____
Hydric Soil Present? Yes X No____	Wetland Type: PF04/SS1C
Wetland Hydrology Present? Yes X No____	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.

R3UBH stream that drains from CZ 592.2. Use Lidar to map. ~100' of swale is wet w/ standing water indepressions & sphagnum. Veg on either side of swale is mature open Pic Cola forest that is dry. Swale is Picgla 30+' tall w/ surrounding trees ~50'. Alnus & Salix shrub community ~ 6-10' tall in swale feature w/ Diverse forb community



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	35	Y	FACU
2.			
3.			
4.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium ovalifolium	6		FAC
2. Vaccinium vitis-idaea	T		FAC
3. Salix bebbiana	8		FAC
4. Spiraea stevenii	8		FACU
5. Empitrum Nigrum	T		FAC
6. Alnus incana tenuifolia	3		FAC
7. Salix pulchra	50	Y	FACW
8.			
9.			

Total Cover: 77

50% of total cover: 38.5 20% of total cover: 15.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	54	X 2 =	108
FAC species	80	X 3 =	240
FACU species	65	X 4 =	260
UPL species	0	X 5 =	0
Column Totals:	199	(A)	608 (B)

PI = B/A = 3.05

Viola	5		N/A
Saxifraga	T		N/A
aconitum delphiniifolium	T		FAC
Rumex Arcticus	1		FAC
Streptopus amplexifolius	T		FACU
Calamagrostis canadensis	20	Y	FAC
trientalis europaea	T		FACU
Geranium erianthum	T		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	10		FACU
2. Chamerion angustifolium	T		FACU
3. Sanguisorba canadensis	2		FACW
4. Rubus arcticus	T		FAC
5. Equisetum sylvaticum	15		FAC
6. Equisetum arvense	25	Y	FAC
7. Gymnocarpium dryopteris	12		FACU
8. Succulent	T		
9. Poa sp	T		
10. Pyrola grandiflora	2		FAC

Total Cover: 87

50% of total cover: 43.5 20% of total cover: 17.4

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

100 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

5 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.16.15 W8SH+005 Y

SOIL	Date_____	Feature ID_____	Soil Pit Required (Y/N)_____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
Oi	0-4								Saturated organics
Oe	4-6								Saturated organics
Bw	6-12	10YR 4/1	100					very gravelly silt loam	
Bw2	12-+	2.5Y 4/1	100					very gravelly clay loam & very dense	

[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) Positive XX

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Y Depth (inches): 12 dense clay loam acting as restrictive feature

Hydric Soil Present (Y/N): Y

Notes: Soil does not meet exact indicator but it meets the requirements of being saturated for 2 consecutive weeks. No indicator needed. Positive XX throughout

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) Y
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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: [illegible]	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 4	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 2	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): Ø	**EC:** 20

Notes: Wet. Packets of standing water, water table to surface. Draining wetland at LFZ 592.2 5.35

WRSHT005
8.16.15

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_X_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_35_ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_3_ Short shrub (0.5-2m)_74_ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _87_ Moss-Lichen_100_ Floating_____ Submerged_____

Number of Wetland Types (M): _1_ **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_X_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 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) ~~43~~ High (>25) _X_

Presence of Islands (M): Absent (none) _X_____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_X_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _X_____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_X_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ 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_____ 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_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_X_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_X_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_X_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_X_____

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)_____ Alkaline (>7.4)_____ Acid (<5.5)_X_____ **pH Reading** 5.35

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: Jessica Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT005 Field Target: 157076 Date: 8/16/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X 8/16/15

Wetland Scientist (print) Signature / Date

X Jessie Brownell X 8/16/15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

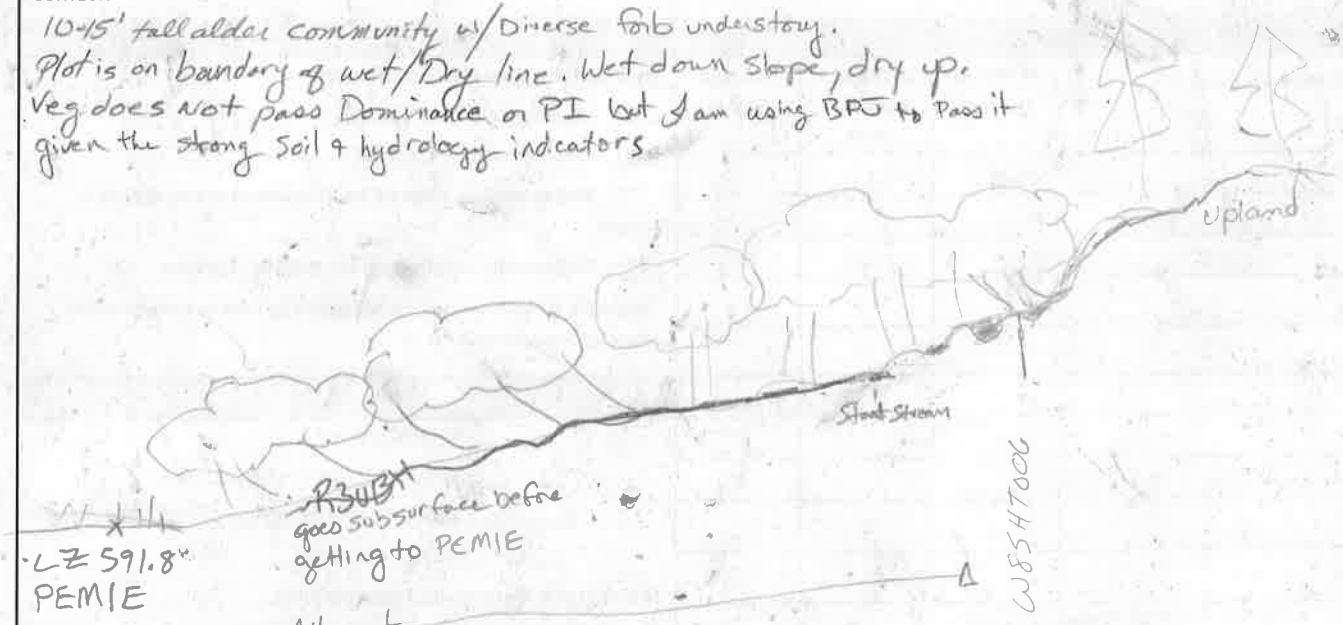
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15077	**Map #:** 173 **Map Date:** 6.29.15
Date: 8.16.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85HT0006	
Investigators: JB, JA				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 591.8		
Latitude: 63°08'54.92		**Longitude:** 149°23'39.04		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 2	**Picture No.:** P_veg-veg, prt_plng		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): swale
Slope (%): 8-10	Local relief (concave, convex, none): concave / undulating
Pre-mapped Alaska LNG/NWI classification: U 1A2 11B2	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 X, Soil____, or Hydrology____ Naturally Problematic?	No____ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes Y No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1C
Wetland Hydrology Present? Yes X 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.

10-15' tall alder community w/ Diverse forb understory.
Plot is on boundary of wet/Dry line. Wet down slope, dry up.
Veg does not pass Dominance or PI but I am using BPU to Pass it given the strong Soil & hydrology indicators



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 15D')	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

Sapling/Shrub Stratum (2b')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Alnus incana tenuifolia	45	Y	FAC
2. Vaccinium ovalifolium	T		FAC
3. Salix bebbiana	10		FAC
4. Ribes triste	T		FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 62

50% of total cover: 31 20% of total cover: 12.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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: 9	X 2 = 18
FAC species 83	X 3 = 249
FACU species 41	X 4 = 164
UPL species	X 5 =
Column Totals: 133 (A)	431 (B)

PI = B/A = 3.24

Mertensia paniculata	6		FACU
saxifrag	1		N/A
Streptopus amplexifolius	+		FACU
Chrysosplenium tetrandrum	T		OBL
Moehringia lateriflora	T		FACU
Equisetum palustre	2		FACW
Heracleum maximum	T		FACU
Calamagrostis canadensis	2		FAC

VEGETATION (use scientific names of plants)

Herb Stratum (2b')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Sanguisorba canadensis	4		FACU
2. Dryopteris expansa	30	Y	FACU
3. Equisetum sylvaticum	18	Y	FAC
4. Rumex arcticus	1		FAC
5. Rubus pedatus	T		FAC
6. Rubus arcticus	T		FACU
7. Poa sp	10		N/A
8. Petasites frigidus	3		FACU
9. Cornus canadensis	T		FAC
10. Viola sp	4		N/A

Total Cover: 76

50% of total cover: 33 20% of total cover: 13.2

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.

5 % Bare Ground

10 % Cover of Wetland Bryophytes

30 Total Cover of Bryophytes

10 % Cover of Water

Hydrophytic Vegetation Present (Y/N): ~~N~~ Y

Notes: (If observed, list morphological adaptations below):

Using BPI to pass Veg despite Not passing Dominance or PI

WETLAND DETERMINATION DATA FORM

8.16.15 WESHT006 Y

SOIL Date 8.16.15 Feature ID WESHT006 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 0-7							Muck	
C 7-9							Cobbles	
Bw1 9-16	10YR 4/2	100					extremely gravelly Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) Muck (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: N Depth (inches):

Hydric Soil Present (Y/N): Y

Notes: Neg αα throughout mineral. 7" of Muck/Oa over very gravely sandy loam. Soil becomes more dense w/ depth turning into a extremely gravelly silt loam.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) 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) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) Y	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 4	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 4		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 37	5.31 pH

Notes: Surface water in pockets of depressions increase as you go down slope. Water table nearly to surface.

AQUATIC SITE ASSESSMENT DATA FORM

W8SHT006 8.16.15

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__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)_____ Tall shrub (2-6m)__45__ Short shrub (0.5-2m)__17__ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) __2__ Short herb (<1m) __64__ Moss-Lichen__30__ Floating_____ Submerged_____

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)__X__

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <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)__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)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.31

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: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: IN85HT826 Field Target: 15077 Date: 8/16/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X _____ 8/16/15

Wetland Scientist (print) Signature / Date

X Jessica Brownlee X _____ 8.18.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain) X **Other** (explain)_____			**Field Target:** 15890	**Map #:** 181 **Map Date:** 6.29.15
Date: 8/17/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85HT007	
Investigators: JB, JA				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 596.5		
Latitude: 63°05'41.69	**Longitude:** 149°28'43.96		**Datum:** WGS84	
Logbook No.: 3	**Logbook Page No.:** 3	**Picture No.:** P- pit, plus. veg. pics		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Bench/glacial Terrace
Slope (%): 3-5	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: U 1A3, 11C2	Evidence of Wildlife Use: N/O
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 11C1, 1A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Pic Cala woodland w/ dense dwarf shrub community Strong hummocking but some are due to downed & covered over trees.
Extremely gravelly sandy soil w/ No signs of hydrology

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.			
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. Empetrum Nigrum	45	Y	Fac
2. Betula nana	15		Fac
3. Vaccinium uliginosum	25	Y	Fac
4. Rhododendrum tomentosum	15		FacW
5. Vaccinium vitis idaea	1		Fac
6. Spiraea stevensii	1		FacU
7. Arctous nigra	T		Fac
8. Picea glauca	5		FacU
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: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of: Multiply by:

OBL species: _____ X 1 = _____

FACW species: 15 X 2 = 30

FAC species 76 X 3 = 228

FACU species 24 X 4 = 84

UPL species _____ X 5 = _____

Column Totals: 112 (A) 342 (B)

PI = B/A = 3.05

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	T		FacU
2. ~~Arctous Sulcata~~	~~T~~		~~Fac~~
3.			Fac
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: T

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

Ø % Cover of Wetland Bryophytes

85 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.17.15 W8SHT007

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 %	Type[1]	Loc[2]	Texture	Notes
Oe/A	0-2	10						Loam	
E	2-3	10YR 4/2	100					fine sandy loam	
Bs	3-4	7.5YR 3/3	100					very gravelly sandy loam	
Bm	4-7	10YR 2/1/Black	100					very gravelly coarse sandy loam	very black cemented horizon
C	7-6	NA	100					very gravelly coarse sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC 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): —

Hydric Soil Present (Y/N): N

Notes: Slight E/Bs horizon over very gravelly sandy soil. Black horizon may be evidence of past fire.

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~~ 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:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	**EC:** —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W185HT007 Field Target: 15290 Date: 8.17.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X 9/2/15

Wetland Scientist (print) Signature / Date

X Jessie Brownlee X 8.17.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15070	**Map #:** 140 **Map Date:** 6.29.15
Date: 8/7/15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W8SHT008
Investigators: JB JA				**Team No.:** 1085
State: Alaska	**Region:** Alaska	**Milepost:** 596.3		
Latitude: 63°05'45.29" / 63.095914		**Longitude:** -149.974367 / -149°58'27.72"		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 4	**Picture No.:** P_veg_veg-Pit_Plug		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Stream bank
Slope (%): 3-5	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: U: 1A3, 11B2	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____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PF04/SS1C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 1A 2, 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Moved FT from original location b/c of creek that was uncrossable: Surveyed the next closest wet spot to document presence of R3UBH creek & ~25' wetland riparian corridor around creek. 30' Tall Pic Gla & Salix 6-15' tall. Diverse forb community Use lidar to update map. 1 Stream that divides into multi channels wetting a wide area before reconverging. Likely wet on other side of creek. use Log book 3, page 4 to map original location of FT 15070; it was



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	35	Y	FACU
2.			
3.			
4.			

Total Cover: 35

50% of total cover: 17.5 20% of total cover: 7

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	2		FACU
2. vaccinium ovalifolium	T		FAC
3. Salix alexensis	4		FAC
4. Salix pulchra	35	Y	FACW
5. Empidrum nigrum	10		FAC
6. Spiraea stevenii	2		FACU
7. Alder tenuifolia	3		FAC
8.			
9.			

Total Cover: 57

50% of total cover: 28.5 20% of total cover: 11.4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 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:	94	X 2 =	188
FAC species	50	X 3 =	150
FACU species	42	X 4 =	168
UPL species	0	X 5 =	0
Column Totals:	186 (A)		506 (B)

PI = B/A = 2.72

pyrola grandiflora	2	FAC
Dryopteris expansa	2	FACU
Rumex Arcticus	1	FACU
~~Parnassia palustris~~	T	FACW
Moneses uniflora	T	FACU
Chrysosplenium tetrandrum	T	OBL

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis Canadensis	30	Y	FAC
2. Trientalis europaea	T		FACU
3. Aconitum delphinifolium	T		FAC
4. Petasites frigidus	2		FACW
5. Saxifraga sp	3		
6. Equisetum palustre	55	Y	FACW
7. Poa sp	T		
8. Sanguisorba Canadensis	2		FACW
9. Mertensia paniculata	T		FACU
10. Streptopus amplexifolius	T		FACU

Total Cover: 97

50% of total cover: 48.5 20% of total cover: 19.4

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

~ 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.

CD % Bare Ground

40 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

8 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.17.15 W8SHT008 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								
Oe 3-8								
Oa 8-12							Muck	
Oa/A 12-16	10YR 3/2 mineral						Mucky silt loam	30% mineral 70 Oa
Bw 16-+	10YR 3/2	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) A10 Muck

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: X Depth (inches): —

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) 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
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4)	Microtopographic Relief (D4) N
Sediment Deposits (B2) Y	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) Y	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 8	**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): 7	**EC:** 131	5.41

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W85HT008 8.17.15

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved__X__ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)__35__ Sapling (<5 dbh, <6m tall)__2__ Tall shrub (2-6m)__42__ Short shrub (0.5-2m)__13__ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) _____ Short herb (<1m) __97__ 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_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover__X__ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine __X__ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric__X__ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty__X__ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet__X__

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate__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** 5.61

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:

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT008 Field Target: 15070 Date: 8.17.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

- ☑ Site description, site parameters and summary of findings are complete?
- ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. **Maps**

- ☑ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X [signature] 9/2/15

Wetland Scientist (print) Signature / Date

X Jessie Browdlee X [signature] 8.17.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

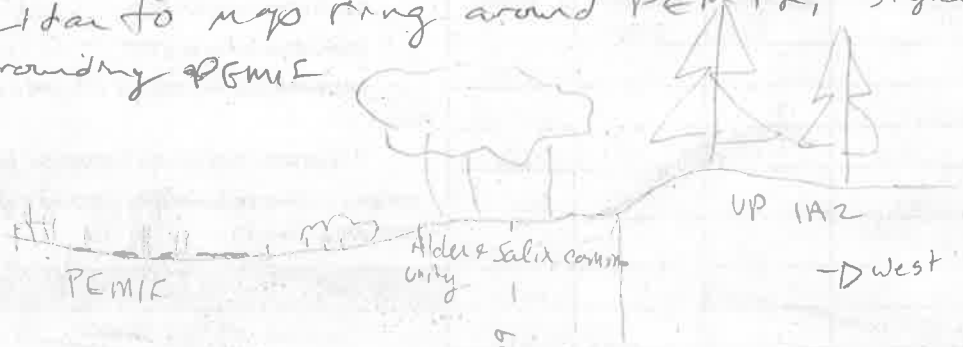
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 150w9	**Map #:** 182 **Map Date:** 6/28/15
Date: 6/17/15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85HTD09	
Investigators: JB, JA				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 596.4		
Latitude: 63° 05'32.26" / 63.092294		**Longitude:** 149°28'21.03" -149.472508		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 4	**Picture No.:** ? pid_plus veg. jpg		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Bear scat
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (If no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1C
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Salix & Alder tall shrub community ringing PEMIF. Standing water, mucky organics. Point is @ boundary where to the West ground raises in elevation and dries out. Use Lidar to map ring around PEMIF, Signature is a narrow band surrounding PEMIF



This survey point is higher in tall shrub but the signature ringing the PEMIF is PFO4/SS1B

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (26')	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Alnus incana tenuifolia	30	Y	FAC
2. Salix pulchra	45	Y	FACW
3. Viburnum edule	2		FACW
4. Dasiphora fruticosa	T		FAC
5. Salix bebbiana	T		FAC
6.			
7.			
8.			
9.			
Total Cover: 77			
50% of total cover: 38.5	20% of total cover: 15.4		

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	49	X 2 =	98
FAC species	72	X 3 =	216
FACU species	23	X 4 =	92
UPL species	0	X 5 =	0
Column Totals:	144 (A)		406 (B)

PI = B/A = 2.81

Petasites Frigidus	T		FACW
Rubus triste	T		FAC
Equisetum arvense	30	Y	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	20	Y	FACU
2. Sanguisorba canadensis	3		FACW
3. Aconitum delphiniifolium	T		FAC
4. Calamagrostis canadensis	20	Y	FAC
5. Geranium erianthum	T		FACU
6. Rumex arcticus	1		FAC
7. Ribes arcticus	1		FAC
8. Streptopus amplexifolius	T		FACU
9. Mertensia paniculata	1		FACW
10. Viola sp	2		
Total Cover: 69			
50% of total cover: 34.5	20% of total cover: 13.8		

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):

WETLAND DETERMINATION DATA FORM

W18SHT009 8.17.15 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 0-6	Black							saturated organics
OA 6-11	Black						Muck	saturated organics
11-18	10YR3/3	100					extremely gravelly loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC 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) Muck 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: N Depth (inches):

Hydric Soil Present (Y/N): Y

Notes: 11" of organics (Black) (Saturated) 5" of muck over extremely gravelly sandy soil

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) 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)	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): Y	Depth (in): 4	**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): 2	EC: 76	5.7 pH

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

WESHT009 8/7/15

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall) 0 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 75 Short shrub (0.5-2m) 2 Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) 10 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_____ 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) 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 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** 5.7

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 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: W85HT009 Field Target: 15069 Date: 8.17.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☑ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X [signature] 8/2/15

Wetland Scientist (print) Signature / Date

X Jessie Brownlee X [signature] 8.17.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15071	**Map #:** 179 **Map Date:** 6.29.15
Date: 8.14.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W8SHTO10	
Investigators: JB JA				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** 595.2		
Latitude: 63°06'40.14		**Longitude:** 149°27'51.86		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 5	**Picture No.:** P_Pit_Plug_Veg_Veg		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.): hillside
Slope (%): 3-5	Local relief (concave, convex, none): slightly concave
Pre-mapped Alaska LNG/NWI classification:	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) 3 days of rain	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1/F04B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II B2, I A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Moved location of FT 15071 from an obvious wet spot to this site that is wet but mapped as Upland

Open tall alnus community in 26'x26' plot but Pic Gla open forest outside of plot. Area is wetter than mapped with the PEMIB's draining down slope in to the Pic Gla forest. On transect from LZ we crossed a R4SB with a wet riparian area around it in thick alder and surround Pic Gla

Extremely cobble soil. Organics vary from 4-8" depth and are muck from 4" down. Little mineral soil folae found.

Map was updated to reflect the R4SB and wet rings around the PEMIB wetlands. Calling wetland Slope HGM based on it position in relation to large wetland above it draing down slope. Low EC of 25 is more influenced by rain in past 3 days & doesnt represent the landscape position

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	Fac U
2.			
3.			
4.			
Total Cover: 20			
50% of total cover: 10 20% of total cover: 5			
Sapling/Shrub Stratum (26)	**Absolute % Cover**	**Dominant Species? (Y/N)**	**Indicator Status**
1. Alnus incana tenuifolia	40	Y	FAC
2. Spiraea stevenii	7		FACW
3. Picea Glauca	T		FACU
4.			
5.			
6.			
7.			
8.			
9.			
Total Cover: 47			
50% of total cover: 23.5 20% of total cover: 9.4			

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	3	X 2 =	6
FAC species	126	X 3 =	378
FACU species	40	X 4 =	160
UPL species	0	X 5 =	0
Column Totals:	169 (A)		544 (B)

PI = B/A = 3.21

VEGETATION (use scientific names of plants)

Herb Stratum (210)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum arvense	25	Y	FAC
2. Sanguisorba canadensis	3		FACW
3. Rubus chamaemorus	1		Fac
4. Trientalis europaea	1		FACU
5. Viola sp	3		—
6. Fern sp	+		—
7. Dryopteris expansa	7		FACU
8. Rubus arcticus	5		Fac U
9. Equisetum sylvaticum	20	Y	Fac
10. Rumex arcticus	+		Fac
Total Cover: 105			
50% of total cover: 52.5 20% of total cover: 21			

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,

Ø % Bare Ground

30 % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Calamagrostis canadensis	Y	40	Fac
Streptopus amplexifolius		T	FacU

WETLAND DETERMINATION DATA FORM

8.18.15 W8SHT010 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	10YR 2/1							organics depth varies throughout pit Based on rocks from 4 to 8". Organics filling void space around rocks to 12". Averaged depth to get 4".
Oa 4-6	10YR 2/1						Muck	
C 6-17							Cobble	small amount of mineral throughout

[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) A10 Muck

[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: NO Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: Positive αα in organic layer & the little bit of mineral that I could find. Two inches of muck from 4-6" and @a material filled in voids between rocks.

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) 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) 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): 0	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 5		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 25	5.13 pH soil pit

Notes: Calling HGM slope despite the low EC. Low EC is due to several days of rain but primary source of water is slope driven.

AQUATIC SITE ASSESSMENT DATA FORM

W85 HT 010 8.18.15

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 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) 20 Sapling (<5 dbh, <6m tall)____ Tall shrub (2-6m) 40 Short shrub (0.5-2m) 7 Dwarf shrub (<0.5m) ____ Tall herb (≥1m) ____ Short herb (<1m) 105 Moss-Lichen 60 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 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.) X Well Developed (6-18in.)____ Pronounced (>18in.)____

Frequency of Overbank Flooding (P): No Overbank Flooding X Return Interval 1-2 yrs____ Return Interval 2-5 yrs____ Return Interval >5 yrs____

Degree of Outlet Restriction (P): No Outflow X Restricted Outflow____ Unrestricted Outflow____

Water pH (P): No surface water____ Circumneutral (5.5-7.4)____ Alkaline (>7.4)____ Acid (<5.5) X **pH Reading** 5.13

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)____ Medium (10-100 acres) X Large (>100 acres)____

Crew Chief QA/QC check: Jessie Brownlee GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT010 Field Target: 15071 Date: 8.18.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson X [signature] 9/2/15

Wetland Scientist (print) Signature / Date

X Jessie Brownlee X [signature] 8.18.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

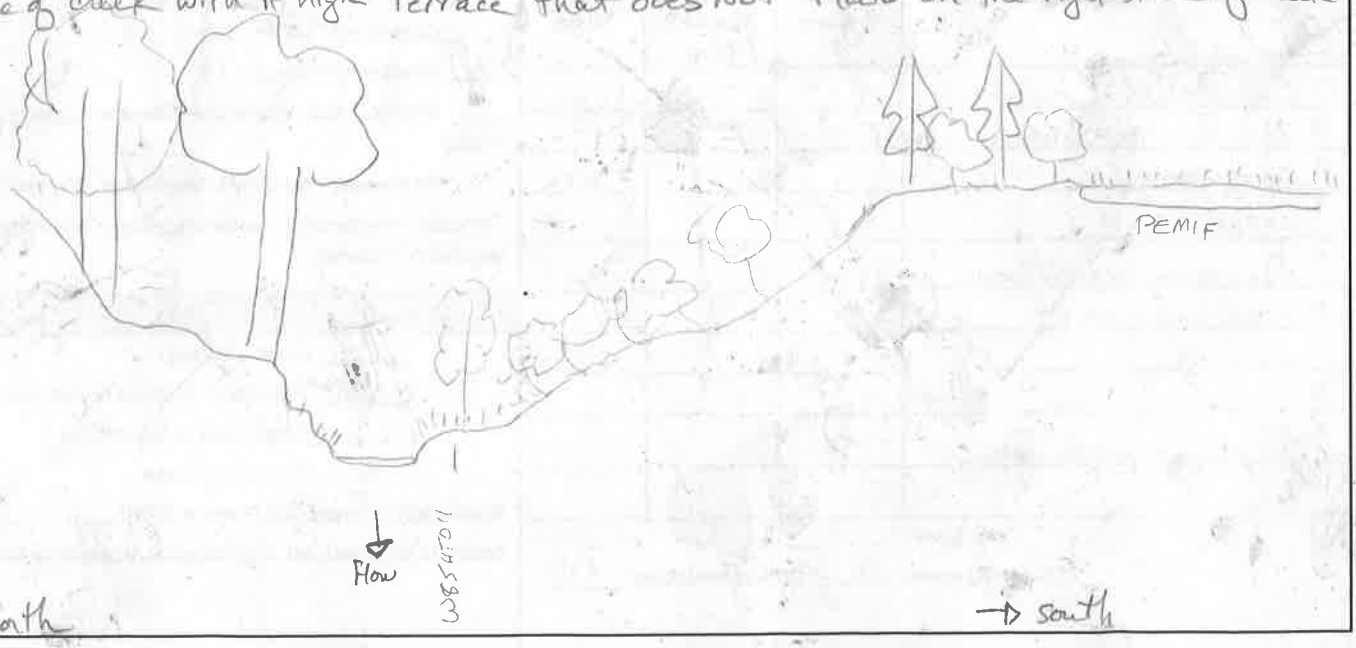
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15072	**Map #:** 179 **Map Date:** 6.29.15
Date: 8.18.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W8SHTOII	
Investigators: JBJA				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** 594.9		
Latitude: 63° 06' 47.86		**Longitude:** 149° 27' 19.78		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 6	**Picture No.:** P_pit, plug, veg, veg		

SITE PARAMETERS			
Subregion: Alaska Range		Landform (hillslope, terrace, hummocks, etc.): Flood lowK	
Slope (%): 3-5		Local relief (concave, convex, none): Concave; undulating	
Pre-mapped Alaska LNG/NWI classification: U:1A2 11B2		Evidence of Wildlife Use: Moose (?) droppings	
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:** PSS1B	
Wetland Hydrology Present? Yes X No____		Alaska Vegetation Classification (Viereck): 11 B2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Field target location is ~150' to the west lower down on creek but essentially same signature as here. R30BH ~ 4' wide and 6" deep, substraight of gravells. Small flood plain on the left side of creek with A high Terrace that does not Flood on the right side of creek



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 40')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera	10	Y	FACW
2. Picea glauca	4	Y	FACU
3.			
4.			

Total Cover: 14

50% of total cover: 7 20% of total cover: 2.8

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix bebbiana	20	Y	FAC
2. Salix Alaxensis	25	Y	FAC
3. Sorbaria Sieversii	T		FACU
4. Viburnum edule	T		FACU
5.			
6.			
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: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	2	X 2 =	4
FAC species	80	X 3 =	240
FACU species	14	X 4 =	56
UPL species		X 5 =	
Column Totals:	96	(A)	300 (B)

PI = B/A = 3.125

Dryopteris expansa T H FACU

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	15	Y	FAC
2. Thalictrum occidentale	T		FACU
3. Sanguisorba officinalis	2		FACW
4. ranunculus sp	5		—
5. Thalictrum sparsiflorum	T		FACU
6. Equisetum arvense	10	Y	FAC
7. viola sp	5		—
8. fern sp	T		
9. Streptopus amplexifolius	T		
10.			

Total Cover: 37

50% of total cover: 18.5 20% of total cover: 7.4

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.

15 % Bare Ground

0 % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8.18.15 W8SHT011 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 0-3	2.5Y 3/2	100					Loamy sand	
C 3-8	NA	100					coarse sand w/ small isolated pockets of silt loam	
C 8-10	NA	50	5YR 3/4	50			coarse sand stained in iron	
OA 10-12	10YR 3/2	90	5YR 3/4	10	C	M	mucky silt loam	
Ob/Bg 12+	Black and	40					mucky silt loam	Black/Grey depleted horizon
	2.5Y 3/1	60						

[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) M		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) A10 Muck

[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): —

Hydric Soil Present (Y/N): Y

Notes: Positive α α starting @ 10.5" and reacting to depth Hydrogen Sulfide @ 17" The band of iron concentrations in the sandy soil from 10-12 inches show signs that the water table reaches this high up in the profile.

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) 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) N
Sediment Deposits (B2) Y	Hydrogen Sulfide Odor (C1) @ 17" SO No	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): Ø	Depth (in): N	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 17		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 12	EC: 240 water chemistry taken from 6.5 pH creek.	

Notes: Marginal Saturation (@ 12") Site shows evidence of repeat flooding with a water table fluctuating between 10-17"

AQUATIC SITE ASSESSMENT DATA FORM

W8SHT011

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) 14 Sapling (<5 dbh, <6m tall)____ Tall shrub (2-6m) 35 Short shrub (0.5-2m) 20 Dwarf shrub (<0.5m) ____ Tall herb (≥1m) ____ Short herb (<1m) 37 Moss-Lichen 45 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____ 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) ____ Moderately Abundant (25-50% of surface) X Abundant (>50% of surface) ____

Vegetative Interspersion (P): Low (large patches, concentric rings) X Moderate (broken irregular rings)____ High (small groupings, diverse and interspersed) X

HGM Class (P): Slope____ Flat____ Lacustrine Fringe____ Depressional ____ Riverine X Estaurine Fringe____

SOIL VARIABLES

Soil Factors (P): Soil Lacking____ Histosol:Fibric____ Histosol:Hemic____ Histosol: Sapric____ Mineral: Gravelly____ Mineral: Sandy X Mineral: Silty____ Mineral: Clayey____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet____ No Inlet/Intermittent Outlet____ No Inlet/Perennial Outlet____ Intermittent Inlet/No Outlet____ Intermittent Inlet/Intermittent Outlet____ Intermittent Inlet/Perennial Outlet____ Perennial Inlet/No Outlet____ Perennial Inlet/Intermittent Outlet____ Perennial Inlet/Perennial Outlet X

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded ____

Evidence of Sedimentation (P): No Evidence Observed____ Sediment Observed on Wetland Substrate X 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 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** 6.5

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: Jessie Brownlee

GPS Technician QA/QC check: [signature]

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HTO11 Field Target: 15072 Date: 8·18·15

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?

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] 9/21/15 — Signature / Date

X Jessie Brownlee — Field Crew Chief (print)

X [signature] 9.18.15 — Signature / Date

WETLAND DETERMINATION DATA FORM

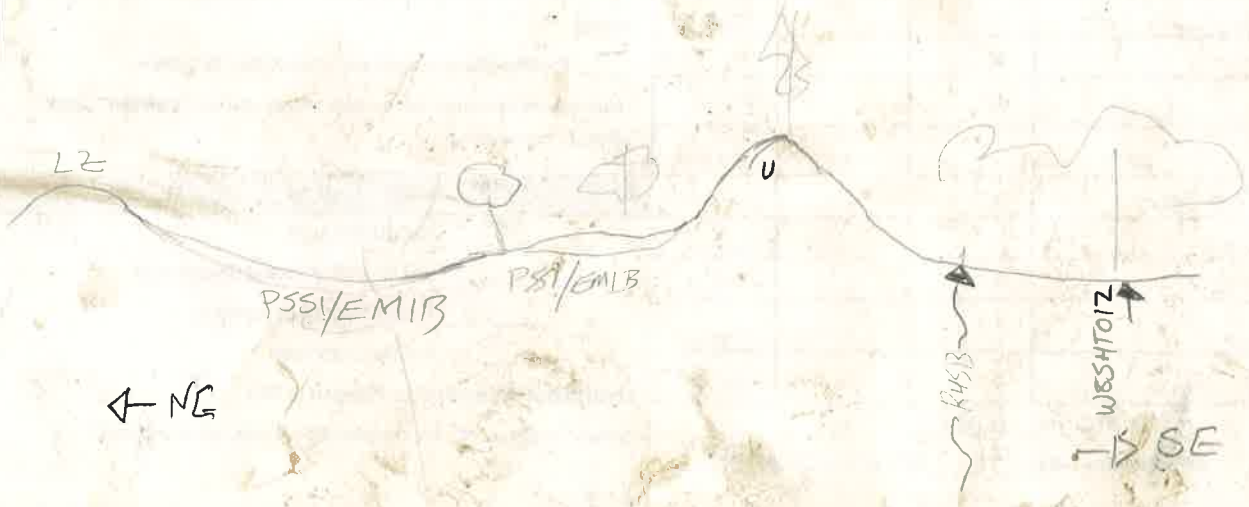
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)_____ **Other** (explain)_____			**Field Target:** 15066	**Map #:** 185 **Map Date:** 6.29.15
Date: 8.18.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85HT012	
Investigators: JB, JA				**Team No.:** W8
State: Alaska	**Region:** Alaska	**Milepost:** 602.2		
Latitude: 63 01'12.74	**Longitude:** 149°32'10.19		**Datum:** WGS84	
Logbook No.: 3	**Logbook Page No.:** 6	**Picture No.:** P_Veg_Veg_Pit_Plug		

SITE PARAMETERS	
Subregion: Alaska Range	Landform (hillslope, terrace, hummocks, etc.):
Slope (%): 0-3	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1/EMIB IIB1 IIIA2	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) 3 days of rain	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PSS1B
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): IIB1, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Salix and Alder Tall shrub community w/ diverse forb community. Topography drives Wet/Dry call here. High amount of glacial features such as knob that FT was originally on. Calling Wetland a slope HGM Despite Low EC based on 3 days of rain and also the plots location on the landscape, specifically down slope of PUBH.



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			

Total Cover:_____

50% of total cover:_____ 20% of total cover:_____

Sapling/Shrub Stratum (30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Salix Pulchra	70%	Y	FACW
2. Alnus incana tenuifolia	3%		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 73

50% of total cover: 36.5 20% of total cover: 14.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	77	X 2 =	154
FAC species	84	X 3 =	252
FACU species	7	X 4 =	28
UPL species	0	X 5 =	0
Column Totals:	168 (A)		434 (B)

PI = B/A = 2.58

Petasites frigidus		2	FACW
Equisetum Arvense	Y	50	FAC
Polemonium acutiflorum		5	FAC
Trientalis europaea		T	FACU
Ranunculus sp		3	—
calamagrostis canadensis	Y	20	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Aconogonon alaskanum	3%		FAC
2. Streptopus amplexifolius	1%		FACU
3. Viola sp	4		—
4. Aconitum delphiniifolium	1		FAC
5. Poa sp			—
6. Rhodiola rosea	T		—
7. Rubus Arcticus.	3		FACU
8. Mertensia paniculata	3		FACU
9. Rumex arcticus	2		FAC
10. Sanguisorba officinalis	5		FACW

Total Cover: 102

50% of total cover: 51 20% of total cover: 20.4

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

20 % Cover of Wetland Bryophytes

45 Total Cover of Bryophytes

15 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

8-18-15 . WESHT012

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 %	Type[1]	Loc[2]	Texture	Notes
Oe	0-3								Saturated organics
Oa	3-5							Mucky	Saturated organics
Bw1	5-8	10 YR 4/2	80	7.5YR 3/4 / 7.5YR 4/4	10 / 10	C / C	M RC / M RC	silt loam	
Bw2	8-15	2.5Y 4/2	80	7.5YR 3/4 / 7.5YR 4/4	10 / 10	C / C	M RC / M RC	silt loam	
Bw2	15-+	2.5Y 5/2	100					very cobbly clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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: Y clay loam Depth (inches): 15

Hydric Soil Present (Y/N): Y

Notes: Negative XX

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) ~~N~~ Y AB
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): 2"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): Ø	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): Ø	EC: 22 5.6 pH

Notes: Dense clay loam @ 15" acticting like a shallow aquitard

AQUATIC SITE ASSESSMENT DATA FORM

W8SHTO12 8.18.15

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_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)_73_ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _102_ Moss-Lichen_45_ 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_____ 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_____ Circumneutral (5.5-7.4)_X_ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _5.6_

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: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85HT012 Field Target: 15066 Date: 8.18.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 9/2/15

Wetland Scientist (print) — Signature / Date

X Jessie Brownlee — X [signature] 8.18.15

Field Crew Chief (print) — Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) LNG Plant			**Field Target:** IS 326	**Map #:** 271 **Map Date:** 6.5.15
Date: 6.22.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85INO01	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.4817		**Longitude:** 151° 21.2814		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 36	**Picture No.:** W85INO01 1 thru 4		

SITE PARAMETERS			
Subregion: South Central		Landform (hillslope, terrace, hummocks, etc.): Terrace / Bluff	
Slope (%): 3-5		Local relief (concave, convex, none): Flat to slightly concave	
Pre-mapped Alaska LNG/NWI classification: 1B2		Evidence of Wildlife Use: Moose in sight; Brown creeper	
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)		Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)	
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)		
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)		

SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes X No____		**Is the Sampled Area within a Wetland?** Yes____ No X	
Hydric Soil Present? Yes____ No X		**Wetland Type:** U	
Wetland Hydrology Present? Yes____ No X		Alaska Vegetation Classification (Viereck): 1B1	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Closed stand of Bet Nea about 50' tall. About 50% are ≥ 3" DBH. Saplings are same height as trees. Few Shrubs in understory but thick lush Forb community.
Soil dry with ~10% gravels throughout. Sight E/Bs in Bw1 horizon.
No signs of hydrology.
Area and signature are Dry uplands

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	50	Y	FAC
2. ~~Picea glauca~~ (JF)			~~FACU~~
3.			
4.			

Total Cover: 50

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. vaccinium vitis-idaea	T	N	FAC
2. Spiraea stevenii	T	N	FACU
3. Lianaea borealis	20	Y	FACU
4. viburnum edule	7%	N	FACU
5. Ribes triste	3%	N	FAC
6. Rosa acicularis	3%	N	FACU
7. Betula neoalaskana	30	Y	FAC
8. Picea glauca	7%	N	FACU
9.			

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: 4 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: .57 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	4	X 2 =	8
FAC species	125	X 3 =	375
FACU species	106	X 4 =	424
UPL species	0	X 5 =	0
Column Totals:	235 (A)		807 (B)

PI = B/A = 3.43

grass 2	T	N	—
Calamagrostis canadensis	7%	N	FAC
Bolium boreale	3%	N	FACU
Rubus pedatus	15	Y	FAC
Aconitum delphiniifolium	3%		Fac

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	3%	N	FACU
2. Gymnocarpium dryopteris	40%	Y	FACU
3. Achillea millefolium	10%	Y	FACU
4. Trientalis europaea	4%	N	FACU
5. Chamerion angustifolium	7%	N	FAC
6. Equisetum arvens	10%	Y	FAC
7. Sanguisorba canadensis	4%	N	FACW
8. Caeranium erianthum	7%	N	FACU
9. Streptopus amplexifolius	2	N	FACU
10. grass SP	3%	N	—

Total Cover: 118

50% of total cover: 59 20% of total cover: 23.6

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

0 Morphological Adaptations[1] (Provide supporting data in Notes)

0 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

35 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

10.22.15 W8SIN001 Y

SOIL Date 10.22.15 Feature ID W8SIN001 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
Oi	0-2								
A	2-3	10YR 3/2	100					Fine Sandy Loam	
Bw1	3-15	10YR 3/4						Coarse Sandy Loam	Charcoal
		10YR 5/2							horizon has pockets of E+Bs material
		10YR 5/6							
Bw2	15-24	2.5Y 5/3	100					Coarse Sandy Loam	Gravel increase

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Soil color taken dry. Gravels increase w/ depth. Slight E/Bs pockets throughout Bw1

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): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes:
Dry, gravelly soil. No signs of Hydrology

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: Jessie Brownlee 6.22.15

GPS Technician QA/QC check: [signature] 6/22/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W851N001 Field Target: 15326 Date: 6.22.15

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~~ map?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

NA ☐ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☐ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/22/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6.22.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)_____ **Other** (explain) LNG Plant			**Field Target:** 15323	**Map #:** 271 **Map Date:** 6.5.15
Date: 6.22.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85INO02	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.5041	**Longitude:** -151° 21.3771			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 36	**Picture No.:** W85IN002 1 thru 4		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Terrace / Bluff
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: 1C3, 11C2	Evidence of Wildlife Use: Heavily Browsed
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, 111B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site was disturbed in past but considered "normal" now given regrowth & time since disturbance. Top soil Looks like it was scraped off in some places and thick soil mats Placed about site. We dug in what appeared to be a undisturbed location. Surrounding signature has many more trees; Signature verges on 1C3 or 1C2. Listed tree cover in plot will not reflect this given size of tree stratum plot size

Site is dry. Sandy soil which becomes gravely @ ~ 20", No signs of Hydrology.

Veg calculations and plot tried to capture the woodland forb community & therefor a more oblong shaped plot was used.

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. Betula Neoalaskana	3%	Y	FAC
3.			
4.			

Total Cover: 10

50% of total cover: 5 20% of total cover: 2

Sapling/Shrub Stratum (25')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Viburnum edule	3%		FACU
2. Salix pulchra	9%	Y	FACW
3. Spiraea stevenii	1%		FACU
4. Linnaea borealis	T		FACU
5. Picea Glauca	10%	Y	FACU
6. Betula Neoalaskana	5%		FAC
7.			
8.			
9.			

Total Cover: 26

50% of total cover: 13 20% of total cover: 5.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

% Dominant Species that are OBL, FACW, or FAC: .25 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	17	X 2 =	34
FAC species	34	X 3 =	102
FACU species	205	X 4 =	820
UPL species	0	X 5 =	0
Column Totals:	256 (A)		956 (B)

PI = B/A = 3.73

Pyrola asarifolia	T		FACU
Calamagrostis canadensis	15		FAC
Equisetum pratense	4%		FAC
Grass sp	T		—
Carex sp	T		—
Rhinanthus minor	T		FACU
Linnaea Borealis	30%	Y	FACU

VEGETATION (use scientific names of plants)

Herb Stratum (2')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	55%	Y	FACU
2. Coeranium erianthum	25%	Y	FACU
3. Sanguisorba canadensis	10%		FACW
4. Cornus canadensis	40%	Y	FACU
5. Achillia millefolium	5%		FACU
6. Trientalis europaea	15%		FACU
7. Lupinus nootkatensis	4%		FACU
8. Gymnocarpium dryopteris	10%		FACU
9. Stellaria sp	T		FAC
10. Rubus Arcticus	7%		FAC

Total Cover: 220

50% of total cover: 110 20% of total cover: 44

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

0 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.22.15 W8SIN002 Y

SOIL Date _____ Feature ID _____ Soil Pit Required (Y/N) _____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
Oi	0-3								
A	3-6	7.5YR 3/2	100					Loam	Thick roots throughout. Depth of
E/Bs	6-11	10YR 5/2						Fine Sandy Loam	A horizon ranges from 3 to 5"
		7.5YR 4/4							
Bw1	11-20	10YR 3/2						Very Fine Sandy Loam	
Bw2	20-24	10YR 3/2						Gravely Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Colors taken dry. E/Bs was mixed and not consistent throughout.

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): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	**EC:** —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownlee 6.22.15

GPS Technician QA/QC check: [signature] 6/22/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN002 Field Target: 15323 Date: 6.22.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in ~~logbook~~ Map?

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

- [ ] NA Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X 6/22/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X 6.22.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)_____ **Other** (explain) LNG Plant			**Field Target:** 15325	**Map #:** 271 **Map Date:** 6.5
Date: 6.22.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN003	
Investigators: Jessie Brownlee Jennifer Anderson				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.5958		**Longitude:** -151° 21.2767		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 37	**Picture No.:** W85IN003 1 thru 4		

SITE PARAMETERS			
Subregion: Southcentral		Landform (hillslope, terrace, hummocks, etc.): Depression	
Slope (%): 0-3		Local relief (concave, convex, none): Concave	
Pre-mapped Alaska LNG/NWI classification: PEM1/SS4B		Evidence of Wildlife Use: NO	
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 X No_____		Alaska Vegetation Classification (Viereck): III B2, IA3	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site is in a localized Low spot. Area all around it has been disturbed with top soil removed, gravel pit, Co-Co lines, construction area to the North, all disturbance is outside of plot polygon.
Site has large hummocks & low depressions. In March Site looked like it could be a wetland but in June the site is dry with a White spruce woodland & healthy/thick Forb community. Soils are Ashy with ~~strong~~ platy features in the Bw2. Bw2 show signs of seasonal freeze thaw given structure and faint concentrations.
Hydrology Indicator is met based on two Secondary Indicators.
Site likely ponds water for a short time during spring but it dries up shortly there after.
Soil pit was dug in the lowest spot possible on landscape.

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 Colauca	6%	Y	FACU
2.			
3.			
4.			

Total Cover: 6

50% of total cover: 3 20% of total cover: 1.2

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Colauca	10%	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 14

50% of total cover: 7 20% of total cover: 2.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	25	X 2 =	50
FAC species	33	X 3 =	99
FACU species	98	X 4 =	392
UPL species	0	X 5 =	0
Column Totals:	156	(A)	541 (B)

PI = B/A = 3.46

viola sp	H	T	N	—
Poa pratensis	H	T	N	FACU
Carex sp	H	T	N	—
[illegible]	H			
Fritillaria Camschatcensis	H	3%	N	FAC
Calamagrostis canadensis	H	T	N	
Rhinanthus minor	H	T	N	FACU
grass sp	H	T	N	
Taraxicum officinale	H	T	N	FACU
~~Hedysarum Alpinum~~	H	T	N	FACU

VEGETATION (use scientific names of plants)

Herb Stratum (210')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	60%	Y	FACU
2. Sanguisorba Canadensis	5%	N	FACW
3. Equisetum pratense	10%	N	FACU
4. Trientalis europaea	5%	N	FACU
5. Rubus Arcticus	15%	Y	FAC
6. Polemonium acutiflorum	10%	N	FACW
7. Achillia millefolium	3%	N	FACU
8. Aconitum delphinifolium	15%	Y	FAC
9. Stellaria sp	2%	N	
10. Heracleum maximum	10%	N	FACU

Total Cover: 138

50% of total cover: 69 20% of total cover: 27.6

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

30 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.22.15 W85IN003 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 %	Type[1]	Loc[2]	Texture	Notes
Oi 0-2								
A 2-5	10YR 4/4	100					Ashy	
Bw1 5-14	2.5Y 5/4	100					Ashy	
Bw2 14-24	2.5Y 6/3	90	10YR 4/6	5	C	M&RC	Ashy	Few faint
	2.5Y 6/4	5						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) —

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Soil is very ashy. Bw2 horizon is very platy. Bw2 concentrations are faint. Color of soil is result of Ashy parent material and not a depleted matrix

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:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): —		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —	

Notes: Pronounced hummocks with deep depressions. Plot is a localized low spot. Two secondary indicators makes for weak hydrology.

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: Jessie Brownlee 6.22.15

GPS Technician QA/QC check: [signature] 6/22/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INOO3 Field Target: 15325 Date: 6.23.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- NA [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/22/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.22.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) LNG Plant			**Field Target:** 15329	**Map #:** 264 **Map Date:** 6.5.15
Date: 6.23.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN004	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 40.4827		**Longitude:** 151° 21.7647		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 38	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Terrace / Bluff
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: 1C3, 11C2	Evidence of Wildlife Use: Moose beds + 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, 11B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site mixed open woodland w/ healthy Cal Can, Equisetum + forb community. Not very many shrubs + they've been heavily browsed. Large tree stumps on site - human dist. Abandoned junk car and little trash.

Dry E Bhs frost soil.

No signs of hydrology.

Entire polygon is dry. A pile of downed trees is stacked @ Road side of Polygone

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula Neoalaskana	12%	Y	FAC
2. Picea Glauca	6%	Y	FACU
3. Populus balsamifera	2%	N	FACU
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. Chamerion angustifolium	15%	Y	FACU
2. Sanguisorba canadensis	10%	Y	FACW
3. Linnaea borealis	6%	N	FACU
4. Viburnum edule	7%	N	FACU
5. Spirea stevenii	2%	N	FACU
6. Salix pulchra	3	N	FACW
7. Ribes sp	2%	N	—
8. Rosa acicularis	2%	N	FACU
9. Sambucus racemosa	2%	N	FACW

Total Cover: 49

50% of total cover: 24.5 20% of total cover: 9.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 8 (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:	27	X 2 =	54
FAC species	37	X 3 =	111
FACU species	78	X 4 =	312
UPL species	0	X 5 =	0
Column Totals:	142 (A)		477 (B)

PI = B/A = 3.35

Streptopus amplexifolius	H	2%	N	FACU
cornus canadensis	H	10	Y	FACU
~~Dryopteris expansa~~	H			FACU
Carex sp	H	2	N	—
Calamagrostis canadensis	H	8	N	FAC
Equisetum sp	H	1%	N	—

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum sylvaticum	12	Y	FAC
2. Equisetum pratense	12	Y	FACW
3. Gymnocarpium dryopteris	15%	Y	FACU
4. veratrum viride	3%	N	FAC
5. Aconitum delphinifolium	1%	N	FAC
6. Trientalis europaea	3%	N	FACU
7. Rubus pedatus	6%	N	FAC
8. Dryopteris expansa	3%	N	FACU
9. Geranium erianthum	5%	N	FACU
10. Stellaria longipes	1%	N	FAC

Total Cover: 74

50% of total cover: 42 20% of total cover: 16.8

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

5% % Cover of Wetland Bryophytes

5% Total Cover of Bryophytes

0% % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

10.23.15 WBSIN004 Y

SOIL Date 10.23.15 Feature ID WBSIN004 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

	Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
Oi	0-2								
E	2-3	10YR 6/3	100					Fine Sandy Loam	
Bhs	3-7	7.5YR 3/4						Fine Sandy Loam	
		7.5YR 5/6							
Bw	7-24	10YR 4/4	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes. —

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: All boundaries wavy. Dry sandy forest soil w/ E and Bhs horizons.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** NO
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes: Dry site. No signs of hydrology.

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: Jesse Brownlee 6.23.15 GPS Technician QA/QC check: 6/23/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INO04 Field Target: 15329 Date: 6/23/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☐ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☐ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/23/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6.23.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)_____ **Other** (explain) LNG Plant			**Field Target:** 15335	**Map #:** 865 **Map Date:** 6.5.15
Date: 6.23.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W85IN005
Investigators: Jessie Brownlee Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 40.2563		**Longitude:** -151° 18.8496		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 38	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Terrace / Bluff
Slope (%): 0-3	Local relief (concave, convex, none): flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: outside of mapping	Evidence of Wildlife Use: moose brows
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, 111B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature mixed forest over 50' tall with Pic Gla and Bet Neo. Few shrubs which have been browsed, healthy Forb community. Site Accessed from 60.668205 -151.31023 is All dry mixed mature forest with lots of downed trees.

Walked down to road following a slight depression/swale feature from FT 15335 and popped a hole in the lowest place and it was dry there by road as well.

Survey Type:

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	10%	Y	FAC
3.			
4.			

Total Cover: 25

50% of total cover: 12.5 20% of total cover: 5

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	2%		FACU
2. Viburnum edule	8%	Y	FACU
3. Linnaea borealis	10%	Y	FACU
4. Spirea stevenii	7%	Y	FACU
5. Betula Neoalaskana	3%		FAC
6. Salix Pulchra	2%		FACU
7. Ribes triste	5%		FAC
8. Vaccinium vitis idaea	4%		FAC
9.			

Total Cover: 41

50% of total cover: 20.5 20% of total cover: 8.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: .14 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	10	X 2 =	20
FAC species	43	X 3 =	129
FACU species	120	X 4 =	480
UPL species	0	X 5 =	0
Column Totals:	173 (A)		629 (B)

PI = B/A = 3.63

Calamagrostis canadensis	H	7%	FAC
Stellaria longipes	H	1%	FAC
poa pratensis	H	T	FACU
grass sp	H	T	
trientalis europaea	H	4%	FACU
Rubus Pedatus	H	2%	FAC
Spinulum Annatinum	H	2%	FACU
grass sp droppy one sp	H	T	

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geranium erianthum	10%		FACU
2. Cornus canadensis	30%	Y	FACU
3. Gymnocarpium dryopteris	25%	Y	FACU
4. Rubus Arcticus	6%		FAC
5. Sanguisorba canadensis	10%		FACW
6. Chamerion Angostifolium	3%		FACU
7. Equisetum pratense	3%		FAC
8. Veratrum viride	7%		FAC
9. Equisetum sylvaticum	2%		FAC
10. Streptopus amplexifolius	2%		FACU

Total Cover: 107

50% of total cover: 53.5 20% of total cover: 21.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

35 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.23.15 W85IN005 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								Dry organics
A	3-4	10YR 3/2						Fine Sandy loam	
E	4-6	10YR 5/2	100					Sandy Loam	
Bs	6-11	7.5YR 4/4						Silt Loam	
Bw	11-24	10YR 4/4	100					Silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes. N

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Dry sandy soil with E & Bs horizons.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes:
Dry site. No signs of hydrology.

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: Jessie Brownlee 6·23·15

GPS Technician QA/QC check: 6/23/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85 1N005 Field Target: 15335 Date: 6/23/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] Anderson

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.23.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) LNG Plant			**Field Target:** 15320	**Map #:** 267 **Map Date:** 6.5.15
Date: 6.23.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN0006	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.8116	**Longitude:** -151° 20.6693			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 39	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): slight Hill above depression
Slope (%): ~5-10	Local relief (concave, convex, none): flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: U ; 1C2	Evidence of Wildlife Use: Moose tracks in mud @ pond; 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 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): Plot 111A2 / Polygon 1C2, 111A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Plot size narrowed to elongated to capture meadow mesic grass signature that is surrounded by a Bet Neo, Pic Gla, Pop Bal mature 60-100' tall trees. Location of FT 15320 was moved slightly down slope. Site is dry all the way to Pond at FT 15319. Hill side shows sign of Past disturbance. Site of plot placed in area with no obvious signs of Disturbance

Soil shows evidence of a fire and erosion from up slope. Charcoal and rocks present

Site Dry. No signs of Hydrology.

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.			

none in narrow and elongated plot. Shape of plot changed to capture guild and signature.

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (15 x 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa aciculoris	T		FACU
2. Populus balsamifera	3%	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 3

50% of total cover: 1.5 20% of total cover: .6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	15	X 2 =	30
FAC species	61	X 3 =	183
FACU species	41	X 4 =	164
UPL species	0	X 5 =	0
Column Totals:	117 (A)		377 (B)

PI = B/A = 3.22

rubus Arcticus	H	3%		FAC
rubus pedatus	H	3%		FAC
viola sp	H	T		—
Fern sp	H	5%		—
Alopecurus pratensis	H	15%	Y	FACW
grass 2	H	2%		—
Calamagrostis canadensis	H	15%		FAC
Streptopus amplexifolius	H	2%		FACU
Cornus canadensis	H	6%		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (15 x 26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Poa pratense	10	Y	FACU
2. Equisetum arvens	15	Y	FAC
3. Equisetum pratense	15	Y	FAC
4. Chamerion angustifolium	5%		FACU
5. Geranium erianthum	5%		FACU
6. Trientalis europaea	4%		FACU
7. Equistem sylvaticum	10	Y	FAC
8. Gymnocarpium dryopteris	1%		FACU
9. Moehringia lateriflora	2%		FACU
10. galium boreale	3%		FACU

Total Cover: 121

50% of total cover: 60.5 20% of total cover: 24.2

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

50 % Cover of Wetland Bryophytes

50 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

Shrub Layer added to Herb Layer For Herb stratum total of 122.5. 50% of that is 61.25. 20% of total is 24.5

WETLAND DETERMINATION DATA FORM

SOIL	Date 6/23/15	Feature ID W35	N006	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
A	0-2	10YR 3/3	100					Loam	small inclusions of E in spots
Bw1	2-4	10YR 4/4	100					Silt loam	
Ab	4-8	10YR 3/2	100					Gravely Sandy loam	charcoal & rocks
Bw2	8-24	10YR 4/2	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes. N

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Pits sides are highly variable on all sides. buried A and charcoal ring pit in ~~the~~ tilted band

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownlee 6.23.15 GPS Technician QA/QC check: 6/23/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WRSIWD06 Field Target: 15320 Date: 6/23/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/23/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6.23.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

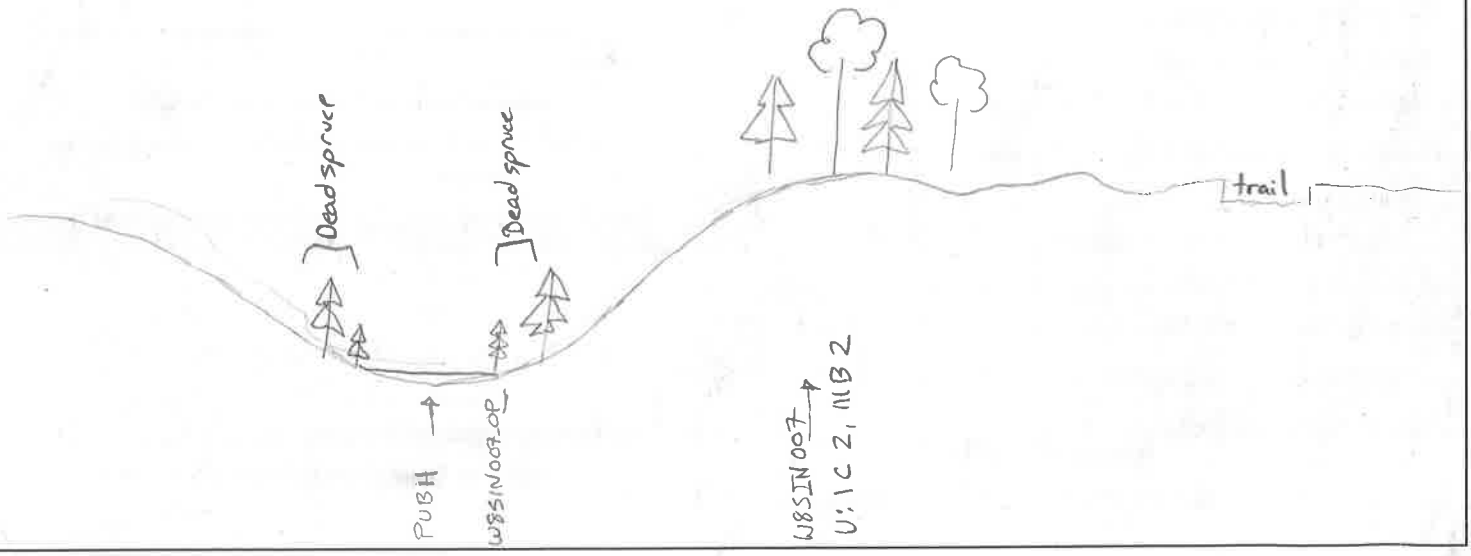
SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) LNG Plant			**Field Target:** 153/8	**Map #:** 263 **Map Date:** 6.5.15
Date: 6.24.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W8SIN007
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 40.6908	**Longitude:** -151° 20.8345			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 41	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Flat/Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification:	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): 1C2, 111B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature mixed forest of Pic Gla + Bet Neo



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. Betula Neoalaskana	20%	Y	FAC
3.			
4.			

Total Cover: 40

50% of total cover: 20 20% of total cover: 8

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. viburnum edule	7%	Y	FACU
2. Spiraea stevenii	3%		FACU
3. Linnaea borealis	4%	Y	FACU
4. Salix sp	2%		—
5. Ribes triste	3%		FAC
6. Rosa acicularis	2%		FACU
7. Vaccinium vitis-idaea	1%		FAC
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: 9 (B)

% Dominant Species that are OBL, FACW, or FAC: .22 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	61	X 3 =	183
FACU species	106	X 4 =	424
UPL species	0	X 5 =	0
Column Totals:	167 (A)		607 (B)

PI = B/A = 3.63

Poa pratensis	1%	H		FACU
Rubus pedatus	2%	H		FAC
Pyrola Grandiflora	2%	H		FAC
Cornus canadensis	3%	H		FACU
Calamagrostis lapponica	20	H	Y	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	3%		FACU
2. Spinulum annotinum	7½%	Y	FACU
3. geranium erianthum	10%	Y	FACU
4. Trientalis europaea	30	Y	FACU
5. Rubus Arcticus	7%		FAC
6. Streptopus amplexifolium	3%		FACU
7. Veratrum viride	2%		FAC
8. Equisetum pratense	2%		FAC
9. Gymnocarpium dryopteris	10%	Y	FACU
10. Equisetum Arvense	2%		FAC

Total Cover: 107

50% of total cover: 53.5 20% of total cover: 21.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

20 % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.24.15 W8SIN007 Y

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

	Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Notes
Oi	0-3								Dry organics
AE	3-4.5	10YR 3/2	80					Fine Sandy Loam	slight E sporatically throughout
Bhs	4.5-6.	7.5YR 2.5/3	70					Silt Loam	↳ 10YR 4/2 ~ 20%
	6-13	7.5YR 4/4	30						
Bw1	6-13	10YR 4/6	100					Silt Loam	
Bw2	13-24	10YR 4/4	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): –

Hydric Soil Present (Y/N): N

Notes: Dry soil. slight E Bhs properties throughout.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: –	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): –	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): –	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): –	**EC:** –

Notes: No signs of hydrology

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: Jessie Brownlee 6.24.15

GPS Technician QA/QC check: [signature] 6/24/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: N85IN007 Field Target: 15318 Date: 6/24/15

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?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/27/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.27.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) LNG Plant			**Field Target:** 15321	**Map #:** 269 **Map Date:** 6.5.15
Date: 6.24.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** WESTN008
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.6431		**Longitude:** -151° 20.6541		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 41	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Flat/Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U:1C2	Evidence of Wildlife Use: No
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 NO	**Is the Sampled Area within a Wetland?** Yes____ No X
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1 C 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Location of original FT 15321 was very close to a GPG cleared Line & other disturbance. plot moved to capture a more representative signature.

Dry Picea, Bet Neo Mature forest with Forb understory & thick feather moss, Area has been logged long ago, skid tracks and moved earth are obvious in spots,

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 15D')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	30	Y	FACU
2. Betula Neoalaskana	15	Y	FAC U
3.			
4.			

Total Cover: 45

50% of total cover: 22.5 20% of total cover: 9

Sapling/Shrub Stratum (2D')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Spiraea stevenii	7%		FACU
2. Linnaea borealis	30%	Y	FACU
3. Vaccinium vitis-idaea	3%		FAC
4. Betula Neoalaskana	1%		FAC
5. Vaccinium uliginosum	T		FAC
6. Empetrum nigrum	T		FAC
7.			
8.			
9.			

Total Cover: 41

50% of total cover: 20.5 20% of total cover: 8.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	5	X 2 =	10
FAC species	6	X 3 =	18
FACU species	165	X 4 =	660
UPL species	0	X 5 =	0
Column Totals:	176	(A)	688 (B)

PI = B/A = 3.9

trientalis europaea	H	2%		FACU
Sanguisorba canadensis	H	5%		FACW
Rubus arcticus	H	2%		FAC
Equisetum pratense	H	T		FAC
Carex sp	H	3%		—
Neottia cordata	H	T		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (2.6')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geranium erianthum	10%		FACU
2. Cornus canadensis	35%	Y	FACU
3. Chamerion angustifolium	2%		FACU
4. Gymnocarpium dryopteris	25%	Y	FACU
5. Achillea millefolium	+		FACU
6. Pyrola asarifolia	2%		FACU
7. Equisetum Arvense	T		FAC
8. Streptopus amplexifolius	+		FACU
9. Moehringia lateriflora	T		FACU
10. Lupinus nootkatensis	7%		FACU

Total Cover: 93

50% of total cover: 46.5 20% of total cover: 18.6

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.24.15 W851N008 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		100					Very fine Sandy loam	Dry organics
AE	2-4	10YR 3/2	90					Silt loam	
		10YR 4/2	10						
Bhs	4-6	7.5YR 3/3	80					Very fine Sandy loam	Pockets of E in horizon
		7.5YR 3/4	15						
		10YR 4/2	5						
Bw	6-24	10YR 3/4	100					Very fine Sandy Loam	Pockets of A material

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): N

Hydric Soil Present (Y/N): N

Notes: Dry E Bhs Soil. Evidence of tree throw throughout given uneven horizons & pockets of different material throughout
Colors taken Dry.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): –	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): –	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): –	EC: –

Notes: No signs of Hydrology

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: Jessie Brownlee 6.24.15 GPS Technician QA/QC check: [signature] 6/24/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INO18 Field Target: 15321 Date: 10/24/15

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?

2. Vegetation

- ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☑ Vegetation names are entered legibly for all strata present?
- ☑ Cover calculations are complete and correct?
- ☑ All dominant species have been determined and recorded per strata?
- ☑ Indicator status is correct for each species?
- ☑ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☑ Soil profile is complete?
- ☑ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☑ Appropriate hydrology indicators are marked?
- ☑ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☑ Each logbook page is initialed and dated?

7. Maps

- ☐ Wetland boundaries have been corrected if necessary?
- ☑ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/24/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.27.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) LNG Plant			**Field Target:** 15327	**Map #:** 270 **Map Date:** 6.5.15
Date: 6.24.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN009	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60°39.6043		**Longitude:** 151°21.7012		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 41	**Picture No.:** P 1-4 N; SE		

SITE PARAMETERS			
Subregion: South central		Landform (hillslope, terrace, hummocks, etc.): small hill	
Slope (%): 5-8		Local relief (concave, convex, none): slightly convex	
Pre-mapped Alaska LNG/NWI classification: U; 1C3, 11C2		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_____, 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, 111A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site is dry mixed woodland of Pic Gla & Bet Neo with dense grass cover. Site has been disturbed with skid tracks & uneven ground & cut tree stumps.

WETLAND DETERMINATION DATA FORM

<30

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
~~Picea Glauca~~	~~13%~~	~~Y~~	~~FACU~~
1. Betula Neoalaskana	17%	Y	FAC
2. Picea Glauca	13%	Y	FACU
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Rosa acicularis	3%		FACU
2. Spiraea stevenii	2%		FACU
3. Vaccinium vitis-idaea	1%		FAC
4. Linnaea borealis	10%	Y	FACU
5. Viburnum edule	5%	Y	FACU
6. Bet Neo	T		FAC
7. Ribes sp.	T		—
8.			
9.			

Total Cover: 21

50% of total cover: 10.5 20% of total cover: 4.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	47	X 3 =	141
FACU species	71	X 4 =	284
UPL species	0	X 5 =	0
Column Totals:	108	(A)	425 (B)

PI = B/A = 3.93

VEGETATION (use scientific names of plants)

Herb Stratum (2')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Gymnocarpium dryopteris	20%	Y	FACU
2. Cornus canadensis	10		FACU
3. Equisetum sylvaticum	3%		FAC
4. Rubus pedatus	1%		FAC
5. Geranium erianthum	4%		FACU
6. Rubus Arcticus	10%		FAC
7. Moehringia lateriflora	1%		FACU
8. Achillea millefolium	2%		FACU
9. Spinulum Annotinum	1%		FACU
10. Calamagrostis lapponica	15%	Y	FAC

Total Cover: 107

50% of total cover: 33.5 20% of total cover: 13.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0% Bare Ground

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):

WETLAND DETERMINATION DATA FORM

6.24.15 W8S1N009 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 0-2.5								Dry organics
A 2.5-4	10YR 3/2	100					Loam	
E Bhs 4-9	10YR 4/1	20					Silt Loam	
	7.5YR 2.5/3	40						
	7.5YR 4/6	40						
Bw1 9-24	7.5YR 4/4	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): —

Hydric Soil Present (Y/N): N

Notes: All colors taken dry. Typical E/Bhs forest soil

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) 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): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes: No signs of Hydrology.

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: Jessie Brownlee 6.24.15

GPS Technician QA/QC check: [signature] 6/24/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN009 Field Target: 15327 Date: 6/24/15

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?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/24/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6.27.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

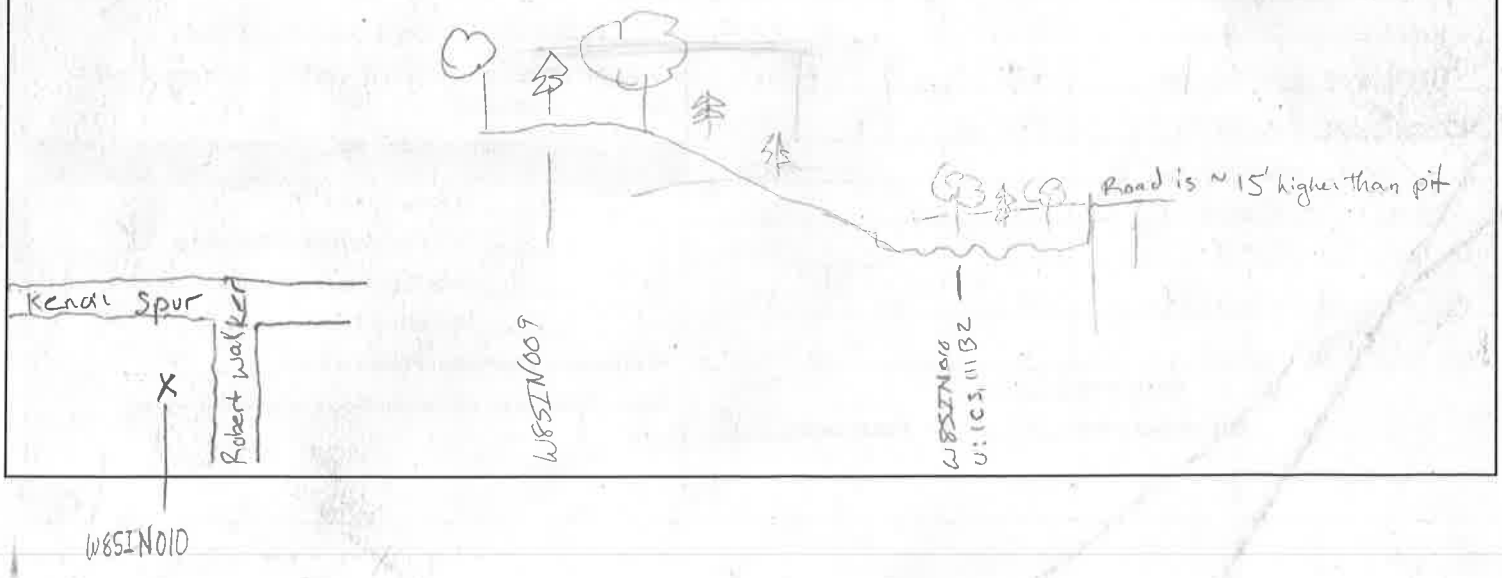
SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) LNG Plant			**Field Target:** 15324	**Map #:** 270 **Map Date:** 6.5.15
Date: 6.24.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W85IN010
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39.6547		**Longitude:** -151° 21.8299		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:**	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): concave
Pre-mapped Alaska LNG/NWI classification: I C 3, II C 2	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_____, 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:** I C 3, III B 2
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): U

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site is at junction of 2 Roads (Kenai spur & Robert Walker). Roads are much higher than the plot. Plot & Polygon are a Mixed woodland with diverse and dense Forb cover. Pit was dug in lowest spot on landscape and NO STILL NO soil indicators were met.



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	FACU
2. Betula Neoalaskea	8%	Y	FAC
3.			
4.			

Total Cover: 22

50% of total cover: 11 20% of total cover: 4.4

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 0

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 71% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	18	X 2 =	36
FAC species	60	X 3 =	180
FACU species	99	X 4 =	396
UPL species	0	X 5 =	0
Column Totals:	177	(A)	612 (B)

PI = B/A = 3.45

Geum macrophyllum	H	3%		FAC
Sanguisorba canadensis	H	3%		FACU
Viola langsdorfii	H	15%	Y	FACW
Stellaria longipes	H	1%		FAC
Streptopus amplexifolius	H	1%		FACU
Equisetum Arvense	H	15%	Y	FAC
Solidago SP	H	4%		—
poa pratense	H	3%		FACU
~~Hedysarum Alpinum~~	H	15%		~~FAC~~
Grass SP	H	T		—

VEGETATION (use scientific names of plants)

Herb Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	3%		FACU
2. Rubus Arcticus	3%		FAC
3. Equisetum sylvaticum	15%	Y	FAC
4. Polemonium acutiflorum	15%	Y	FAC
5. Heracleum maximum	60%	Y	FACU
6. Fritillaria camschatcensis	1%		FAC
7. Trientalis europaea	2%		FACU
8. Geolium Boreale	5%		FACU
9. Mochringia lateriflora	4%		FACU
10. Achillia millifolium	7%		FACU

Total Cover: 159

50% of total cover: 79.5 20% of total cover: 31.8

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0. % Cover of Wetland Bryophytes

60 Total Cover of Bryophytes

60 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.24.15 W8SIN010 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								Dry organics
A 2-4	10YR 3/2						Silt Loam	
Bw1 4-7	10YR 6/4						Silt Loam	
Bw2 7-10	7.5YR 5/8	70	7.5YR 4/6	30	C	M & RC	Silt Loam	
Bw3 10-24	10YR 6/2	70	7.5YR 4/6	30	C	M & RC	Silt Loam	Strong platey structure

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Colors taken dry. Color is not due to Depleted Matrix but is Parent Material related. Platey feature & High % of concentrations are likely related to seasonal Frost.

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:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes: Large hummocks around. Pit dug in between & at Low Spot on Landscape (hummocks) Weak hydrology indicators

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: Jessie Brownlee 6-24-15

GPS Technician QA/QC check: [signature] 6/24/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85 1IN010 Field Target: 15324 Date: 6/24/15

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?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/24/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Bowdlee — X [signature] 6·27·15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)____ **Other** (explain) LNG Plant			**Field Target:** 15328	**Map #:** 272 **Map Date:** 6.5.15
Date: 6.24.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85INON11	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 39. 3743	**Longitude:** 151° 20. 9380			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 42	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Flat / Terrace
Slope (%): 0-3	Local relief (concave, convex, none): undulating
Pre-mapped Alaska LNG/NWI classification: U:1C3, 11C2	Evidence of Wildlife Use: 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, 111B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Site has been disturbed in distant past with trails put in, trees cut, ground moved.
Plot placed in a more natural setting.
Mature 50' tall Picea Gla + Bet Neo + Pop Bal with good grass + forb cover.
Dry site. Typical Dry E Bs Soil with no signs of hydrology

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	2%		FAC
2. Picea Glauca	10%	Y	FACU
3. Populus balsamifera	1%		FAC U
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. viburnum edule	3%		FACU
2. Linnaea Borealis	10%	Y	FACU
3. Rosa acicularis	2%		FACU
4. Spiraea stevenii	3%		FACU
5. Salix barclayi	3%		FAC
6. Betula neoalaskana	1%		FAC
7. Vaccinium vitis ideae	20%	Y	FAC
8.			
9.			

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: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	40	X 3 =	120
FACU species	78	X 4 =	312
UPL species	0	X 5 =	0
Column Totals:	118	(A)	432 (B)

PI = B/A = 3.66

Poa pratensis	T	H		FACU
Calamagrostis lapponica	10%	H	Y	FAC
Sanguisorba canadensis	3%	H		FACU
Chamerion angustifolium	5%	H		FACU
Equisetum sp	2%	H		—
Vaccinium vitis ideae				

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Geranium erianthum	3%		FACU
2. Achillea Millifolium	2%		FACU
3. Spinulum annotinum	10	Y	FACU
4. Cornus canadensis	20%	Y	FACU
5. Rubus Articus	3%		FAC
6. Gymnocarpium dryopteris	3%		FACU
7. Streptopus Amplexifolius	1%		FACU
8. Equisetum sylvaticum	1%		FAC
9. Pyrola aserifolia	1%		FACU
10. Trientalis europaea	1%		FACU

Total Cover: 65

50% of total cover: 32.5 20% of total cover: 13

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.24.15 WSSINO11 Y

SOIL Date 6.24.15 Feature ID WSSINO11 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
O: 0-2								Dry organics
A 2-4	10YR 3/1	100					Loam	
E 4-5	10YR 4/2	100					Silt Loam	
Bs 5-8	7.5YR 3/4	100					Silt Loam	
Bw1 8-24	7.5YR 4/4	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Colors taken Dry.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownlee 6.24.15 GPS Technician QA/QC check: [signature] 6/24/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W851N011 Field Target: 15328 Date: 6/24/15

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?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☐ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☐ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☑ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/24/15

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.27.15

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 15002	**Map #:** 258 **Map Date:** 6.5.15
Date: 6.25.15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W85INO12	
Investigators: Jessie Brownlee, Jennifer Anderson			**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 796.2	
Latitude: 60° 44.2012	**Longitude:** -151° 18.2847		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 43	**Picture No.:** 1 thru 4 SE; NE	

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Hill top
Slope (%): 0-3	Local relief (concave, convex, none): convex
Pre-mapped Alaska LNG/NWI classification: U: IIB2	Evidence of Wildlife Use: NO
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): IB3, IIB1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Location of FT 15002 is a disturbed trail, bare dirt & rock. Surrounding veg is thick Devil's club, Alder, Cal Can. Thick veg in all direction. Trail systems throughout area to South East. Site choosen to capture 100% devils club & Cal Can in surrounding tall Pop Bal, Bet Neo, Alder IB3, IIB1

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	5	Y	FAC
2. Populus balsamifera	5%	Y	FACU
3. Picea Glauca	1%		FACU
4. ~~Alnus fruticosa~~ JA			FAC
Total Cover: 11			
50% of total cover: 5.5	20% of total cover: 2.2		

Sapling/Shrub Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Oplopanax horridus	65%	Y	FACU
2. Rubus idaeus	8%		FACU
3. Sanguisorba racemosa	3%		FACU
4. Alnus fruticosa (60' High)	25%	Y	FAC
5.			
6.			
7.			
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: 9 (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 52	X 3 =	156
FACU species 98	X 4 =	392
UPL species 0	X 5 =	0
Column Totals: 150 (A)		548 (B)

PI = B/A = 3.65

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Equisetum Arvense	2%		FAC
2. Chamerion angustifolium	2%		FACU
3. Calamagrostis canadensis	20%	Y	FAC
4. Trientalis europaea	10%		FACU
5. Dryopteris expansa	4%		FACU
6.			
7.			
8.			
9.			
10.			
Total Cover: 38			
50% of total cover: 19	20% of total cover: 7.6		

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

Ø % Cover of Wetland Bryophytes

10% Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.25.15 W8SIN012 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								Dry organics
AE 3-4	10YR 3/2						Silt Loam	Property was slightly
A 4-6	7.5YR 2.5/2						Silt Loam	
Bw 6-24	10YR 3/4						Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): —

Hydric Soil Present (Y/N): N

Notes: Dry soil

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes: No Hydrology

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: Jessie Brownlee 6-25-15 GPS Technician QA/QC check: 6/25/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INI012 Field Target: 15002 Date: 6/25/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] — **Signature / Date** 6/25/15

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] — **Signature / Date** 6.27.15

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain) LNG Plant			**Field Target:** 152169	**Map #:** 262 **Map Date:** 6.5.15
Date: 6.25.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W8SIN013
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** 803.9		
Latitude: 60° 40.8639		**Longitude:** 151° 21.3832		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 43	**Picture No.:** 1 thru 5		

SITE PARAMETERS			
Subregion: Southcentral		Landform (hillslope, terrace, hummocks, etc.): Flat/Terrace	
Slope (%): 0-3		Local relief (concave, convex, none): 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 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): 1C2, 111A2	

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Dry Forest of Bet Neo, Pic Gla, Pop Bal, ~70' tall with thick understory of grass & horsetail.

* Goodyera repens seen on site.

Dry forest soil and No sign of hydrology.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 10ft)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	10%	Y	FACU
2. Betula Neoalaskana	15%	Y	FAC
3. Populus balsamifera	3%		FACU
4.			

Total Cover: 28

50% of total cover: 14 20% of total cover: 5.6

Sapling/Shrub Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Linnaea borealis	15%	Y	FACU
2. Spiraea stevenii	3%		FACU
3. Ribes triste	1%		FAC
4. viburnum edule	5%		FACU
5. Betula Neoalaskana	2%		FAC
6. Sorbus sitchensis	2%		FACU
7. Picea glauca	10%	Y	FACU
8. 0			
9.			

Total Cover: 38

50% of total cover: 19 20% of total cover: 7.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 42% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	4	X 2 =	8
FAC species	76	X 3 =	228
FACU species	103	X 4 =	412
UPL species	0	X 5 =	0
Column Totals:	183 (A)		648 (B)

PI = B/A = 3.54

equisetum sylvaticum	2%	H		FAC
Rubus Arcticus	3%	H		FAC
Neottia cordata	1%	H		FACU
Chamerion angustifolium	1%	H		FACU
Calamagrostis canadensis	30%	H	Y	FAC
unknown forb	T	H		—
Streptopus amplexifolius	1%	H		FACU
pyrola aserifolia	1%	H		FACU
Moehringia lateriflora	1%	H		FACU
goodyera repens (Awesome)	T	H		FAC

VEGETATION (use scientific names of plants)

Herb Stratum ( )	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Cornus canadensis	6%		FACU
2. Gymnocarpium dryopteris	25%	Y	FACU
3. Equisetum Arvense	5%		FAC
4. Veratrum viride	3%		FAC
5. Geranium erianthum	2%		FACU
6. Trientalis europaea	2%		FACU
7. Sanguisorba canadensis	4%		FACW
8. Dryopteris expansa	5%		FACU
9. Rubus Pedatus	15%	Y	FAC
10. Spinulum Annotinum	10%		FACU

Total Cover: 117

50% of total cover: 58.5 20% of total cover: 23.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

35 Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.25.15 W8SIN013 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								Dry organics
A 2-3	10YR 3/2						Silt loam	
E 3-4	10YR 5/1	100					Silt loam	charcoal present
Bhs 4-6	7.5YR 2.5/3						Silt loam	
	5YR 4/4							
Bw 6-24	10YR 5/6	50					Silt loam	
	10YR 4/4	50						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Soil colors taken dry. Typical Forest soil w/ E and Bhs horizons.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes: —	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: N

Notes: No signs of hydrology.

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: Jessie Brownell 6.25.15 GPS Technician QA/QC check: [signature] 6/25/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INDI3 Field Target: 15269 Date: 6/25/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/25/15 — **Signature / Date**

X Jesse Brownlee — **Field Crew Chief (print)**

X [signature] 6.27.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) LNG Plant			**Field Target:** 15336	**Map #:** 276 **Map Date:** 6.5.15
Date: 6.25.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W8SIN014	
Investigators: Jessie Brownlee, Jenny Anderson				**Team No.:** 8S
State: Alaska	**Region:** Alaska	**Milepost:** NA		
Latitude: 60° 38.7437	**Longitude:** -151° 20.6308			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 44	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: Southcentral	Landform (hillslope, terrace, hummocks, etc.): Flat/terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: outside mapping boundary	Evidence of Wildlife Use: 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): III B2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Forb + grass land. Surrounding signature is 1C3 or 1C2 depending on location. Thick forb community with greater diversity in surrounding area than is represented in this plot.
Soil is Ashy pale with increased concentrations starting with 19"
No signs of hydrology
Some sign of tree harvest in surrounding lot.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Picea Glauca	2%	Y	FACU
2. Betula Neoalaskana	3%	Y	FAC
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. Ribes triste	3%	Y	FAC
2. Rubus idaeus	3%	Y	FACU
3. Betula Neoalastana	3%	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 9

50% of total cover: 4.5 20% of total cover: 1.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (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:	5	X 2 =	10
FAC species	34	X 3 =	102
FACU species	57	X 4 =	228
UPL species	0	X 5 =	0
Column Totals:	96	(A)	340 (B)

PI = B/A = 3.54

Polemonium acutiflorum	H	T	T	FAC
Geum macrophyllum	H	+	T	FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	45%	Y	FACU
2. Equisetum Arvense	15%		FAC
3. Trientalis europaea	2%		FACU
4. Moehringia lateriflora	2%		FACU
5. Achillia millefolium	1%		FACU
6. Sanguisorba canadensis	5%		FACW
7. Calamagrostis canadensis	10%		FAC
8. Carex sp			—
9. Galium boreale	2%		FACU
10. Geranium erianthum	T		FACU

Total Cover: 82

50% of total cover: 41 20% of total cover: 16.4

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

35 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.25.15 W8SINO14 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 0-4								Dry organics
A 4-8	10YR 2/2	100					Loam	Dense root f
Bw1 8-11	10YR 5/4	100					Silt Loam	
Bw2 11-24	2.5Y 7/3	70	5YR 4/6	15	C	RC	Silt Loam	Concentrations start @ 19" and
			7.5YR 4/6	15	C	M		continue @ depth.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: — Depth (inches): —

Hydric Soil Present (Y/N): N

Notes: Colors taken dry. Ash material. Color of Bw2 is parent material related. Concentrations and platey feature likely due to seasonal frost & Ash material.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —

Notes: Dry soil no signs of hydrology

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: Jessie Brownlee 6/25/15 GPS Technician QA/QC check: [signature] 6/25/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W851NN14 Field Target: 15336 Date: 6/25/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/25/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6.27.15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)_____ **Other** (explain) LNG Plant			**Field Target:** 15331	**Map #:** 273 **Map Date:** 6.5.15
Date: 6.25.15	**Project Name & No.:** Alaska LNG 60418403			**Feature Id:** W8SINO1S
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:**		
Latitude: 60° 39.3306		**Longitude:** -151° 20.1519		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 44	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South Central	Landform (hillslope, terrace, hummocks, etc.): Flat/Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U: 1C3, 11C2	Evidence of Wildlife Use: Moose scat
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): III A2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Area to the north has been scraped to the bare ground. Major heavy machinery are moving dirt. unsure what they are doing.

Plot is in a grass & forb meadow. The surrounding signature is open woodland. Plot dry. Parked at same location as W8SINO11. All of area from there to here is dry.

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%	Y	FACU
2. Betula Neoalaskana	4%	Y	FAC
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. Spiraea Stevenii	6%	Y	FACU
2. Betula Neoalaskana	3%	Y	FAC
3. Vaccinium vitis-idaea	T		FAC
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 9

50% of total cover: 4.5 20% of total cover: 1.8

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (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:	3	X 2 =	6
FAC species	44	X 3 =	132
FACU species	35	X 4 =	140
UPL species	0	X 5 =	0
Column Totals:	82 (A)		278 (B)

PI = B/A = 3.39

Equisetum arvense 1% FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	10%	Y	FACU
2. Sanguisorba canadensis	3%		FACW
3. Gymnocarpium dryopteris	7%		FACU
4. Maehringia lateriflora	2%		FACU
5. Rubus Arcticus	5%		FAC
6. Cornus canadensis	3%		FACU
7. Trientalis europia	2%		FACU
8. Calamagrostis canadensis	30%	Y	FAC
9. Geranium erianthum	2%		FACU
10. Equisetum sylvaticum	1%		FAC

Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

Hydrophytic Vegetation Indicators:

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

35 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6·25·15 W8SIN015 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 %	Type[1]	Loc[2]	Texture	Notes
Oi	0-3								Dry organics
A	3-4	Black						Loam	Lots of charcoal
E	4-7	10YR 5/2	100					Fine Sandy Loam	
Bhs	7-14	7.5YR 4/4	50					Fine Sandy Loam	
		7.5YR 3/3	50						
Bwl	14-24	10YR 4/4	100					silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): N

Notes: Soil colors taken dry. All boundaries extremely wavy.

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): –	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): –	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): –	EC: –

Notes: No Hydrology

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: Jessie Brownlee 6.25.15 GPS Technician QA/QC check: 6/25/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85 IN 015 Field Target: 15331 Date: 6/25/18

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/25/15 — **Signature / Date**

X Jesse Brownlee — **Field Crew Chief (print)**

X [signature] 6.27.15 — **Signature / Date**

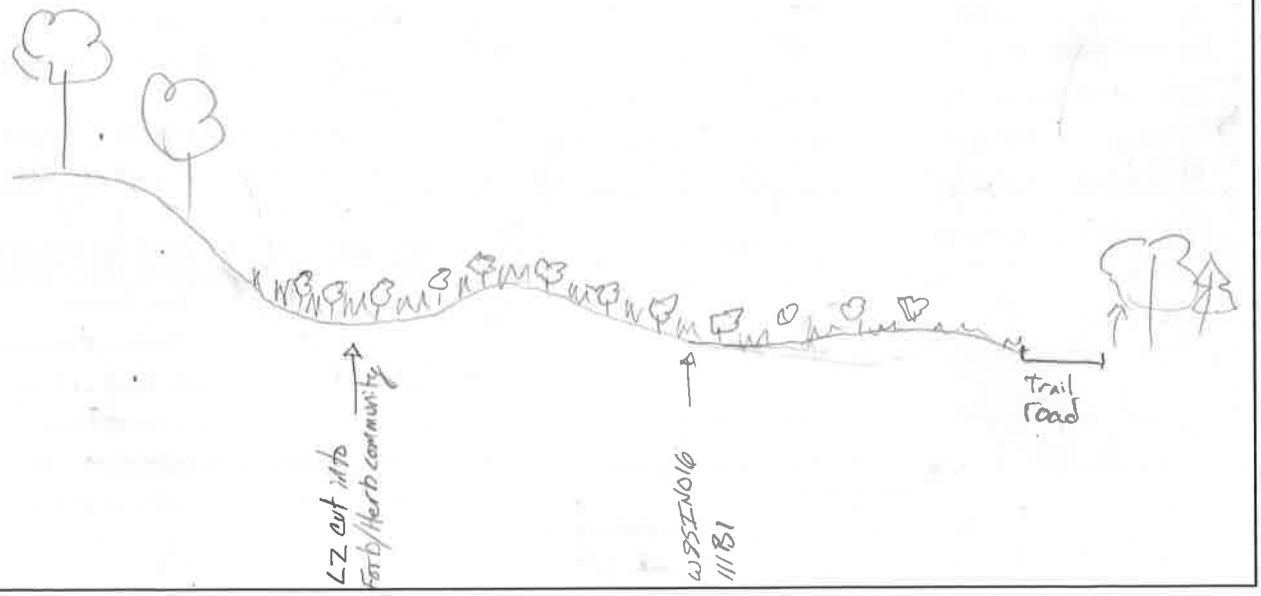
WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) OFF ROW			**Field Target:** 15270	**Map #:** 256 **Map Date:** 6.5.15
Date: 6.26.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN016	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 793.		
Latitude: 60° 45.4103	**Longitude:** -151° 15.4736			**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 45	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): Swale
Slope (%): 0-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: U, 1C2, 11B2	Evidence of Wildlife Use: NO
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): 111B1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. grass+ Dense forb cover in a swale feature. upslope to the east is a Dense 1B2, 11B2 w/ no spruce present (Mapping adjustment needed). Dry site, No Hydrology, Dry soil with dark A horizon,



WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30')	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. Rubus idaeus	3%	Y	FACU
2. Rosa acicularis	8%	Y	FACU
3. Betula neoalaskana	2%		FAC
4.			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	0	X 2 =	0
FAC species	7	X 3 =	21
FACU species	97	X 4 =	388
UPL species	0	X 5 =	0
Column Totals:	104	(A)	409 (B)

PI = B/A = 3.93

Athyrium cyclosorum	H	10%	FAC
trientalis europaea	H	1%	FACU
sanguisorba canadensis	H	1%	FACU
Aconitum delphiniifolium	H	T	FAC
mochringia lateriflora	H	T	FACU
unknown forb	H	2%	—

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Heracleum maximum	60%	Y	FACU
2. Gymnocarpium dryopteris	3%		FACU
3. Cornus canadensis	2%		FACU
4. Mertensia paniculata	5%		FACU
5. Equisetum arvense	5%		FAC
6. Calamagrostis canadensis	15%		FAC
7. Galium boreale	2%		FACU
8. Chamerion angustifolium	3%		FACU
9. Lupinus nootkatensis	3%		FACU
10. Geranium erianthum	8%		FACU

Total Cover: 106

50% of total cover: 53 20% of total cover: 21.2

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

N Morphological Adaptations[1] (Provide supporting data in Notes)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.26.15 W8SINO16 Y

SOIL Date 6.26.15 Feature ID W8SINO16 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	0-4								Dry organics
A	4-7	10YR 2/1	100					Loam	
E	7-8	10YR 3/2	100					Silt loam	Spotty & faint & discontinuous
Bh	8-12	7.5YR 2.5/2	100					Silt loam	
Bw	12-23	10YR 3/3	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) N	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: – Depth (inches): –

Hydric Soil Present (Y/N): N

Notes: Wavy boundaries & various depths

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) N	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) N
Saturation (A3) N	Sparsely Vegetated Concave Surface (B8) N	Oxidized Rhizospheres along Living Roots (C3) N	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) N	Microtopographic Relief (D4) N
Sediment Deposits (B2) N	Hydrogen Sulfide Odor (C1) N	Salt Deposits (C5) N	FAC-Neutral Test (D5) N
Drift Deposits (B3) N	Dry-Season Water Table (C2) N	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes): N		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): –	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): –	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): –	EC: –

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial Geologic Deposit Under Wetland (P): High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_____ Glacial Till/Not Permeable_____

Basin Topographic Gradient (M): Low Gradient (<2%)_____ High Gradient (≥2%)_____

Evidence of Seeps and Springs (P): No Seeps or Springs_____ Seeps Observed_____ Intermittent Spring_____ Perennial Spring_____

LANDSCAPE VARIABLES (M)

Wetland Juxtaposition: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_____ Unknown_____

Wetland Land Use: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_____

Watershed Land Use: 0-5% Rural_____ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownlee 6-26-15

GPS Technician QA/QC check: [signature] 6/26/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85INO16 Field Target: 15270 Date: 6/26/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — **Wetland Scientist (print)**

X [signature] 6/26/15 — **Signature / Date**

X Jessie Brownlee — **Field Crew Chief (print)**

X [signature] 6-27-15 — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15003	**Map #:** 257 **Map Date:** 6.26.15
Date: 6.26.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN017	
Investigators: Jessie Brownlee, Jennifer Anderson				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 793.9		
Latitude: 60° 45.2148		**Longitude:** -151° 14.756		**Datum:** WGS84
Logbook No.: 1	**Logbook Page No.:** 46	**Picture No.:** 1 thru 4		

SITE PARAMETERS	
Subregion: South central	Landform (hillslope, terrace, hummocks, etc.): depression
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U IC2, IIB2	Evidence of Wildlife Use: Moose droppings, 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 X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PSS1/EM1B
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): IIB2, IIIA2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

extend wet boundary to base of hill.
IIB2, IIIA2
This spot marks wet Dry boundary. Dry IB2, IIB2 ~ 30" to the south & land gains in elevation.
see map for additional guidance

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. Alnus sinuata	10%	Y	FAC
2. Spiraea stevenii	7%	Y	FACU
3. Salix pulchra	T		FACW
4. Betula neoalaskana	10%	Y	FAC
5.			
6.			
7.			
8.			
9.			

Total Cover: 27

50% of total cover: 13.5 20% of total cover: 5.4

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:	60	X 1 =	60
FACW species:	5	X 2 =	10
FAC species	54	X 3 =	162
FACU species	10	X 4 =	40
UPL species	0	X 5 =	0
Column Totals:	129	(A)	272 (B)

PI = B/A = 2.10

Carex magellanica H T OBL

Equisetum arvense H T FAC

VEGETATION (use scientific names of plants)

Herb Stratum (26')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	50%	Y	OBL
2. Equisetum fluviatile	10%		OBL
3. Calamagrostis Canadensis	30%	Y	FAC
4. Rubus Articus	3%		FAC
5. Carex sp	V.		—
6. Athyrium cyclosorum	V.		FAC
7. Rubus chamaemorus	3%		FACW
8. Viola Langsdorffii	2%		FACW
9. Cornus canadensis	3%		FACU
10. Pea sp	T		

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

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

50 % Cover of Wetland Bryophytes (Sphagnum)

70 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

6.26.15 W85INC17 Y

SOIL Date 6.26.15 Feature ID W85INC17 Soil Pit Required (Y/N) Y

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-22								Saturated organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) Y	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frost Depth (inches): 27"

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) 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) 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) Y	Notes:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in):	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): ~~N~~ Y	Depth (in): 14		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 7	EC: 73	pH 5.25

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__X__ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)__10__ Short shrub (0.5-2m)__17__ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) __03__ Moss-Lichen__70__ Floating_____ Submerged_____

Number of Wetland Types (M): __1__ **Evenness of Wetland Type Distribution (M):** Even ____Highly Uneven ____Moderately even __X__

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ 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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__X__ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.23

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: Jessie Brownlee 6.26.15 GPS Technician QA/QC check 6/26/15

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN017 Field Target: 15003 Date: 6/26/15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X Jennifer Anderson — X [signature] 6/26/18

Wetland Scientist (print) — **Signature / Date**

X Jessie Brownlee — X [signature] 6.27.18

Field Crew Chief (print) — **Signature / Date**

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) X Highway reconnaissance			**Field Target:** 15338	**Map #:** 276 **Map Date:** 9.4.15
Date: 9.8.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN018	
Investigators: Jessie Brownlee, Nick Simmons				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** End of Line/804		
Latitude: 60.643663		**Longitude:** 151.348421		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 7	**Picture No.:** P_veg_veg_Pit_Plug		

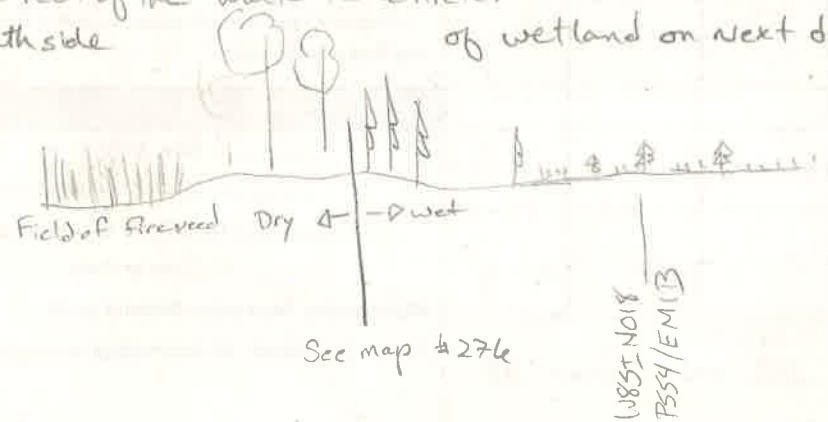
SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): slight depression
Slope (%): 0-3	Local relief (concave, convex, none): Slightly concave
Pre-mapped Alaska LNG/NWI classification: PSS1B	Evidence of Wildlife Use: Moose scat
Are climatic/hydrologic conditions on the site typical for this time of year? Yes_X_ No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes_X_ No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No_X_ (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No_X_ (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_X_ No_____	**Is the Sampled Area within a Wetland?** Yes_X_ No_____
Hydric Soil Present? Yes_X_ No_____	**Wetland Type:** PSS4/EM1B
Wetland Hydrology Present? Yes_X_ No_____	Alaska Vegetation Classification (Viereck): II A 3, III A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Stunted Pic Gla woodland w/ dense cover Aqu. and Car pad. - Thick sphagnum moss with over 16" of saturated organics. Surface water in small pockets but likely only when it rains as it has the past few days.

Site dries out fairly rapidly. On transect to Miller Loop road only the closest edge of spruce are wet while the taller & more set back deciduous trees are in upland as was the rest of the walk to vehicle. See Notebook # 3 page 10 For OP's done on the south side of wetland on next day.



WETLAND DETERMINATION DATA FORM

W8S1N018

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2. NONE			
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	20	Y	FACU
2. Rhododendron tomentosum	15	Y	FACW
3. Betula nana	10		FAC
4. Empetrum nigrum	15	Y	FAC
5. Andromeda polifolia	4		FACW
6. Vaccinium oxycoccus	2		OBL
7. Vaccinium uliginosum	T		FAC
8.			
9.			

Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	62	X 1 =	62
FACW species:	19	X 2 =	38
FAC species	25	X 3 =	75
FACU species	20	X 4 =	80
UPL species	0	X 5 =	
Column Totals:	126 (A)		255 (B)

PI = B/A = 2.02

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex aquatilis	30	Y	OBL
2. Pedicularis sp	T		—
3. Carex pauciflora	30	Y	OBL
4. Drosera rotundifolia	T		OBL
5.			
6.			
7.			
8.			
9.			
10.			

Total Cover: 60

50% of total cover: 30 20% of total cover: 20

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

30 % Cover of Wetland Bryophytes

30 Total Cover of Bryophytes

2 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9-8-15 L18SIN018 Y

SOIL	Date	Feature ID	Soil Pit Required (Y/N)

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-16+								Saturated organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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: No Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes: 16+" of Saturated organics

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) 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) —	Shallow Aquitard (D3) N
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:	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): Y	Depth (in): 5-6"	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 4	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	**EC:** 70 1.8 pH pit water

Notes: Calling Depressional HGM despite high EC Based on given Landscape position. TY 4.68 pH surface water

AQUATIC SITE ASSESSMENT DATA FORM

W85IN018

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved__X__ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)__20__ Tall shrub (2-6m)_____ Short shrub (0.5-2m)__25__ Dwarf shrub (<0.5m) __21__ Tall herb (≥1m) _____ Short herb (<1m) __60__ Moss-Lichen__90__ 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)_____ Moderate (broken irregular rings)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric__X__ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)__X__ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 4.68

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__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_____ 5-25% Urbanized__X__ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)__X__ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Bradley

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN018 Field Target: IS338 Date: 9.8.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. **Photos**

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X _____ X _____

Wetland Scientist (print) Signature / Date

X Jessie Brownlee X Jessie Brownlee 9.13.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

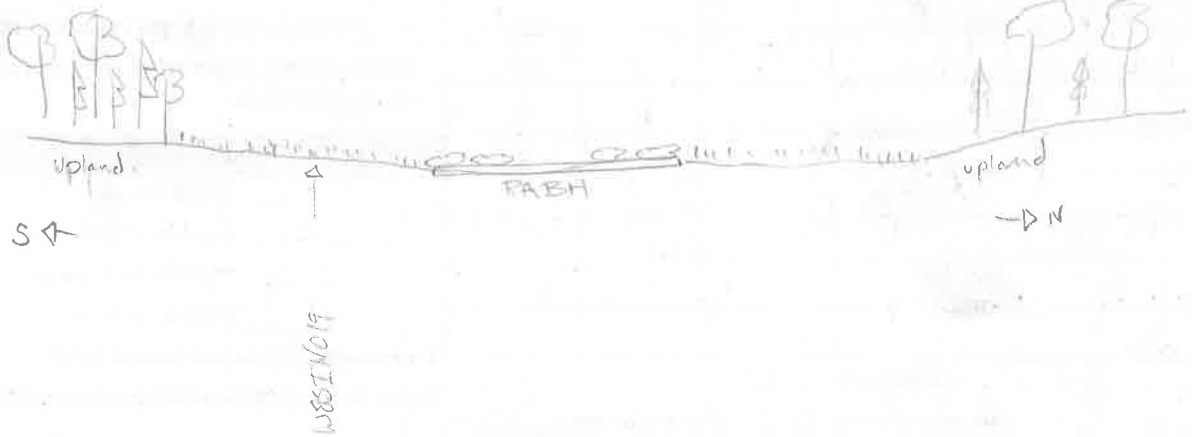
SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) X LNG Feed Plant			**Field Target:** 15322	**Map #:** 272 **Map Date:** 9.4.15
Date: 9.8.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W8SIN019	
Investigators: Jessie Brownlee Nick Simmons				**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** NA End of Line/804		
Latitude: 60.656029	**Longitude:** 151.354927		**Datum:** WGS84	
Logbook No.: 3	**Logbook Page No.:** 7	**Picture No.** pW8SIN019_veg_veg_Pit_Plug		

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Depression
Slope (%): 0-3	Local relief (concave, convex, none): flat to slightly concave
Pre-mapped Alaska LNG/NWI classification: PEMI/5SIB	Evidence of Wildlife Use: Moose droppings
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.)
Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No_____	**Is the Sampled Area within a Wetland?** Yes X No_____
Hydric Soil Present? Yes X No_____	**Wetland Type:** PEMIE
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Floating sphagnum moss mat on edge of aquatic pond. Thick, 100% cover of sphagnum with moderately dense carex community and otherwise low forb- shrub diversity. Mixed mature upland forest rings this depressional wetland.



WETLAND DETERMINATION DATA FORM

W85IN019

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. \			
2. - NONE -			
3. \			
4.			

Total Cover: _____

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Vaccinium oxycoccus	2	Y	OBL
2. Andromeda polifolia	3	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			

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: 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:	49	X 1 =	49
FACW species:	3	X 2 =	6
FAC species	0	X 3 =	0
FACU species	0	X 4 =	0
UPL species	0	X 5 =	0
Column Totals:	52 (A)		55 (B)

PI = B/A = 1.05

VEGETATION (use scientific names of plants)

Herb Stratum (24)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex pauciflora	20	Y	OBL
2. Eriophorum angustifolium	4		OBL
3. Menyanthes trifoliata	3		OBL
4. Drosera rotundifolia	T		OBL
5. Carex chordorrhiza	20	Y	OBL
6. Ped. cubris sp	T		—
7.			
8.			
9.			
10.			

Total Cover: 47

50% of total cover: 23.5 20% of total cover: 9.4

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

100 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9-8-15 W85IN019 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								Saturated organics
Oe 10-22								Saturated organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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: N Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) M (see Notes)	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) —	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) —	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: Surface water was only expressed upon compression of mat ergo Not calling it	
Algal Mat or Crust (B4) N	Other (Explain in Notes):		
Iron Deposits (B5) N			

Surface Water Present (Y/N): N	Depth (in): —	**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: 46 4.6 pH	

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES P= Plot, M= Matrix

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial 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:

AQUATIC SITE ASSESSMENT DATA FORM

W8SIN019 Y

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) __5__ Tall herb (≥1m) _____ Short herb (<1m) __47__ Moss-Lichen 100 Floating_____ Submerged_____

Number of Wetland Types (M): __2__ **Evenness of Wetland Type Distribution (M):** Even __X__ Highly Uneven _____ Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water__X__ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover__X__

Dead Woody Material (P): Low Abundance (0-25% of surface) __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)_____ Pockets of moss vs moss & carex

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__X__ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__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)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 4.6

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__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_____ 5-25% Urbanized__X__ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)__X__ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brouillet

GPS Technician QA/QC check:

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_____

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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 _____

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Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

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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: W8SIN019 Field Target: 15322 Date: 9.8.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.13.15
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline____ **Access Road** (explain)_____ **Other** (explain) LNG footprint		**Field Target:** 15240	**Map #:** 259 **Map Date:** 6.5.15
Date: 9.8.15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W85IN020	
Investigators: Jessie Brownlee, Nick Simmons			**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 800	
Latitude: 60.708210	**Longitude:** -151.373643		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 7	**Picture No.:** P_W85IN020_001_veg_002_veg_003_pit_corplug	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Flats/terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U	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_____ 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): I C 3, III B 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature mixed woodland of Pop Bal + Pic Gla about 30-40' tall. Dense diverse forb understory thick w/ Cal Can + Cha Ang. Dry fine sandy soils w/ slight ECBHS properties. No signs of hydrology.

WETLAND DETERMINATION DATA FORM

WBSIN020

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Populus balsamifera 40'	8	Y	FACU
2. Picea Glauca 30'	8	Y	FACU
3.			
4.			

Total Cover: 16

50% of total cover: 8 20% of total cover: 3.2

Sapling/Shrub Stratum (20')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula neoalaskana	5	Y	FACU
2. Ribes sp	1		—
3. Picea glauca	2	Y	FACU
4. Populus balsamifera	T		FACU
5.			
6.			
7.			
8.			
9.			

Total Cover: 8

50% of total cover: 4 20% of total cover: 1.6

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

% Dominant Species that are OBL, FACW, or FAC: 16% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	X 1 =	0
FACW species:	8	X 2 =	16
FAC species	50	X 3 =	150
FACU species	169	X 4 =	276
UPL species	0	X 5 =	0
Column Totals:	127	(A)	442 (B)

PI = B/A = 3.48

Dryopteris expansa	H	T		FACU
Mochringia lateriflora	H	2		FACU
Heracleum alpinum	H	T		FACU
Taraxacum sp	H	T		—
Rubus arcticus	H	5		FAC

VEGETATION (use scientific names of plants)

Herb Stratum (24')	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	30	Y	FACU
2. Calamagrostis canadensis	35	Y	FAC
3. Equisetum arvense	10		FAC
4. Gymnocarpium dryopteris	8		FACU
5. Pyrola asarifolia	3		FACU
6. Geranium erianthum	3		FACU
7. Veratrum viride	T		FAC
8. Sanguisorba Canadensis	8		FACW
9. Stellaria sp	T		—
10. Trientalis europaea	T		FACU

Total Cover: 104

50% of total cover: 52 20% of total cover: 20.8

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

0 % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9.8.15 W85IN020 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 %	Type[1]	Loc[2]	Texture	Notes
A	0-3	10YR 3/3	100					fine sandy loam	
Bw1	3-13	7.5YR 4/4	90					fine sandy loam	Slight Bhs small pockets of E material
		7.5YR 5/1	5						
		7.5YR 3/3	5						
Bw2	13-20	2.5Y 4/3	100					fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): —

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): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	**EC:** —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

W85IN020

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 _____

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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_____

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Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

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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_____

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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_____

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Size: Small (<10 acres)_____ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Brownell

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN020 Field Target: 15240 Date: 9-8-15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.13.2015
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)_____		**Field Target:** 15604	**Map #:** 254 **Map Date:** 9.4.15
Date: 9.08.15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W8SEN021	
Investigators: Jessie Brownlee, Nick Simmons			**Team No.:** W8S
State: Alaska	**Region:** Alaska	**Milepost:** 792.7	
Latitude: 60.767103	**Longitude:** 151.251373		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 8	**Picture No.:** P_001_veg/002_veg/003_pit/004_plug	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Depressions
Slope (%): 0-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: U / B3, 11 B1	Evidence of Wildlife Use: Moose droppings
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:** PEMIC
Wetland Hydrology Present? Yes X No_____	Alaska Vegetation Classification (Viereck): III A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mapped as U w/ R4SB running through but actually its a depressional wetland surrounded on 3 sides by a ridge seperating this wetland from the lakes to the NE. Site is dominated w/ Car Ut- all the way SE toward the PUBH.

Use Lidar to map or at least Google maps or earth to see the elevational differences and clear shape of the PEMIC

The surround veg community all around is 1B2, 11 B1

WETLAND DETERMINATION DATA FORM

W85 1N021

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2. – NONE –			
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.			
2.			
3.			
4. – NONE –			
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:	74 X 1 =	74
FACW species:	0 X 2 =	0
FAC species	0 X 3 =	0
FACU species	2 X 4 =	8
UPL species	0 X 5 =	0
Column Totals:	76 (A)	82 (B)

PI = B/A = 1.07

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex utriculata	60	Y	OBL
2. Comarum palustre	10		OBL
3. Moehringia lateriflora	2		FACU
4. Chamerion angustifolium	T		FACU
5. Menyanthes trifoliata	2		OBL
6. Calamagrostis canadensis	T		FAC
7. Carex chordorriza	2		OBL
8. grass sp	2		—
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.

8 % Bare Ground

15 % Cover of Wetland Bryophytes

15 Total Cover of Bryophytes

3 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9.8.15 WBSIN021 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 0-8								Saturated organics
Ob 8-9								Buried woody debris
A 9-18	10YR 2/1	100					Mucky silt loam	
C 18-20	10YR 4/3	100					Sand lense	

[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: N Depth (inches): _____

Hydric Soil Present (Y/N): Y

Notes: Soil is high in organics all the way to depths. A few signs of depositional events w/ OB + sand

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) N	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) N	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) Y	Oxidized Rhizospheres along Living Roots (C3) _____	Shallow Aquitard (D3) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) _____	Microtopographic Relief (D4) _____
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): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 2	EC: 816 5.01	Standing water

Notes: Pit is oversaturated w/ water oozing in from the surface. Small depressions filled w/ water. Sparsely vegetated muddy surfaces. Calling HGM depressional despite High EC given strong landscape position. Wetlands are ~~poss~~ likely connected subsurface to some degree resulting in higher EC reading

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:

AQUATIC SITE ASSESSMENT DATA FORM

W85IN021

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) __78__ Moss-Lichen__15__ 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%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover__X__ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic__X__ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet__X__ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated__X__ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__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)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.01

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: Jessie Brower

GPS Technician QA/QC check:

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: W8S1N012 Field Target: 15004 Date: 9.8.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.13.15
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION			
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____		**Field Target:** 15271	**Map #:** 254 **Map Date:** 9.4.15
Date: 9.8.15	**Project Name & No.:** Alaska LNG 60418403	**Feature Id:** W85IN022	
Investigators: Jessie Brownlee, Nick Simmons			**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 792.8	
Latitude: 60.775737	**Longitude:** 150.284945		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 8	**Picture No.:** P_001-veg/002-veg/003-pit/004-plug	

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): depression/swale
Slope (%): 0-3	Local relief (concave, convex, none): Concave
Pre-mapped Alaska LNG/NWI classification: U: 1B2, 1B1	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____, 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:** PEMIF
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): II A 3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Plot on edge of wetland/upland boundary. R45B starts between W85IN021 and here. Wetland PEMIF transitions into PUBH. Wetland pinches in middle as it transitions wetter from W85IN021

Grassy/Forb knoll to the S/E on upland side.

WETLAND DETERMINATION DATA FORM

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 30)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2. — NONE —			
3.			
4.			

Total Cover:_____

50% of total cover:_____ 20% of total cover:_____

Sapling/Shrub Stratum (20)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2.			
3.			
4. — NONE —			
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: 66	X 1 =	66
FACW species:	X 2 =	
FAC species	X 3 =	
FACU species	X 4 =	
UPL species	X 5 =	
Column Totals: 66 (A)		66 (B)

PI = B/A = 1.0

Veg plot modified to capture wet/dry line so veg to the South West is captured in survey and not on the higher elevation To the East

VEGETATION (use scientific names of plants)

Herb Stratum (20)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Carex Utriculata	40	Y	OBL
2. Menyanthes trifoliata	8		OBL
3. Equisetum fluviatile	1		OBL
4. Comarum palustre	8		OBL
5. Carex Chordorrhiza	10		OBL
6.			
7.			
8.			
9.			
10.			

Total Cover: 66

50% of total cover: 33 20% of total cover: 13.2

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.

5 % Bare Ground

10 % Cover of Wetland Bryophytes

10 Total Cover of Bryophytes

20 % Cover of Water

Hydrophytic Vegetation Present (Y/N): Y

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9.8.15 W8SIN022 Y

SOIL Date _____ Feature ID _____ Soil Pit Required (Y/N) _____

SOIL PROFILE DESCRIPTION: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Notes
0-5								Saturated organics / pocket of soil
5-10	2.5Y 5/1	100					Mucky fine sandy loam	
10-11	10YR 3/2	100					Sand	
11-20	10YR 3/2	100					mucky fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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) Positive XX

[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): —

Hydric Soil Present (Y/N): Y

Notes: Positive alpha alpha starting 5" and going to depth (in photo, xx on right side of plug)

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) N	Drainage Patterns (B10) Y	Geomorphic Position (D2) Y
Saturation (A3) Y	Sparsely Vegetated Concave Surface (B8) Y	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) 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): 15-19	**Wetland Hydrology Present (Y/N):** Y	
Water Table Present (Y/N): Y	Depth (in): 10		
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	EC: 61	5.0

Notes: Calling HGM Depressional instead of Slope based on significant topography and landscape positioning. We walked to what looks like an outlet toward the Cook Inlet but no obvious drainage was seen.

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:

AQUATIC SITE ASSESSMENT DATA FORM

W8SIN022

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) __60__ Moss-Lichen__10__ 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%)__X__ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover__X__ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) __X__ High (>25) _____

Presence of Islands (M): Absent (none) __X__ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open__X__ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) __X__ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)__X__ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional __X__ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy__X__ 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_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent__X__ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs__X__ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow__X__ 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** 5.0

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: Jamie Brown

GPS Technician QA/QC check:

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: W85IN022 Field Target: 15271 Date: 9.8.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- ☒ Site description, site parameters and summary of findings are complete?
- ☒ A detailed site sketch is included in logbook?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X _____ X _____

Wetland Scientist (print) Signature / Date

X Jessie Brownlee X Jessie Brownlee 9.13.15

Field Crew Chief (print) Signature / Date

WETLAND DETERMINATION DATA FORM

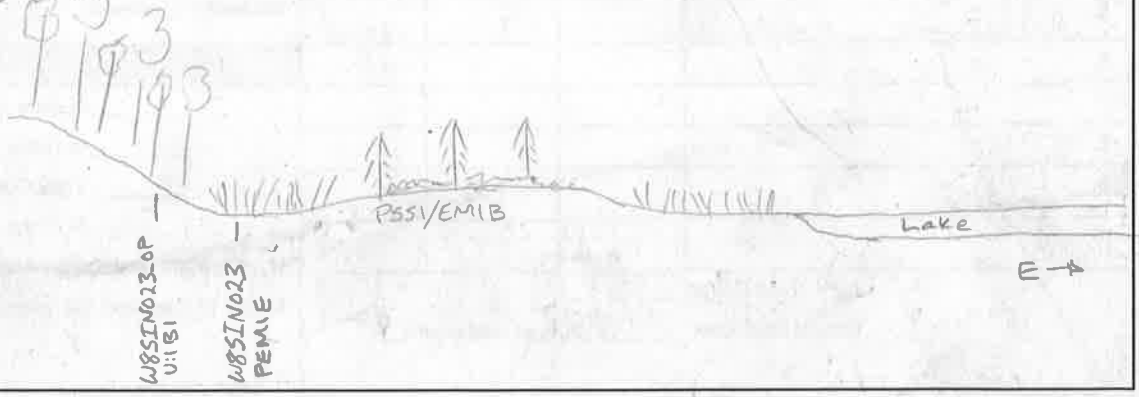
SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** FT5001	**Map #:** 260 **Map Date:** 6.5.15
Date: 9.9.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN023	
Investigators: Jessie Brownlee, Nick Simons				**Team No.:**
State: Alaska	**Region:** Alaska	**Milepost:** 802.2		
Latitude: 60.690743		**Longitude:** 151.381441		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 9	**Picture No.:** P_W85IN023_001_veg/-002-veg/003-pit/004-plug		

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): swale
Slope (%): 0-3	Local relief (concave, convex, none): Flat to slightly concave
Pre-mapped Alaska LNG/NWI classification:	Evidence of Wildlife Use: Wood frog, Moose droppings
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes)	Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.)
Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed?	No X (If yes, explain in Notes)
Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes X No____	**Is the Sampled Area within a Wetland?** Yes X No____
Hydric Soil Present? Yes X No____	**Wetland Type:** PEMIE
Wetland Hydrology Present? Yes X No____	Alaska Vegetation Classification (Viereck): III A3

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

FT5001 moved from orginal location due to land access issues.
W85IN023 captures PEMIE signature that rings PSS1/EMIB at end of Lake.
The PSS1/EMIB has ~20% dead Pic Gla snags and is dominated by Bet Nan, Vac Uli, Rho Tom And Pol, Vac Oxi + Carex sp. 100% sphagnum cover.
W85IN023 is swales water and acting as drainage for lake as it pinches in toward Kenai spur. As wetland moves toward spur it begins to dry out w/ only pockets of discontinous water and less vegetation. A R4SB should be drawn in connecting wetlands on either side of the road.
Use Lidar to map.



WETLAND DETERMINATION DATA FORM

W8S1N023

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1.			
2. -NONE-			
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 fuscenscens	T		FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover:_____

50% of total cover:_____ 20% of total cover:_____

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	30	X 1 =	30
FACW species:	35	X 2 =	70
FAC species	30	X 3 =	90
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:	95 (A)		190 (B)

PI = B/A = 2.0

Plot modified to capture PEMIE signature & Not the upland Deciduous forest up slope.

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Comarum palustre	15		OBL
2. Calamagrostis canadensis	30	Y	FAC
3. Equisetum fluviatile	5		OBL
4. Carex Aquatalis	10		OBL
5. Arctagrostis latifolia	35	Y	FACW
6. Chamerion angustifolia	T		FACU
7.			
8.			
9.			
10.			

Total Cover: 95

50% of total cover: 47.5 20% of total cover: 19

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):

WETLAND DETERMINATION DATA FORM

9.9.15 W85IN023 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								Saturated organics
Oe 3-6								Saturated organics
Oa 6-16								Saturated organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) Y	Alaska Gleyed (A13) N	Alaska Color Change (TA4)[4] N
Histic Epipedon (A2) N	Alaska Redox (A14) N	Alaska Alpine Swales (TA5) N
Black Histic (A3) N	Alaska Gleyed Pores (A15) N	Alaska Redox with 2.5Y Hue N
Hydrogen Sulfide (A4) N		Alaska Gleyed without 5Y Hue or Redder Underlying Layer N
Thick Dark Surface (A12) N		Other (Explain in Notes) N

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: N Depth (inches): —

Hydric Soil Present (Y/N): Y

Notes:

HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient)		SECONDARY INDICATORS (2 or more required)	
Surface Water (A1) Y	Surface Soil Cracks (B6) N	Water-stained Leaves (B9) N	Stunted or Stressed Plants (D1) N
High Water Table (A2) Y	Inundation Visible on Aerial Imagery (B7) Y	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) N
Water Marks (B1) N	Marl Deposits (B15) N	Presence of Reduced Iron (C4) —	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): 2	**Wetland Hydrology Present (Y/N):** Y
Water Table Present (Y/N): Y	Depth (in): 1	
Saturation Present (Y/N): (includes capillary fringe) Y	Depth (in): 0	**EC:** 87 pH 5.34

Notes:

WETLAND DETERMINATION DATA FORM

VEGETATION VARIABLES **P= Plot, M= Matrix**

Primary Vegetation Type (P): Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

Percent Cover (P): Tree (>5 dbh, >6m tall)_____ Sapling (<5 dbh, <6m tall)_____ Tall shrub (2-6m)_____ Short shrub (0.5-2m)_____ Dwarf shrub (<0.5m) _____ Tall herb (≥1m) _____ Short herb (<1m) _____ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): _____ **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _____

Vegetation Density/Dominance (P): Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_____

Interspersion of Cover & Open Water (P): 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

Plant Species Diversity (P): Low (< 5 plant species) _____ Medium (5-25 species) _____ High (>25) _____

Presence of Islands (M): Absent (none) _____ One or Few_____ Several to Many _____ N/A_____

Cover Distribution of Dominant Layer (P): No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_____

Dead Woody Material (P): Low Abundance (0-25% of surface) _____ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

Vegetative Interspersion (P): Low (large patches, concentric rings)_____ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope_____ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_____

Wetland Water Regime (P): Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

Evidence of Sedimentation (P): No Evidence Observed_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding_____ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_____

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** _____

Surficial 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:

AQUATIC SITE ASSESSMENT DATA FORM

9.9.15 W8SINO23 Y

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) __95__ Moss-Lichen_____ Floating_____ Submerged_____

Number of Wetland Types (M): 3 | **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _____Moderately even __A__

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)__X__ High (small groupings, diverse and interspersed)_____

HGM Class (P): Slope__X__ Flat_____ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

SOIL VARIABLES

Soil Factors (P): Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric__X__ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_____ Mineral: Clayey_____

HYDROLOGIC VARIABLES

Inlet/Outlet Class (P): No Inlet/Outlet_____ 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_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded __X__

Evidence of Sedimentation (P): No Evidence Observed__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

Microrelief of Wetland Surface (P): Absent_____ Poorly Developed (6in.)__X__ Well Developed (6-18in.)_____ Pronounced (>18in.)_____

Frequency of Overbank Flooding (P): No Overbank Flooding__X__ Return Interval 1-2 yrs__X__ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

Degree of Outlet Restriction (P): No Outflow_____ Restricted Outflow_____ Unrestricted Outflow__X__ Restricted @ culvert under Kenai spur

Water pH (P): No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_____ Acid (<5.5)__X__ **pH Reading** 5.34

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_____ 5-25% Urbanized__X__ 25-50% Urbanized_____ >50% Urbanized_____

Size: Small (<10 acres)__X__ Medium (10-100 acres)_____ Large (>100 acres)_____

Crew Chief QA/QC check: Jessie Bourke

GPS Technician QA/QC check:

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: W85IN023 Field Target: 15001 Date: 9.9.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

N/A ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.13.15
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline___ **Access Road** (explain)___ **Other** (explain) Highway Realignment			**Field Target:** 15332	**Map #:** 275 **Map Date:** 6.5.15
Date: 9.9.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN024	
Investigators: Jessie Brownlee, Nick Simmons				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 802/ Highway Realignment		
Latitude: 60.70452/		**Longitude:** -151.18310/		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 9	**Picture No.:** P001.jpg/002.jpg/003-pit/004-plug		

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Flats/terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U, 1 C 2	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_____, or Hydrology_____ Naturally Problematic?	No X (If yes, explain in Notes.)

SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes_____ No X	**Is the Sampled Area within a Wetland?** Yes_____ No X
Hydric Soil Present? Yes_____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes_____ No X	Alaska Vegetation Classification (Viereck): 1 C 2, 111 B 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Open mixed forest of mature Pic Gla and Bet Neo. Diverse forb understory.
Dry soils w/ slight E/Bs properties. No signs of hydrology
Walk in from road was fairly similar w/ little change in veg signature.

WETLAND DETERMINATION DATA FORM

W8SIN024

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. Betula Neoalaskana	10	Y	FACU
3.			
4.			

Total Cover: 30

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Spiraea stevenii	20	Y	FACU
2. Betula Neoalaskana	T		FACU
3. Salix bebbiana	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			

Total Cover: 25

50% of total cover: 12.5 20% of total cover: 5

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:	6	X 2 =	12
FAC species	36	X 3 =	108
FACU species	84	X 4 =	336
UPL species	0	X 5 =	0
Column Totals:	126 (A)		456 (B)

PI = B/A = 3.61

Rubus pubescens	H	T		FAC
Equisetum sylvaticum	H	T		FAC
Moehringia lateriflora	H	T		FACU
Achillea millefolium	H	3		FACU
Heracleum maximum	H	T		FACU
Dryopteris expansa	H	T		FACU

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Chamerion angustifolium	20	Y	FACU
2. Calamagrostis canadensis	20	Y	FAC
3. Trientalis europaea	T		FACU
4. Rubus arcticus	3		FAC
5. Geranium erianthum	2		FACU
6. Gymnocarpium dryopteris	2		FACU
7. Equisetum arvense	8		FAC
8. Linaea borealis	3		FACU
9. Sanguisorba canadensis	6		FACW
10. Cornus canadensis	4		FACU

Total Cover: 71

50% of total cover: 35.5 20% of total cover: 14.2

Hydrophytic Vegetation Indicators:

N 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): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9.9.15 W8SIN024 Y

SOIL Date 9.9.15 Feature ID W8SIN024 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 6-2								
A 2-5	7.5YR 3/2	100						good amount of charcoal in bottom of horizon
Bs 5-8	7.5YR 4/3	68	7.5YR 3/3	2	Con	PL	fine sandy loam	(topsoil?)
	10YR 5/3	10						
	7.5YR 3/3	20						
Bw 8-24	10YR 5/4	90	10YR 6/2	3	Dep	M	fine sandy loam	(topsoil?)
			7.5YR 5/4	7	Con	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): —

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): —	**Wetland Hydrology Present (Y/N):** N
Water Table Present (Y/N): N	Depth (in): —	
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	**EC:** —

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

WBS 1N024

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: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85/N024 Field Target: 15332 Date: 9.9.15

For all items not checked, please provide detailed explanation in the notes section of data form.

1. Site Description

- [x] Site description, site parameters and summary of findings are complete?
- [x] A detailed site sketch is included in logbook?

2. Vegetation

- [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- [x] Vegetation names are entered legibly for all strata present?
- [x] Cover calculations are complete and correct?
- [x] All dominant species have been determined and recorded per strata?
- [x] Indicator status is correct for each species?
- [x] Dominance Test and Prevalence Index have been completed?

3. Soil

- [x] Soil profile is complete?
- [x] Appropriate hydric soil indicators are marked?

4. Hydrology

- [x] Appropriate hydrology indicators are marked?
- [x] Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- [x] Each logbook page is initialed and dated?

7. Maps

- [x] Wetland boundaries have been corrected if necessary?
- [x] Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.9.15
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline____ **Access Road** (explain)____ **Other** (explain) Highway realignment			**Field Target:** 15334	**Map #:** 15334 **Map Date:** 9.11.15
Date: 9.9.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN025	
Investigators: Jessie Brownlee, Nick Simmons				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 802 / Highway realignment		
Latitude: 60°39'39.2926"	**Longitude:** 151°20'12.1856"			**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 10	**Picture No.:** P_col_veg/002_veg/003_pit/004_plug		

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Flats / Terrace
Slope (%): 0-3	Local relief (concave, convex, none): Flat
Pre-mapped Alaska LNG/NWI classification: U 1C2	Evidence of Wildlife Use: Moose droppings
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): 1C2, III A 2

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Point choosen based on access granted on this parcel. (Tablet was acting up)
Site is open mature mixed forest of Pic Glac and Bet Nea with diverse Forb & grass understory. Seismic line cut to the North.
Dry soil w/ slight E/Bhs properties.
No signs of hydrology

Tablet/GPS was acting up. We tried to survey the Highway realignment but were unable to navigate right to it based on poor satelite signals. The signature and upland status for this spot is the same for the Highway alignment 750' to the East.

WETLAND DETERMINATION DATA FORM

W8S1N025

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. Betula Neoalaskana	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. Ribes triste	2		FAC
2. Viburnum edule	5	Y	FACU
3. Picea Glauca	1		FACU
4. Vaccinium vitis-idaea	3		FAC
5. Spiraea stevenii	2		FACU
6. Linnaea borealis	4	Y	FACU
7. Rosa acicularis	3		FACU
8.			
9.			

Total Cover: 20

50% of total cover: 10 20% of total cover: 4

Dominance Test worksheet:

No. of Dominant Species that are OBL, FACW, or FAC: 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:	0	X 2 =	0
FAC species	67	X 3 =	201
FACU species	66	X 4 =	264
UPL species	0	X 5 =	0
Column Totals:	133 (A)		465 (B)

PI = B/A = 3.49

Trientalis Europaea	T	H	FACU
Dryopteris Expansa	T	H	FACU

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Calamagrostis canadensis	45	Y	FAC
2. cornus canadensis	5		FACU
3. Gymnocarpium dryopteris	8		FACU
4. Rubus pedatus	4		FAC
5. Spiraulum anastinum	3		FACU
6. Rubus arcticus	3		FAC
7. Chamerion angustifolium	T		FACU
8. Equisetum Arvense	10		FAC
9. Sangaisorba sp	3		—
10. Geranium erianthum	T		FACU

Total Cover: 81

50% of total cover: 40.5 20% of total cover: 16.2

Hydrophytic Vegetation Indicators:

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

— Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):

WETLAND DETERMINATION DATA FORM

9.9.15 WSSINO25 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								Dry organics
E 2-5	10YR 5/2	100					fine sandy loam	
Bhs 5-8	7.5YR 5/2 / 5YR 3/4	60 / 40					very fine sandy loam	
Bw 8-24	10YR 4/4	100					silt loam (ashy material)	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

HYDRIC SOIL INDICATORS		INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3]
Histosol or Histel (A1) 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): —

Hydric Soil Present (Y/N): N

Notes: Dry soil w/ spodic properties

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): —	**Wetland Hydrology Present (Y/N):** N	
Water Table Present (Y/N): N	Depth (in): —		
Saturation Present (Y/N): (includes capillary fringe) N	Depth (in): —	EC: —	

Notes:

AQUATIC SITE ASSESSMENT DATA FORM

WESINO25

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: Jessie Brownlee

GPS Technician QA/QC check:

Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W85IN025 Field Target: 15334 Date: 9.9.15

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?

2. Vegetation

- ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
- ☒ Vegetation names are entered legibly for all strata present?
- ☒ Cover calculations are complete and correct?
- ☒ All dominant species have been determined and recorded per strata?
- ☒ Indicator status is correct for each species?
- ☒ Dominance Test and Prevalence Index have been completed?

3. Soil

- ☒ Soil profile is complete?
- ☒ Appropriate hydric soil indicators are marked?

4. Hydrology

- ☒ Appropriate hydrology indicators are marked?
- ☒ Surface water, water table, and saturation depths are recorded if present?

5. Functions and Values

- ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. Field Logbook

- ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
- ☒ Each logbook page is initialed and dated?

7. Maps

- ☒ Wetland boundaries have been corrected if necessary?
- ☒ Maps are initialed and dated?

8. Photos

☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?

NA ☐ Two photos were taken for each Observation Point (vegetation/site overview)?

X	X
Wetland Scientist (print)	Signature / Date
X Jessie Brownlee	X Jessie Brownlee 9.13.13
Field Crew Chief (print)	Signature / Date

WETLAND DETERMINATION DATA FORM

SITE DESCRIPTION				
Survey Type: Centerline X **Access Road** (explain)____ **Other** (explain)____			**Field Target:** 15333	**Map #:** 261 **Map Date:** 6.25.15
Date: 9.9.15	**Project Name & No.:** Alaska LNG 60418403		**Feature Id:** W85IN026	
Investigators: Jessie Brownlee Nick Simmons				**Team No.:** W85
State: Alaska	**Region:** Alaska	**Milepost:** 803		
Latitude: 60.687822		**Longitude:** 151.346441		**Datum:** WGS84
Logbook No.: 3	**Logbook Page No.:** 11	**Picture No.:** P_001_veg/002_veg/003_pit/004_plug		

SITE PARAMETERS	
Subregion: Cook Inlet Basin	Landform (hillslope, terrace, hummocks, etc.): Hillside (small)
Slope (%): 3-5	Local relief (concave, convex, none): Flat to slightly convex
Pre-mapped Alaska LNG/NWI classification: U	Evidence of Wildlife Use: None
Are climatic/hydrologic conditions on the site typical for this time of year? Yes 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 X No____
Hydric Soil Present? Yes____ No X	**Wetland Type:** U
Wetland Hydrology Present? Yes____ No X	Alaska Vegetation Classification (Viereck): 1C1

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Closed mixed forest of even aged Pic Gla + Bet Neo. Densely packed in and spindly with majority of each being saplings. Site was likely cleared in the past explaining even age. clearings have been cut all around site w/ junked cars + other objects about. The PEMI to the west of W85IN026 in the depression on the dirt ROW between Power Poles to the North and South is much wetter than mapped, change to PEMIE, IIIA3, (See map)

(Landowners were uneasy with our being there despite having granted access. No additional data was gathered for this reason.)

WETLAND DETERMINATION DATA FORM

W85N026

VEGETATION (use scientific names of plants)

Tree Stratum (Plot sizes: 100)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Betula Neoalaskana	10	Y	FACU
2. Picea Glauca	10	Y	FACU
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. Betula Neoalaskana	25	Y	FACU
2. Picea Glauca	30	Y	FACU
3. Viburnum edule	T		—
4.			
5.			
6.			
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: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species:	0 X 1 =	0
FACW species:	0 X 2 =	0
FAC species	0 X 3 =	0
FACU species	113 X 4 =	452
UPL species	0 X 5 =	0
Column Totals:	113 (A)	452 (B)

PI = B/A = 4.0

VEGETATION (use scientific names of plants)

Herb Stratum (26)	Absolute % Cover	Dominant Species? (Y/N)	Indicator Status
1. Dryopteris expansa	8		FACU
2. Gymnocarpium dryopteris	30	Y	FACU
3. Rubus Pedatus	T		FAC
4. Orthilia Secunda	T		FACU
5. Streptopus amplexifolius	T		FACU
6.			
7.			
8.			
9.			
10.			

Total Cover: 38

50% of total cover: 19 20% of total cover: 7.6

Hydrophytic Vegetation Indicators:

0 Dominance Test is > 50%

0 Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

____ Total Cover of Bryophytes

Ø % Cover of Water

Hydrophytic Vegetation Present (Y/N): N

Notes: (If observed, list morphological adaptations below):